



# BOOK OF ABSTRACTS

2017 Summer Symposium



# BOOK OF ABSTRACTS

2017 COURI  
**SUMMER**  
**SYMPOSIUM**

**AUGUST 5**  
Undergraduate  
Learning Center  
10:00 am - 3:00 pm

Laura A. Diaz-Martinez, Editor  
Karina Canaba, Associate Editor  
Nallely Medina, Assistant Editor  
Andrea Maravilla, Editorial Assistant

## EDITOR'S NOTE

The Annual 2017 Spring Symposium highlighted the work of 142 undergraduate students, high school students and high school teachers who performed research, scholarly or creative activities at UTEP. These students conducted research under the mentoring of faculty from 20 UTEP departments representing the colleges of Education, Engineering, Health Sciences, Liberal Arts and Science, as well as the Schools of Pharmacy and Nursing, and the Department of Biological Sciences at El Paso Community College.

This year's presenters included 32 visiting undergraduate researchers from 14 national and international institutions who came to UTEP to conduct research during the summer. The institutions represented by these students are: Barry University, Beijing Normal University, California State University at Long Beach, El Paso Community College, New Mexico Institute of Mining and Technology, New Mexico State University, Shantou University, Southwestern Indian Polytechnic Institute, Trine University, Universidad del Turabo, University of California Santa Barbara, University of New Mexico, Universidad de Puerto Rico Mayaguez, and Western New Mexico University.

The enthusiasm of the students and high quality of their projects, together with the participation of faculty, postdocs, staff and graduate students who volunteered as judges, made the Symposium a success. Participation of students from diverse disciplines and institutions is evidence of UTEP's commitment to providing high quality opportunities in research, scholarly and creative activities.

Laura A. Diaz-Martinez, Ph.D.  
COURI Associate Director  
August 10, 2017

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## **MISSION**

Through collaborations with faculty mentors from all disciplines, COURI seeks to enrich the experience of UTEP students by facilitating their training in research, scholarly and creative activities, enhancing their academic success and professional development, and showcasing the results of their work.



**PROGRAM AGENDA****Saturday August 5, 2017**

10:00 am – 11:15 pm	<b>Poster Presentations: Session A</b>	UGLC Lobby
11:30 pm – 12:45 pm	<b>Poster Presentations: Session B</b>	UGLC Lobby
1:00 pm - 2:00 pm	<b>Eminent Guest Speaker:</b> Laura Motta-Mena, Ph.D. <i>“From Academia to the Commercial Sector: Lessons Learned from a Researcher- Entrepreneur”</i> Co-Founder and CEO Optologix, Inc.	UGLC Room 128
2:15 pm – 3:00 pm	<b>Awards Ceremony and Concluding Remarks</b>	UGLC Lobby

## EMINENT GUEST SPEAKER

### FROM ACADEMIA TO THE COMMERCIAL SECTOR: LESSONS LEARNED FROM A RESEARCHER-ENTREPRENEUR



**Laura Motta-Mena, Ph.D.**

CEO and co-founder of Optologix, Inc.

August 5, 2017

1:00 p.m. – 2:00 p.m.

Undergraduate Learning Center

Dr. Motta-Mena graduated from UTEP with a B.S. in Microbiology and went to obtain her Ph.D. at UT-Southwestern Medical Center. She then transitioned into the commercial sector as co-founder and CEO of Optologix, Inc.

#### Abstract

For many of us in the life sciences, undergraduate research gave us a head start in our research careers. In my presentation I will speak to my own experience as an undergraduate researcher, my decision to pursue a doctoral degree, and my move into the commercial sector by forming my own biotechnology startup company called Optologix. Optologix is based on a patented, genetic technology called LITE Switch, which I developed during my post-doctoral training. LITE Switch technology is a DNA-based research tool that allows medical researchers to use light, instead of drugs, to ‘turn on’ a gene inside of a cultured cell or model organism. It is the first commercial product of its kind on the market. By offering an eco-friendly solution to regulating gene expression, LITE Switch avoids the many toxic side effects of drug-triggered research tools. Because light can be localized to a specific spot on a cell or tissue, users can limit gene activation to certain cells and reverse this effect by simply turning off the light. LITE Switch is currently in use in more than 70 academic and industry laboratories worldwide, where researchers have found new and interesting applications for it.

#### Biography

Dr. Motta-Mena received her PhD degree in Biological Chemistry from UT Southwestern Medical Center (UTSWMC). She worked as a postdoctoral research fellow in Prof. Kevin Gardner’s group at UTSWMC and CUNY’s Advanced Science Research Center. Dr. Motta-Mena is currently co-founder and CEO of Optologix, Inc., provider of light-controlled genetic toolkits for biomedical research. She is also a graduate of the 2015 Bio & Health Tech Entrepreneurship Lab NYC and the 2016 Health Wildcatters Accelerator.

## **ACKNOWLEDGEMENTS**

### **Institutional Support**

Diana Natalicio, President  
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 Gary Edens, Vice-President for Student Affairs  
 John Wiebe, Associate Provost for Research

### **Faculty Mentors**

Special thanks to all faculty members who mentored students presenting at this symposium for their continuous dedication to the mission of undergraduate research, scholarly & creative activities.

### **Volunteer Judges**

Special thanks also to all faculty, staff and graduate students who volunteered to serve as judges during the Symposium. Your enthusiasm about undergraduate research, scholarly & creative activities motivates presenters and creates a campus-wide culture of undergraduate research

### **Funding Support for Student Research**

UTEP Campus Office of Undergraduate Research Initiatives (COURI)  
 UTEP Office of the Provost  
 UTEP On-Campus Student Employment Program  
 UTEP Border Biomedical Research Center (BBRC)  
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**2017 SPRING SYMPOSIUM TECHNICAL PROGRAM****Poster Session A**

- 1A** Music Production Audio CD  
*Maria F. Lozano\**, *Christopher Reyman*, *Angel S. Otero*, *Ernesto Hernandez*, *Jorge Baylon*, *Brian Carbajal*, *Christopher Reyman*<sup>^</sup>
- 3A** Frobenius matrix norm of product of symmetric toeplitz matrices  
*Jaime Avendano\**, *Carlos R. Cuellar*, *Hamide Dogan-Dunlap*<sup>^</sup>
- 5A** Towards automatic registration of histological data to canonical brain atlases  
*Jose G. Perez\**, *Arshad M. Khan*, *Olac Fuentes*<sup>^</sup>
- 7A** Predicting Epileptic Seizures using Deep Learning  
*Miguel A. Zamudio Arias\**, *Rodrigo A. Romero*, *Olac Fuentes*<sup>^</sup>
- 9A** Collision-avoidance system for unmanned aerial vehicles for aircraft damage inspection  
*Enrique Anguiano Chavez\**, *Pablo Rangel*, *Virgilio Gonzalez*<sup>^</sup>
- 11A** The Effects of Increased HVAC Usage  
*Derek Cranford\**, *Raed Al-Dourri*<sup>^</sup>
- 13A** Small-scale solar-powered point-of-use reverse osmosis desalination of brackish water  
*Miguel A. Fraga\**, *William S. Walker*<sup>^</sup>
- 15A** Robust optimization of dynamic systems  
*Joseph Gutierrez\**, *Martine Ceberio*<sup>^</sup>
- 17A** Social media application in health care supply chain management  
*Jiaqi He\**, *Amit J. Lopes*<sup>^</sup>
- 19A** Hyperspectral remote sensing image analysis using MATLAB  
*Justin T. Johnson\**, *Roberto Garcia\**, *Matthew Wood*, *Miguel Velez-Reyes*<sup>^</sup>
- 20A** Laboratory Validation of Wireless Sensors for Structural Health Monitoring  
*Daniela Mora\**, *Jeffrey Weidner*<sup>^</sup>
- 22A** Speech recognition and listening effort in bilinguals L1 and L2  
*Jordan A. Orozco\**, *Jamie Desjardins*<sup>^</sup>
- 24A** Power generation using oxy-fuel based magnetohydrodynamics  
*Paul A. Perez\**, *Luisa A. Cabrera*, *Norman D. Love*<sup>^</sup>
- 26A** The benefits and complications of using molten salt as a working fluid for a concentrated solar power tower system  
*Arturo Rodriguez\**, *Victor Madrid\**, *Abbas Ghassemi*, *Vinod Kumar*<sup>^</sup>
- 27A** Nanotechnology based solution to enhance solubility and antibacterial activity of silver-furosemide complex  
*Jade D. Vigil\**, *Rahul S. Kalhapure*, *Jwals Renukuntla*<sup>^</sup>
- 29A** Social media application in smartphone supply chain management  
*Jiamin Wu\**, *Amit J. Lopes*<sup>^</sup>
- 31A** Pyroelectric energy harvesting for high temperature applications  
*Fabian O. Zayas\**, *Luis A. Chavez*, *Yirong Lin*<sup>^</sup>
- 33A** Exposure to fluoxetine induces long-lasting changes in sensitivity to the rewarding properties of cocaine in female c57bl/6 mice  
*Miguel A. Arenivar\**, *Sergio Iniguez*<sup>^</sup>
- 35A** Genetic variation and population structure of a Chagas Disease vector *Triatoma rubida* along the Western Mexico-Texas Border  
*Olivia Calderon\**, *Camilo E. Khatchikian*<sup>^</sup>
- 37A** Development of mesoporous silica nanoparticles for anti-cancer platinum drug delivery  
*Miguel A. Carrillo-Alvarado\**, *Andrew Pardo*, *Armando Varela*, *Juan C. Noveron*<sup>^</sup>
- 39A** Antioxidants may be a protectant against Parkinson's disease as evidenced by the sticky dot test  
*Stephen Collins\**, *Lois Mendez*, *Gabriela Henriquez*, *Mahesh Narayan*, *Karen Corral*, *Edward Castañeda*<sup>^</sup>

- 41A** The effects of a high fat diet and physical activity on mitochondria, PLIN3, and PLIN5 protein contents in humans  
*Catalina De La Pena\**, *Cesar Meza*, *Cynthia K. Montenegro*, *Matthew L. Maldonado*, *Armando Varela*, *Jeffery Covington*, *Sudip Bajpeyi*<sup>^</sup>
- 43A** Genetic factors influencing inhibitory control in *Drosophila*  
*Julietta K. Diaz Erives\**, *Paul R. Sabandal*, *Kyung-An Han*<sup>^</sup>
- 45A** *Anas platyrhynchos diazi* (Mexican Duck) nest surveys  
*Esmeralda Duenez\**, *Phillip Lavretsky*<sup>^</sup>
- 47A** Effects of dietary fatty acid composition, in a high fat diet, on PLIN3 content  
*Dorian Fernandez\**, *Cesar Meza*, *Catalina De La Pena*, *Sudip Bajpeyi*<sup>^</sup>
- 49A** Replacing saturated with monounsaturated fatty acids, in a high fat diet, protects against impaired skeletal muscle glucose transport  
*Mario A. Garcia\**, *Catalina De La Pena*, *Cesar A. Meza*, *Cynthia Montenegro*, *Lannie O'Keefe*, *Shaan Naughton*, *Anna Simcocks*, *Deanne Hryciw*, *Michael Mathai*, *Armando Varela-Ramirez*, *Andrew McAinch*, *Sudip Bajpeyi*<sup>^</sup>
- 51A** Multidrug resistant bacteria isolated from the Rio Grande River  
*Jose Gomez\**, *Daniella Sahagun\**, *Jose Mendoza*, *Maria Alvarez*<sup>^</sup>
- 52A** The effects of eating a high fat diet on sensitivity to the behavioral effects of dopamine D1 receptor agonist SKF 82958 and methamphetamine  
*Adrian T. Gonzalez\**, *Jeremiah Ramos*, *Katherine M. Serafine*<sup>^</sup>
- 54A** Sex differences and the role of ovarian hormones in the expression of nicotine withdrawal in rats  
*Grace G. Hendricks\**, *Rodolfo J. Flores*, *Kevin Uribe*, *Bryan Cruz*, *Victor Correa*, *Luis M. Carcoba*, *Laura E. O'Dell*<sup>^</sup>
- 56A** The role of serotonin in movement inhibition  
*Samantha J. Hinojos\**, *Paul R. Sabandal*, *Kyung-An Han*<sup>^</sup>
- 58A** Evaluation of anti-tuberculosis and cytotoxic activity of ursolic acid and osthole with *Mycobacterium marinum* and in vitro cell infection models  
*Zongyu Huang\**, *Wanyu Tao*, *Javier Aguilera*, *Mei Han*, *Jianjun Sun*<sup>^</sup>
- 60A** Environmental factors affecting fly inhibitory control  
*Linlin Li\**, *Paul R. Sabandal*, *Kyung-An Han*<sup>^</sup>
- 62A** The effects and the correlation of *Francisella Tularensis* infection amongst alcoholic humans, nonalcoholic humans, alcoholic rats and mice  
*Cicilia A. Lovato\**, *Charles T. Spencer*<sup>^</sup>
- 64A** Falls in Men  
*Mary Ann E. Martinez\**, *Guillermina Solis*<sup>^</sup>
- 66A** Purification of GST-SAE1/SAE2 for GAM1 interaction studies  
*Brenda Moreno\**, *Jose E. Rodriguez*, *Hengwei Zhu*, *Andres Rubio*, *Yuejiao Xian*, *Supriyo Ray*, *German Rosas-Acosta*, *Chuan Xiao*<sup>^</sup>
- 68A** Structural significance of the R136W point mutation in Hsp27 that leads to neurodegenerative disease  
*Anna K. Orta\**, *Janelly Villalobos*, *Bianka Holguin*, *Jay Bhatt*, *Ricardo A. Bernal*<sup>^</sup>
- 70A** Differential expression of glycine receptors in the globus pallidus, thalamus and striatum  
*Jeremiah Paul\**, *Manuel Miranda*<sup>^</sup>
- 72A** Sex differences in ghrelin receptor expression in the hypothalamus of maternally separated adult rats  
*Akshita S. Pillai\**, *Jorge A. Sierra*, *Gabe A. Lodoza*, *Jameel N. Hamdan*, *Sigifredo Saucedo*, *Kristin L. Gosselink*<sup>^</sup>
- 74A** Plant compounds reduce Alzheimer's radical damage in cells  
*Orlena Roe\**, *Mahesh Narayan*<sup>^</sup>
- 76A** Food availability and waterfowl behavior in Chihuahuan Desert wetlands  
*Matthew Salyer\**, *Joshua I. Brown*, *Philip Lavretsky*<sup>^</sup>
- 78A** Long-term effect of alcohol exposure/withdrawal in neuronal differentiation and morphology of PC12 cells  
*Luisa M. Sanchez\**, *Jason T. Small*, *Sukla Roychowdhury*<sup>^</sup>
- 80A** Nicotine effect on alcohol-induced alterations of the G $\beta$ 1 $\beta$ -Microtubule dependent signaling pathway  
*Jason T. Small\**, *Luisa M. Sanchez*, *Michelle A. Aranda*, *Sukla Roychowdhury*<sup>^</sup>

- 82A** Evaluate anti-micobacterial and cytotoxic activity of stemona extract using high-content screening  
*Wanyu Tao\**, *Zongyu Huang*, *Javier Aguilera*, *Mei Han*, *Jianjun Sun*<sup>^</sup>
- 84A** Expression and purification of Human Brain and Muscle Arnt-like 1 protein (hBMAL1)  
*Dongman Xi\**, *Jose Rodriguez*, *Jennie Choi*, *Alejandro Sarabia*, *Supriyo Ray*, *Chuan Xiao*<sup>^</sup>
- 86A** The properties of room temperature ionic liquids and water confined inside microporous carbon  
*Alice M. Alayon\**, *José A. Espitia*, *José L. Bañuelos*<sup>^</sup>
- 88A** Synthesis and characterization of protein-carrying nanoparticles for the treatment of cancer  
*Laila Alsaihati\**, *Sarah C. McKinney\**, *Andrew Pardo*, *Luis A. Barrera*, *Juan C. Noveron*<sup>^</sup>
- 89A** Estimating groundwater discharge into the ocean in the Yucatan Peninsula  
*Guadalupe Alvarez\**, *Hugo Gutierrez-Jurado*<sup>^</sup>
- 91A** Concentration and solvent effects on the solution-state structure of asphaltenes  
*Eduardo J. Arzabala\**, *Samuel Cano*, *Juan Pablo Speer*, *Jose L. Banuelos*<sup>^</sup>
- 93A** Three dimensional printed nanoparticle-templated porous nanomaterials for water treatment  
*Carmen A. Chavez\**, *Andrew Pardo*, *Juan C. Noveron*, *Luis A. Barrera*<sup>^</sup>
- 95A** Water-soluble cobalt (II) porphyrin supported on zirconium phosphate as a highly efficient electrocatalyst for hydrogen generation from water  
*Tong Chu\**, *Isabel Barraza\**, *Yanyu Wu*, *Dino Villagran*<sup>^</sup>
- 96A** Detergent free protein purification for M. tuberculosis  
*Erika C. De Santiago\**, *Ilse Hernandez*, *Jianjun Sun*<sup>^</sup>
- 98A** Exploring the biological properties of Datura stramonium  
*Roger Ezri\**, *Rachid Skouta*<sup>^</sup>
- 100A** Phytoremediation of toxic metals using Texas Bermuda grass in El Paso, Texas  
*Prescilla Garcia-Trevizo\**, *Maria S. Arteaga*, *Jose Mendoza*<sup>^</sup>
- 102A** Electrocatalytic hydrogen gas evolution by an iron porphyrin-based organic polymer  
*Maria I. Grajeda\**, *Isabel Barraza*, *Yanyu Wu*, *Dino Villagran*<sup>^</sup>
- 104A** Electron spin resonance studies of Mn doped CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> crystals  
*Jose Delgado\**, *Christian Saiz*, *Luis Martinez*, *Sohan Hennadige*, *Jesse Murillo*, *Eduardo Romero*, *Skye Fortier*, *Srinivasa Singamaneni*<sup>^</sup>
- 106A** Addition of Nitrogen During Arcing and its Effect on the Production of Uranium Metallofullerenes  
*Allison N. Koopman\**, *Wenting Cai*, *Luis A. Echegoyen*<sup>^</sup>
- 108A** Dynamic Porous Nanomaterials from 3-D Printed 6-(benzyloxy) hexa-2,4-diyne-1-ol Nanocomposites for the Removal of Heavy Metals from Water  
*Xiaohui Peng\**, *Yuwei Chen*, *Juan Noveron*, *Sudhakar Kalagara*<sup>^</sup>
- 110A** Conservation and sustainability education in the Chihuahuan Desert  
*Christina R. Rodriguez\**, *Jessica Bane*, *Maryam Z. Chaleshtori*<sup>^</sup>
- 112A** Inorganic biochemical aspect on amyloid-beta peptides  
*Jose A. Rosales\**, *Emmanuel Gras*, *Mahesh Narayan*, *Christelle Hureau*<sup>^</sup>
- 114A** Unexpected Signals from the Glass Substrates used in CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> Solar Cell Thin Film Devices: An Electron Spin Resonance Investigation  
*Chris Saiz\**, *Edison Portillo*, *Luis Martinez*, *Sohan Hennadige*, *Luis Echegoyen*, *Srinivasa Singamaneni*<sup>^</sup>
- 116A** Synthesis and characterization of N-heterocyclic olefin ligated early transition metal coordination complexes  
*Casey Tarrab\**, *Alejandra Torres*, *Rolando Aguilar*, *Skye Fortier*<sup>^</sup>
- 118A** Crystallization of ADP and ATP bound Phi-EL Chaperonin for X-Ray Crystallography  
*Daniel H. Von Salzen\**, *Jesus Garcia*, *Jay M. Bhatt*, *Ricardo A. Bernal*<sup>^</sup>
- 120A** New chemiluminescence method coupled with Loop-mediated isothermal Amplification (LAMP) for portable and sensitive DNA detection  
*Helei Xiong\**, *Xiaofeng Wei*, *Xiujun (James) Li*<sup>^</sup>
- 122A** Synthesis and Purification of Uranium-based Clusterfullerenes  
*Jiaxin Zhuang\**, *Luis Echegoyen*, *Jesse Murrillo*<sup>^</sup>

- 124A** Affiliation between Responsible Beverage Service training and intoxicated patrons behind the wheel in regions with predominantly Hispanic populations  
*Sandra E. Dominguez\**, *Miguel A. Holguin*, *Matthew R. Leal*, *Leonardo Gamboa*, *Carmen Medellin*, *Areli Chacon Silva*, *Frank G. Perez*<sup>^</sup>
- 126A** Is health coverage a predicament to HPV vaccination adherence in the young adult male population  
*Heber J. Lara\**, *Gabriel A. Frieze*, *Denise I. Pinal*, *Jessica M. Shenberger-Trujillo*<sup>^</sup>
- 128A** Health policy: A comprehensive study to understand the millennial perspective on the future of health care  
*Gabrielle C. Mendoza\**, *Irasema Coronado*<sup>^</sup>
- 130A** Are perceptions and social norms linked to knowledge of HPV and HPV vaccine adherence in the male population?  
*Raymond Oliva\**, *Gabriel A. Frieze*, *Jessica M. Shenberger-Trujillo*<sup>^</sup>
- 132A** Obesity a target for bullying among children  
*Nathalie Prieto\**, *Danielle X. Morales*, *Timothy W. Collins*, *Sara E. Grineski*<sup>^</sup>
- 134A** The role of family perceptions and religion on HPV vaccines acceptability  
*Jacqueline B. Triana\**, *Gabriel A. Frieze*, *Jessica M. Shenberger*<sup>^</sup>
- 136A** Mujeres Sin Fronteras provide borderland testimonios of women of color whose struggles posture the fight for social justice  
*Jessica Ortiz\**, *Elva Reza-Lopez*<sup>^</sup>

### Poster Session B

- 2B** Negritude for beginners: A comparative analysis of museological public memory and coming of age narratives within the African American literary sphere  
*Jade N. Williams\**, *Marion C. Rohrleitner*<sup>^</sup>
- 4B** HITHMM Homolog Identification Tool using Hidden Markov Modeling  
*Jerry Duran Jr.\** *Daniel Carrillo*, *Jennifer Apodaca*, *Jonathan Mohl*, *Ming-Ying Leung*<sup>^</sup>
- 6B** Structure of West Nile antibodies in a silica matrix in the presence of carbon black  
*Monica Robles\**, *Carolina De Santiago*, *Julio E. Rincon*, *Thomas Boland*<sup>^</sup>
- 8B** Motion artifact removal from photoplethysmographic signals  
*Ahmed Ahmed\**, *Mohammad Ghamari*, *Homer Nazeran*<sup>^</sup>
- 10B** Language sample measures in bilingual preschool children  
*Isabel A. Cano\**, *Vanesa Smith*, *Connie L. Summers*<sup>^</sup>
- 12B** Mucoadhesive chitosan nanoparticles for improved precorneal retention and corneal permeability of tobramycin  
*Aleli D. Fernandez\**, *Rahul Kalhapure*, *Jwala Renukuntla*<sup>^</sup>
- 14B** Manufacturing and materials for creating a multi-sensor liner  
*Steven Garibay\**, *Leticia M. Mojica*, *Meagan R. Kendall*<sup>^</sup>
- 16B** The effects of cryopreservation and lyophilization on the viability of spray-on-cells  
*Aubrey M. Hands\**, *Thomas Boland*<sup>^</sup>
- 18B** Fabrication of BaTiO<sub>3</sub>/MWCNT/PVDF composites for sensor and energy storage application via fused deposition modeling and electric in-situ poling  
*Jeffrey Johnson\**, *Hoejin Kim*, *Yirong Lin*<sup>^</sup>
- 19B** Hyperspectral remote sensing image analysis using MATLAB  
*Justin T. Johnson\**, *Roberto Garcia\**, *Matthew Wood*, *Miguel Velez-Reyes*<sup>^</sup>
- 21B** Oxy-combustion: Clean and efficient use of coal and fossil energy  
*Bryan Morales Justiniano\**, *Norman Love*<sup>^</sup>
- 23B** Summary of effort at UTEP in the Consortium for integrating energy systems in engineering and science education  
*Norma A. Perea\**, *Jareny .Santiesteban*, *Norman D. Love*, *Yirong Lin*<sup>^</sup>
- 25B** Phonological awareness training on the decoding abilities of children with Down Syndrome  
*Leanna C. Peru\**, *Vannesa Mueller*<sup>^</sup>
- 26B** The benefits and complications of using molten salt as a working fluid for a concentrated solar power tower system

- Arturo Rodriguez\**, *Victor Madrid\**, *Abbas Ghassemi*, *Vinod Kumar*<sup>^</sup>
- 28B** UFP and VOC gradient profile across a central El Paso, Texas community near Interstate 10 Highway  
*Derrick B. Voight\**, *Angel Medina*, *Hector A. Olvera*, *Ismael Beltran*<sup>^</sup>
- 30B** Development of a user-friendly mobile app for PPG-based heart rate monitoring devices  
*Cody A. Yazzie\**, *Ahmed E. Ahmed*, *Jaime R. Perez*, *Daniel J. Cruz*, *Cesar Y. Sanchez Zambrano*, *Mohammad Ghamari*<sup>^</sup>
- 32B** Desiccation and pigmentation effects on mortality in a model organism when exposed to UVR  
*Rachael A. Apodaca\**, *Maribel Baeza*, *Elizabeth Walsh*<sup>^</sup>
- 34B** The effects of intermittent dietary supplementation with fish oil on high fat diet-induced enhanced sensitivity to quinpirole  
*Nina M. Beltran\**, *Caroline Hernandez-Casner*, *Katherine M. Serafine*<sup>^</sup>
- 36B** Identification of Akt1 inhibitors for the treatment of colorectal cancer  
*Denise Cano\**, *Filip Fratev*, *Suman Sirimulla*<sup>^</sup>
- 38B** Early life stress may cause life-long changes in brain reward structures and vulnerability to addiction in female rats  
*Alexis A. Cohen\**, *Jorge A. Sierra Fonseca*, *Jameel N. Hamdan*, *Sigifredo Saucedo, Jr.*, *Kristin L. Gosselink*<sup>^</sup>
- 40B** Antioxidants may be used as a prophylactic against Parkinson's disease through Cylinder Test evidence  
*Karen P. Corral\**, *Lois Mendez*, *Gabriela Henriquez*, *Stephen Collins*, *Edward Castañeda*, *Mahesh Narayan*<sup>^</sup>
- 42B** Neural mechanism underlying ethanol sensitivity and tolerance  
*Nataly M. Delgado\**, *John M. Sabandal*, *Paul R. Sabandal*, *Kyung-An Han*, *Michelle Park*, *Grace Park*<sup>^</sup>
- 44B** Laser cutter engraving for fabrication of dissolvable microneedle for drug delivery  
*Zayra N. Dorado\**, *Rui Zheng*, *Sharma Sanjay*, *XiuJun Li*<sup>^</sup>
- 46B** Season and sex-specific variation in movement patterns by Western Diamond-backed Rattlesnakes (*Crotalus atrox*)  
*Sarah E. Ebert\**, *Dominic L. DeSantis*, *Jerry D. Johnson*<sup>^</sup>
- 50B** Replacing saturated with monounsaturated fatty acids, in a high fat diet, protects against impaired skeletal muscle glucose transport.  
*Mario A. Garcia\**, *Cesar Meza*, *Catalina De La Pena*, *Cynthia Montenegro*, *Lannie O'Keefe*, *Shaan Naughton*, *Anna Simcocks*, *Deanne Hryciw*, *Michael Mathai*, *Armando Varela-Ramirez*, *Andrew McAinch*, *Sudip Bajpeyi*<sup>^</sup>
- 51B** Multidrug resistant bacteria isolated from the Rio Grande River  
*Jose Gomez\**, *Daniella Sahagun\**, *Jose Mendoza*, *Maria Alvarez*<sup>^</sup>
- 53B** The effects of alcohol on social behavior  
*Ruta Grinceviciute\**, *Quiana W. Vidal*, *Adam N. Perry*, *Bruce S. Cushing*<sup>^</sup>
- 55B** Large-Scale Production of Therapeutic Monoclonal Antibodies against Co-Inhibitory Immune Receptors PD-1 and BTLA  
*Juan R. Hernandez\**, *Rosabril Acuna*, *Georgialina Rodriguez*, *Robert Kirken*<sup>^</sup>
- 57B** Soil, and belowground productivity response to a five year extreme chronic drought and shifted monsoon experiment in an arid grassland ecosystem  
*Jennifer Holguin\**, *Jennie R. McLaren*, *Scott L. Collins*<sup>^</sup>
- 59B** Expression and purification of human Neuronal PAS domain protein 2 (hNPAS2) for structural studies  
*Diyang Li\**, *Jose Rodriguez*, *Karla Moriel*, *Supriyo Ray*, *Chuan Xiao*<sup>^</sup>
- 61B** Octopamine regulates movement suppression in flies  
*Yan Liu\**, *Paul R. Sabandal*, *Kyung-An Han*<sup>^</sup>
- 63B** Water potential variations in dryland shrubs before and after a rainfall event  
*Javier Lozano\**, *Anthony J. Darrouzet-Nardi*<sup>^</sup>
- 65B** Root, fungal, and microbial biomass spatial distribution in the fungal loop hypothesis  
*Charles A. Mettler \**, *Anthony Darrouzet-Nardi*<sup>^</sup>
- 67B** Less is more: Nutrient enrichment of small arctic aquatic ecosystems  
*Lydia Ornelas\**, *Vanessa L. Loughheed*<sup>^</sup>
- 69B** Improving El Paso area land conservation and public education  
*Magdalen Paredes\**, *Janae V. Reneaud-Field*<sup>^</sup>

- 71B** A viral vector approach to understanding the roles of estrogen receptors in behavior  
*Guadalupe Pena Contreras\**, *Adam N. Perry*, *Manuel Miranda*, *Bruce S. Cushing*<sup>^</sup>
- 73B** Localized migration of T-Cell Acute Lymphoblastic Leukemia into the Central Nervous System  
*Kumail Rizvi\**, *Michael Brissette*, *Charles Bill*, *Charlotte Vines*<sup>^</sup>
- 75B** Techniques and Methods in Neuroscience Research  
*Clarissa F. Rosa\**, *Luis M. Carcoba*, *Bryan Cruz*, *Rodolfo J. Flores Garcia*, *Victor L. Correa Rodriguez*, *Laura E. O'Dell*<sup>^</sup>
- 77B** Psychological stress induces depression-related outcomes in female C57BL/6 mice  
*David O. Sanchez\**, *Sergio D. Iniguez*<sup>^</sup>
- 79B** Using GIS to understand the effect of bathymetry on vegetation coverage at a created desert wetland  
*Julieta A. Saucedo\**, *Lisa C. Baughman*, *Vanessa L. Loughheed*<sup>^</sup>
- 81B** NKT cell-controlled reduction of inflammation due to the regulation of Cytokine  
*Matthew T. Storey\**, *Nicole Setzu*, *Gabrielle Miller*, *Mireya G. Ramos*, *Charles T. Spencer*<sup>^</sup>
- 83B** Does sleep disruption affect ethanol-induced locomotor activity in *Drosophila*?  
*Ernesto Villanueva\**, *John M. Sabandal*, *Erick Saldes*, *Kynung-An Han*<sup>^</sup>
- 85B** Effects of shrub removal on soil carbon during grassland restoration in New Mexico  
*Max M. Zaret\**, *Jennie McLaren*, *Kathleen Schaeffer*<sup>^</sup>
- 87B** Magnetic graphene oxide coupled with ZIF-67 as efficient adsorbents of water pollutants  
*Edgar Aldama\**, *Karen Ventura*, *Dino Villagran*<sup>^</sup>
- 88B** Synthesis and characterization of protein-carrying nanoparticles for the treatment of cancer  
*Laila Alsaihati\**, *Sarah C. McKinney\**, *Andrew Pardo*, *Luis A. Barrera*, *Juan C. Noveron*<sup>^</sup>
- 90B** A short and efficient synthesis of a photoreactive amino acid  
*Huiwen An\**, *Hector P. Del Castillo*, *Katja Michael*<sup>^</sup>
- 92B** Synthesis of titanium complexes supported by Imidazolin-2-Iminato ligands  
*Miguel A. Baeza Cinco\**, *Skye Fortier*, *Josue R. Aguilar Calderon*, *Skye Fortier*<sup>^</sup>
- 94B** Dynamic porous nanomaterials from 3-D Printed 6-(benzyloxy) hexa-2,4-diyn-1-ol nanocomposites for the removal of heavy metals from water  
*Yuwei Chen\**, *Xiaohui Peng*, *Juan Noveron*, *Sudhakar Kalagara*, *Andrew Pardo*<sup>^</sup>
- 95B** Water-soluble cobalt (II) porphyrin supported on zirconium phosphate as a highly efficient electrocatalyst for hydrogen generation from water  
*Tong Chu\**, *Isabel Barraza\**, *Yanyu Wu*, *Dino Villagran*<sup>^</sup>
- 97B** Organic, biodegradable, high surface area, free of petrochemicals active material for water filters  
*Alma C. Escobosa\**, *Luis A. Barrera*, *Juan C. Noveron*<sup>^</sup>
- 99B** Crystallization of the phi-EL chaperonin in the APO conformation  
*Jesus Garcia\**, *Daniel H. Von Salzen*, *Jay M. Bhatt*, *Ricardo A. Bernal*<sup>^</sup>
- 101B** Estimation of the number of discoveries in multiple tests at low sample numbers  
*Amairani Giner\**, *Marian Manciu*<sup>^</sup>
- 103B** A novel maximum likelihood estimator for survival analysis  
*Joscelyne Guzman-Gonzales\**, *Sorour Hosseini*, *Marian Manciu*<sup>^</sup>
- 105B** Curcumin C60 fullerene derivatives as electron transporting materials in inverted perovskite solar cells  
*Quentin Y. Kim\**, *Edison Castro*, *Luis Echegoyen*<sup>^</sup>
- 107B** Surface spectroscopic analysis of the Maya Blue pigment  
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- 109B** Automation of a high precision stage for X-Ray Grazing Incidence Small-Angle Scattering (GI-SAXS) and Reflectivity (XR) studies  
*Daniel F. Puentes\**, *Jose L. Banuelos*<sup>^</sup>
- 111B** HSA solution-state protein structure: Native conformations, and temperature-induced aggregation using small-angle X-ray scattering  
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- 117B** XRF and XPS Analysis of Columbite-Tantalite (COLTAN)  
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- 121B** Synthesis and characterization of variable chain-length fullerene derivatives for perovskite solar cells  
*Tingyuan Yang\**, *Edison Castro*, *Luis Echegoyen*<sup>^</sup>
- 123B** Inhibition, Health Metrics, and Change in Brain Oxygenated Hemoglobin during Incremental Exercise.  
*Elizabeth Barrera\**, *John Capps*, *Jessica Hernandez*, *Oswaldo Morera*<sup>^</sup>
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*David Esparza\**, *Haidar Ahmed*, *Jeffrey T. Olimpo*<sup>^</sup>
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*Katia E. Ochoa\**, *Paulette Ramirez*, *Jaime R. Ayala*, *Rogelio Valles*, *Ruben A. Guzman*, *Geoffrey B. Saupe*, *James E. Becvar*<sup>^</sup>
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- 133B** Effects of food insecurity on economically-disadvantaged American elementary schoolchildren's academic competencies  
*Ricardo Rubio\**, *Sara E. Grineski*, *Danielle Morales*, *Timothy W. Collins*<sup>^</sup>
- 135B** Secondary analysis of psychological measures to help characterize cumulative stress from common measures of stress  
*Sahaly A. Valadez\**, *Carlos Portillo*, *Bryon Adinoff*, *Craig Field*<sup>^</sup>
- 137B** Grit: The academic resilience  
*Francisco Arriaga\**, *Sandra Oviedo Ramirez*, *Miriam Alvarez*, *Guadalupe Corral*<sup>^</sup>

## 2017 SPRING SYMPOSIUM PRESENTER AWARDS

### Arts, Humanities and Social Sciences

<b>Best presentation</b>	David Esparza	Mentor: Jeffrey Olimpo
<b>Honorable mention</b>	Heber J. Lara	Mentor: Jessica Shenberger-Trujillo

### Engineering, Computational and Applied Sciences

<b>Best presentation</b>	Jerry Duran	Mentor: Ming-Ying Leung and Jennifer Apodaca
<b>Honorable mention</b>	Jordan A. Orozco	Mentor: Jamie Desjardins

### Life Sciences

<b>Best presentation</b>	Grace G. Hendricks	Mentor: Laura O'Dell
<b>Honorable mention</b>	Zayra N. Dorado	Mentor: XiuJun Li

### Physical Sciences

<b>Best presentation</b>	Miguel A. Baeza	Mentor: Skye Fortier
<b>Honorable mention</b>	Jose A. Rosales	Mentors: Mahesh Narayan and Christelle Hureau

**ARTS, HUMANITIES  
AND SOCIAL SCIENCES**

# Grit: The academic resilience

Francisco Arriaga<sup>^</sup>, Sandra Oviedo Ramirez, Miriam Alvarez, Guadalupe Corral\*

*REAS, The University of Texas at El Paso.*

Grit, a non-cognitive trait that refers to perseverance and passion for long-term goals, has been shown to predict positive academic outcomes such as academic retention and performance (i.e., GPA) among high school and college students. Few studies, however, have examined the effect of grit on first-year college retention in a minority serving institution. The present study sought to investigate the relationship between grit and academic retention among first-year college students. We hypothesized that higher grit scores would predict re-enrollment for first-year college students. Additionally, we expected a positive correlation between GPA and grit. Participants were first-year UTEP students (n=341). The Short Grit Scale was used to assess students' grittiness. A logistic regression was conducted to assess the relationship between academic retention and grit. Secondly, a zero-order correlation was done and a linear regression to examine the association between GPA and grit. Results from a logistic regression indicate that when controlling for age, build affiliation, and first generation status, for every unit increase in grit, first-year students become 3.4 times more likely to be retained, OR= 3.411,  $p= 0.027$ . As predicted, grit was positively correlated with GPA ( $r= .181$ ,  $p=0.025$ ). Our research provides evidence for the positive role that grit plays in college students' likelihood of continuing their education, for this reason, we believe it makes an important step in expanding our understanding of the factors that contribute to student success in higher education.

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**Recommended Citation:**

Arriaga, Francisco; Oviedo Ramirez, Sandra; Alvarez, Miriam; Corral, Guadalupe. "Grit: The academic resilience" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1258

# Inhibition, Health Metrics, and Change in Brain Oxygenated Hemoglobin during Incremental Exercise.

Elizabeth Barrera<sup>^</sup>, John Capps, Jessica Hernandez, Osvaldo Morera\*

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Obesity is an important global health crisis. Many factors influence food intake and weight status, however, one of interest in health psychology is the ability to inhibit the influence of external cues in favor of a controlled planned goal. Different aspects of health also influence the body's circulatory system, such as blood vessel response and blood pressure. This is especially important with the brain, which requires a robust vasculature for proper functioning. Using function Near-Infrared Spectroscopy (fNIRS), it is known that the brain's hemodynamic response (supply of oxygenated hemoglobin) to exercise can be enhanced by aerobic exercise or deteriorated by poor health. The current study uses fNIRS to assess the relationship between a test of inhibition, health metrics (BMI and blood pressure), and a metric combining mean hemodynamic change and time to 85% of maximum heart rate during an incremental exercise task. Using data from sixty-three healthy participants and path analysis, it was demonstrated that both blood pressure and BMI negatively influenced brain hemodynamic response to incremental exercise. Furthermore, BMI was associated with poorer scores on a test of inhibition and poor hemodynamic response was also related to poor scores on the test of inhibition via mediation of participants BMI.

**Funding Source: National Institute of General Medical Sciences of the National Institutes of Health**

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**Recommended Citation:**

**Barrera, Elizabeth; Capps, John; Hernandez, Jessica; Morera, Osvaldo. "Inhibition, Health Metrics, and Change in Brain Oxygenated Hemoglobin during Incremental Exercise." (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1236**

# Affiliation between Responsible Beverage Service training and intoxicated patrons behind the wheel in regions with predominantly Hispanic populations

Sandra E Dominguez<sup>1^</sup>, Matthew R Leal<sup>1</sup>, Leonardo Gamboa<sup>1</sup>, Carmen Medellin<sup>2</sup>, Areli Chacón Silva<sup>3\*</sup>, Frank G Perez<sup>1\*</sup>, Miguel A Holguin<sup>1</sup>

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<sup>3</sup> *Leadership Studies, The University of Texas at El Paso.*

Intoxicated driving negatively impacts communities throughout the United States. Responsible Beverage Service (RBS) training laws seek to minimize drunk driving related traffic accidents. These training programs are typically offered in English, and regions with large Hispanic populations are drastically affected due to lack of RBS programs offered in Spanish. The specific purpose of this research is to develop Way to Serve-Español, a culturally tailored online alcohol service-training program aimed at Spanish-speakers. The WTS-E program is being developed to offer scenarios, dialects, and actor portrayals related to RBS in such a way that trainees will be able to identify with the messages and grasp the concepts being presented. Comprehension of laws and procedures pertaining to serving alcohol will reduce the overpouring of drinks and the number of extremely intoxicated patrons, particularly behind the wheel. Four focus groups consisting of seven to 10 Spanish-speaking servers from the El Paso, Texas, and Las Cruces, New Mexico, regions have been conducted with the objective of discovering the features and content the targeted audience would like the program to possess. When the program is completed, establishments will be chosen to be the test group and to train their servers utilizing Way to Serve-Español program, while the control group uses their own training services, if any. Comparative analysis will be used to determine what effect, if any, the WTS-E program had on the number of individuals who are sold alcoholic beverages.

**Funding Source: National Institute on Minority Health and Health Disparities**

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**Recommended Citation:**

Dominguez, Sandra; Leal, Matthew ; Gamboa, Leonardo; Medellin, Carmen; Chacón Silva , Areli; Perez, Frank; Holguin, Miguel. "Affiliation between Responsible Beverage Service training and intoxicated patrons behind the wheel in regions with predominantly Hispanic populations" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1222

# Characterization of students' experimental design approaches in traditional laboratories versus Course-based Undergraduate Research Experiences

David Esparza<sup>^</sup>, Haidar Ahmed, Jeffrey T Olimpo\*

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Course-based undergraduate research experiences (CUREs) have been identified as a promising vehicle to encourage student engagement in authentic research opportunities. Whereas recent studies have capitalized upon the influence of CUREs on cognitive and non-cognitive student outcomes, it remains unclear whether undergraduate students exhibit explicit preferences when designing scientific experiments and why. Additionally, the degree of similarity or dissimilarity of experimental design preferences between students enrolled in traditional laboratories *vs.* CUREs requires examination. To address these concerns, we administered the Expanded Experimental Design Ability Tool (E-EDAT) in pre-/post-semester format to students enrolled in traditional (n = 60) or CURE (n = 47) sections of an introductory biology laboratory course in the Spring 2016 term. Experimental design type (e.g., repeated measures; treatment *vs.* control) was assessed using an in-house rubric. Individuals from both the CURE and non-CURE cohorts (n = 25) were invited to participate in an end-of-term semi-structured interview to provide details on their experimental design choices and the potential "evolution" of these choices over time. Chi-square analyses demonstrated that students in both cohorts exhibited a preference for the "control *vs.* treatment" design at the start and end of the course ( $p < 0.005$  for all analyses). Descriptive interpretive analyses of interview data revealed that scientific method conceptualization in prior coursework or media, insufficient knowledge of alternative design strategies, and personal experience influence such preferences. Collectively, these outcomes suggest that an explicit pedagogical focus on *how* students choose to design experiments and the utility of various design-based approaches is warranted.

Funding Source: NIH

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**Recommended Citation:**

Esparza, David; Ahmed, Haidar; Olimpo, Jeffrey. "Characterization of students' experimental design approaches in traditional laboratories versus Course-based Undergraduate Research Experiences" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1108

# Is health coverage a predicament to HPV vaccination adherence in the young adult male population

Heber J Lara<sup>1^</sup>, Gabriel A Frieze<sup>2</sup>, Denise I Pinal<sup>1</sup>, Jessica M Shenberger-Trujillo<sup>1\*</sup>

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Human Papillomavirus (HPV) is the number one sexually transmitted infection in the U.S. It is estimated that at one point all sexually active people will have a form of HPV. The majority of research investigating HPV vaccine acceptability has focused on female populations and very few studies have focused on male populations. Young males frequently become disconnected from health care especially as they get older. Therefore, it is imperative to focus on this population. The purpose of this study is to explore factors such as health coverage and financial/time barriers that are associated with HPV vaccination acceptability in a young adult male population. The present study recruited males (n=110) who ranged from the age 18 and up from the University of Texas at El Paso and they completed a survey using the online survey system Qualtrics. The survey required approximately 15-20 minutes to complete and assessed perceptions and opinions related to the HPV vaccine. After completion of the survey the participants were compensated with a \$5 voucher that could be redeemed throughout UTEP's food services. Additionally, they were also signed up for a raffle to win a \$150 UTEP Bookstore gift card. Correlational analyses will be conducted in order to examine variables associated with vaccine acceptability (e.g., health coverage, time barriers, and financial barriers). The results of this study have implications for developing health communication messages aimed at promoting vaccines. These results are informative for health professionals that provide recommendations to vaccinate to their male patients.

**Funding Source:** NIGMS Award Numbers RL5GM118969, TL4GM118971, and UL1GM118970

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**Recommended Citation:**

Lara, Heber; Frieze, Gabriel; Pinal, Denise ; Shenberger-Trujillo, Jessica. "Is health coverage a predicament to HPV vaccination adherence in the young adult male population" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1147

# News media role in the impeachment of South Korean President Park Geun Hye

Josue E Lopez<sup>^</sup>, Pratyusha Basu\*

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South Korea recently saw a large political shift due to a presidential scandal that rocked the entire system. With only 30 years into life as a democracy, South Korea experienced its first impeachment of an acting president. Former President Park Geun Hye is now being investigated on corruption charges that include collusion with chaebol companies, and political corruption with a close friend. South Korean media played a large role in the investigation and immediately spread information to the citizens who were already protesting out in the streets for her impeachment. Combined, both pressured the government to take quick action against Park Geun Hye. Sources such as Yonhap News, the Korea Herald, and KBS, are all examples of media involvement and coverage of the scandal, where nightly they would release new information regarding Park, or her close confidant Choi Soon Shill. This paper will discuss whether news media outlets were attacking or defending Park Geun Hye's presidency and impeachment. Using sources from Korean newspapers and LexisNexis, we will discuss the position that news media in Korea and abroad took when reporting on the developments and proceedings of protests and impeachment of Park Geun Hye.

**Funding Source:** UTEP Office of the Provost

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**Recommended Citation:**

Lopez, Josue; Basu, Pratyusha. "News media role in the impeachment of South Korean President Park Geun Hye" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1180

## Music Production Audio CD

Maria F Lozano<sup>1^</sup>, Christopher Reyman<sup>1\*</sup>, Angel S Otero<sup>2</sup>, Ernesto Hernandez<sup>1</sup>, Jorge Baylon<sup>1</sup>, Brian Carbajal<sup>1</sup>,  
Christopher Reyman<sup>1\*</sup>

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One of the most satisfying, yet challenging aspects about being an artist is the capacity to explore ways to reach out to an audience and have the courage to share a piece of work with the purpose of connecting with them in an intimate and genuine way. As a musician, there is a critical importance to spread the passion of being one. This project is ultimately hoping to achieve both these visions. The creation of this audio CD brings in a variety of musicians from the department of music, students and faculty, who share the same visions I have. As the lead singer of this project, I strive for the listener to feel free to experience the music of this CD, and achieve an emotional connection to it. The audio CD proposes a diverse selection of songs, arranged by UTEP's Commercial Ensemble, chosen specifically because of the emotional meaning they hold for me as a musician. The CD will contain five songs and one original composition. The genres of these songs range from electronic, to alternative rock, to ballads, all united with the performing style of the Commercial Ensemble. This project will not only be unique on its own, but it is innovative as well, given that this is the first time the Commercial Ensemble has performed, recorded and produced a CD of their own arrangements with the music technology available at UTEP's own recording studio. This project is hoped to be seen as a representation of the College of Liberal Arts and the Department of Music at the University in the long term.

**Funding Source:** Office of the Provost (SURPASS)

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**Recommended Citation:**

Lozano, Maria ; Reyman, Christopher; Otero, Angel; Hernandez, Ernesto; Baylon, Jorge; Carbajal, Brian; Reyman, Christopher. "Music Production Audio CD" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1234

# Health policy: A comprehensive study to understand the millennial perspective on the future of health care

Gabrielle C Mendoza <sup>^</sup>, Irasema Coronado \*

*Department of Political Science, The University of Texas at El Paso.*

The purpose of this study is to further examine the future of health care through the millennial perspective. With the United States' current political climate the issue of health care is on the minds of many, especially millennials. They make up more than a quarter of the nations population, (Gourlay K., 2017), and are likely to see gaps in coverage due to the common theme of low wages for this generational group. This study will assess this age group's health policy adherence as well as their health policy preferences. Approximately 200 students will be recruited from the University of Texas at El Paso to take a survey. This survey will evaluate millennials current health policy knowledge and their preference in coverage. Results from this study will provide insight into this generation's beliefs about health care coverage in the United States.

Gourlay, K. (2017, March 19). How Millennials Win And Lose Under The GOP Health Bill. Retrieved July 13, 2017, from <http://www.npr.org/sections/health-shots/2017/03/19/520459848/how-millennials-win-and-lose-under-the-gop-health-bill>)

**Funding Source: NIGMS-NIH**

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**Recommended Citation:**

Mendoza , Gabrielle ; Coronado , Irasema . "Health policy: A comprehensive study to understand the millennial perspective on the future of health care" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1136

# Bilingual workbook for General Chemistry I

Katia E Ochoa<sup>1</sup>, Paulette Ramirez<sup>2</sup>, Jaime R Ayala<sup>2</sup>, Rogelio Valles<sup>3</sup>, Ruben A Guzman<sup>1</sup>, Geoffrey B Saupe<sup>2\*</sup>, James E Becvar<sup>2\*</sup>

<sup>1</sup> *Department of Biological Sciences, The University of Texas at El Paso.*

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El Paso, Texas borders Ciudad Juarez, Mexico. The first language for University of Texas at El Paso (UTEP) students is most often Spanish. Peer leaders in chemistry at UTEP continue to develop an all-English workbook for PLTL workshop which facilitates students' understanding by giving explanations and problems that parallel topics taught in lecture. At PLTLIS IV in San Jose, peer leaders from UTEP described the development of a second semester general chemistry workbook in Spanish. We describe progress toward a bilingual workbook for first semester general chemistry which could benefit many UTEP students. The workbook explanations would be in Spanish along with some practice problems. After the students have practiced in both languages, the Module Worksheets in English would allow students to fully transition their knowledge for examinations. A future all-Spanish workbook would open new opportunities for Latin American students to experience PLTL.

**Funding Source: UTEP Peer-Led Team Learning Organization (PLTL)**

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**Recommended Citation:**

Ochoa, Katia; Ramirez, Paulette; Ayala, Jaime; Valles, Rogelio; Guzman, Ruben; Saupe, Geoffrey; Becvar, James. "Bilingual workbook for General Chemistry I" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1109

# Are perceptions and social norms linked to knowledge of HPV and HPV vaccine adherence in the male population?

Raymond Oliva<sup>^</sup>, Gabriel A Fietze, Jessica M Shenberger-Trujillo\*

*School of Pharmacy, The University of Texas at El Paso.*

Human Papillomavirus (HPV) is a viral disease created by group of more than 150 related viruses<sup>1</sup> that cause a substantial burden of disease<sup>2</sup>. HPV is so common that nearly all individuals get it at some point in their life through sexual contact.<sup>3</sup> Notably, HPV is the most common STI in the United States<sup>3</sup>. Although there are three 3-dose vaccinations to help prevent HPV and HPV linked cancers, there is not enough awareness about the virus or the cancer preventing vaccine. A limited amount of studies on HPV vaccine knowledge focus solely on male populations whereas the majority of studies focus on female populations<sup>4</sup>. The current study examined factors associated with HPV vaccine acceptability including knowledge, perceived risks of HPV, and perceived benefits of the HPV vaccine. The aim for this project was to survey college male participants (N=110) from the University of Texas at El Paso through a survey based website (Qualtrics) on an iPad. This survey required approximately 15-20 minutes to complete. Subjects were compensated with a \$5 gift card for their participation and entered into a raffle for a \$150.00 UTEP Bookstore gift card. Correlational analyses will be conducted in order to examine the association between knowledge, perceived risk and benefits of the HPV vaccine, and vaccine acceptability. The results of this study have implications for developing health communication messages aimed at promoting vaccinations. These results may be informative for health professionals that provide recommendations to vaccinate to their patients.

**Funding Source: National Institutes of Health**

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**Recommended Citation:**

Oliva, Raymond; Fietze, Gabriel; Shenberger-Trujillo, Jessica. "Are perceptions and social norms linked to knowledge of HPV and HPV vaccine adherence in the male population?" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1135

# Tracking changes in attention with the eyes

Leslie Ornelas<sup>^</sup>, Ashley S Bangert\*

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Prior research shows that people experience peaks of attention at points in time when they expect something will occur. For example, people can extrapolate the pattern from a regular auditory signal and develop an expectancy about when future tones in the signal might occur. This process is known as attention entrainment. In the current study, we assessed whether pupil diameter is sensitive to the online dynamic changes in attention that occur during entrainment. College-aged participants completed a gap-detection task where on each trial they were presented with a backward-masked square with a gap in one side; they had to decide on which side the gap was located. Each square was either preceded by an auditory entrainment signal or no signal. For signal trials, the square was presented either at a moment predicted by the signal or earlier or later than expected. An Eyelink 1000 Plus eye tracker was used to collect pupil diameter during the initial entrainment signal (or no signal) and during the presentation of the square. We predicted larger pupil dilations for the no signal condition relative to the signal conditions, indicative of increased effort expended to prepare for the upcoming trial. For signal conditions, we expected smaller pupil dilations during presentation of the squares appearing at an expected moment when attention should be at its peak relative to trials presented at unexpected moments. Though data collection is ongoing, we will present preliminary results from our study.

**Funding Source: Office of the Provost (SURPASS)**

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**Recommended Citation:**

Ornelas, Leslie; Bangert, Ashley . "Tracking changes in attention with the eyes" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1138

# Mujeres Sin Fronteras provide borderland “testimonios” of women of color whose struggles posture the fight for social justice

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*Department of Teacher Education, The University of Texas at El Paso.*

The purpose of this qualitative paper is to embrace and share with colleagues and students testimonios of local women who have made differences in the political and educational sphere by advocating for marginalized minorities. Through a Feminist Testimonios and Critical Pedagogical lens, the purpose of this study is to engage public school educators and students in dialogue about their personal thoughts, observations and stories that impedes their learning or progress due to fear of crossing unknown borders. The aim is to develop a Critical Conscious Student aware of borderlands that create barriers and provide opportunities. Local testimonios of women of color who have trespass (conquered) borderland barriers in education, and politics will be used to spark and guide dialogue.

Research questions that will guide this study are: How do women of color utilize their voices to uphold their fundamental rights? How do the stories of these border crossers serve to remind us of past and present oppressions, so that we may transform the future? What social factors contribute to the inequality faced by women of color on the borderlands? Through single case studies of personal testimonios of Latinas/Chicanas living or working in the U.S.-Mexico borderlands, this study provides examples of the efforts and achievements the women in the study endure on their quest to fight social injustices as well as, how they became Border Crossers or Mujeres sin Fronteras. Their stories provide biographical or autobiographical sketches to spark and guide dialogue in public spheres such as public schools classrooms.

**Funding Source:** The Office of the Provost

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**Recommended Citation:**

Ortiz, Jessica; Reza-Lopez, Elva. "Mujeres Sin Fronteras provide borderland “testimonios” of women of color whose struggles posture the fight for social justice" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1257

# Obesity a target for bullying among children

Nathalie Prieto<sup>^</sup>, Danielle X Morales, Timothy W Collins, Sara E Grineski\*

*Department of Sociology and Anthropology, The University of Texas at El Paso.*

Bullying is an issue among older children and overweight children face greater odds of bullying. Few studies have examined younger children, so it is unknown if overweight children are bullied as early as second grade and if the effects of being overweight on bullying victimization vary based on gender or race/ethnicity. To investigate this, we employed two-level hierarchical linear models (HLM) to examine teacher-reports of children being teased, pushed, lied about, and excluded, as well as parent and school administrator data from the nationally representative Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K: 2011). 43.9% of second graders were teased, 28.1% were pushed, 34.9% were excluded, and 29.8% were lied about by other students. HLM results showed that obese and overweight children were significantly more likely to be teased, but no more likely to be pushed, than non-overweight children. Obese (but not overweight) children were more likely to be victims of lying and social exclusion, as compared to non-overweight children. Interaction effects for pushing show that obese girls were more likely to be pushed than obese boys. Interestingly, obese Hispanic children were less likely to be teased, excluded and lied about than white obese children. This might be because heavy children tend to be perceived in Hispanic culture (in contrast to Anglo-American culture) as healthy children. Parents, teachers and school administrators should recognize early childhood bullying as a problem and seek to better address it. Future research should aim to explain the protective effects of Hispanic ethnicity on bullying among obese children.

**Funding Source:** NIGMS

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**Recommended Citation:**

Prieto, Nathalie; Morales, Danielle; Collins, Timothy; Grineski, Sara. "Obesity a target for bullying among children" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1144

# Effects of food insecurity on economically-disadvantaged American elementary schoolchildren's academic competencies

Ricardo Rubio<sup>^</sup>, Sara E Grineski, Danielle Morales, Timothy W Collins\*

*Department of Sociology and Anthropology, The University of Texas at El Paso.*

Prior research indicates that food insecurity at home may negatively affect children's performance in school. Most studies documenting that relationship have focused on one area of learning competency and few have examined how other social disadvantages may interact with food insecurity to cumulatively impact children's competencies across multiple learning domains. We analyzed data from the Early Childhood Longitudinal Study, Kindergarten Class of 2010/2011 (ECLS-K:2011), which is a nationally representative sample of more than 18,000 US schoolchildren. The ECLS-K:2011 dataset we examined was collected from parent interviews and direct academic tests of children from the kindergarten and first grade school years (2010/2011-2011/2012). Multivariate analyses were performed using generalized estimating equations to examine the relationship between first-grade food insecurity and academic competency among economically-disadvantaged children ( $n=8,149$ ), adjusting for clustering by school and a host of factors known to influence academic competency. We found that food insecurity was negatively, but not equally, related to all first-grade competencies examined. Food insecurity was more strongly negatively associated with first-grade math and cognitive flexibility scores ( $p<.05$ ) than it was with reading, science, and working memory scores. Interaction model results indicate that relationships between food insecurity and academic competencies are modified by social factors. Results suggest that public health efforts to increase the food security of American households with youths are warranted for the betterment of children's health and development.

Funding Source: NIGMS Award Numbers RL5GM118969, TL4GM118971, and UL1GM118970

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**Recommended Citation:**

Rubio, Ricardo; Grineski, Sara; Morales, Danielle; Collins, Timothy. "Effects of food insecurity on economically-disadvantaged American elementary schoolchildren's academic competencies" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1142

# The role of family perceptions and religion on HPV vaccines acceptability

Jacqueline B Triana<sup>1^</sup>, Gabriel A Frietze<sup>1</sup>, Jessica M Shenberger<sup>2\*</sup>

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**Background:** The Human Papilloma Virus (HPV) is the most common viral infection transmitted through sexual contact.1 Approximately one in four Americans are estimated to have HPV at the present moment1. The majority of studies regarding the HPV vaccine focus on female populations, whereas a limited amount of studies have focused solely on male populations2. The current study seeks to address this gap in knowledge. Furthermore, the present project focuses on the role of male's perceptions of immediate family members' attitudes and beliefs about the HPV vaccine. Furthermore, the role of religious activity and beliefs were also explored. A dearth of studies have examined the role of family perceptions and religion on male vaccine acceptability. **Method:** One-hundred and ten young adult males who ranged from the age 18 and up were recruited from UTEP to participate in the study. Participants completed a 15-20 minute survey on an I-pad using Qualtrics software and were compensated with a \$5.00 gift card for their participation. Additionally, all participants were signed up for a raffle to win a \$150 UTEP Bookstore gift card. Each participant was informed that the purpose of the questionnaire was to gather information regarding their perceptions of vaccines. **Results and Discussion:** Correlation analyses will be conducted in order to examine factors (e.g., family attitudes and beliefs) associated with HPV vaccine acceptability in males. **Conclusion:** The results have implications for developing health communication messages aimed at promoting vaccines and are informative for health professionals that provide vaccine recommendations to their male patients.

**Funding Source:** National Institutes of Health

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**Recommended Citation:**

Triana, Jacqueline; Frietze, Gabriel; Shenberger, Jessica. "The role of family perceptions and religion on HPV vaccines acceptability" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1137

# Secondary analysis of psychological measures to help characterize cumulative stress from common measures of stress

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The biological and psychological concept of cumulative stress influences health status and health outcomes and may help us better explain health disparities (McEwen BS, Stellar E. Stress and the individual: mechanisms leading to disease. *Arch Intern Med* 1993;153:2093–101.) While McEwen 1993 clearly defines the biological markers of cumulative stress, the psychological indicators of cumulative stress are poorly defined. In this study, we conducted a secondary data analysis of psychological measures of stress collected from 95 veterans in order to characterize cumulative stress from common measures of stress. Some of these measures included maltreatment as a child, measuring for both chronic and episodic/acute stress, a childhood adversity interview and a PTSD questionnaire. We will conduct principal component analysis to determine which measures of psychological stress best represent the latent construct of cumulative stress based on the percentage of variance explained. In order to better understand the influences of cumulative stress on health status and health outcomes among Hispanics we need to be able to measure stress using both biological and psychological indicators.

Funding Source: NIGMS RL5GM118969, TL4GM118971, UL1GM118970

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**Recommended Citation:**

Valadez, Sahaly; Portillo, Carlos; Adinoff, Bryon; Field, Craig. "Secondary analysis of psychological measures to help characterize cumulative stress from common measures of stress" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1195

# Negritude for beginners: A comparative analysis of museological public memory and coming of age narratives within the African American literary sphere

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African American bildungsromans, or YA fiction in the African American literary subgroup, are often cast aside in the construction of the literary canon. However, the connection to constructions of race in these narratives correlates to the miniscule existence of African American museums and memorials in our nation, thus hindering our historical public memory. Inquiry into these narratives, particularly Danzy Senna's *Caucasia* and Sapphire's *Push*, along with the journalistic writings of Ida B Wells, ask us to consider which societal forces push young adults of the African American community to subsequently categorize themselves in racialized America. A comparison into the ways in which race is constructed in African American museums is immensely helpful in determining social expectations presented in these fictional accounts and how they transcend the page into modern reality. A select group of African American museums in Dallas, TX, Albuquerque, NM, Chicago, IL and Washington, D.C. will be visited with a critical eye to interrogate racial presentation and the inevitable exclusivity of certain elements of history. Additionally, fictional narratives are considered through the lens of a historical archive, considering how our country's past still very much haunts the present.



Funding Source: Tom Lea Research Fellowship, Office of the Provost (SURPASS)

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#### Recommended Citation:

Williams, Jade ; Rohrleitner, Marion. "Negritude for beginners: A comparative analysis of museological public memory and coming of age narratives within the African American literary sphere " (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1127

**ENGINEERING, COMPUTATIONAL  
AND APPLIED SCIENCES**

# Motion artifact removal from photoplethysmographic signals

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Photoplethysmography (PPG) – optical recording of volume changes in the blood vessels - is commonly used in modern medical devices for measuring pulse rate, oxygen saturation, and cardiac output. The sensor in the PPG device detects light intensities at specific wavelengths reflecting volumetric changes in the underlying tissue and the electronics in the device processes the arterial pulse signal sensed in the finger. However, the acquired PPG signal is easily corrupted by motion artifacts, which results in a false reading of the PPG data. Therefore, the reduction or elimination of the motion artifacts is an important research issue when measuring pulse rate and oxygen saturation. In this research project, we used an adaptive Kalman filter to model the corrupted PPG signal and consequently remove the background noise and unwanted components of the PPG signal. Our simulation results demonstrated that the Kalman filter could effectively reduce the motion artifact and was able to produce a clean PPG signal quantified by the signal to noise ratio (SNR). Our proposed algorithm also accurately detected the PPG signal peaks. By using the Kubios Heart Rate Variability (HRV) software we were able to analyze the variations in the PPG signal peak-to-peak intervals (PPIs) and generate quantitative markers of the Autonomic Nervous System (ANS) derived from spectral analysis of the PPIs.

**Funding Source: National Institutes of Health (NIH)**

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**Recommended Citation:**

Ahmed, Ahmed; Ghamari, Mohammad; Nazeran, Homer. "Motion artifact removal from photoplethysmographic signals" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1118

# Collision-avoidance system for unmanned aerial vehicles for aircraft damage inspection

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The increasing advancements and popularity of Unmanned Aerial Vehicles (UAV) has created new enhanced applications in surveillance, damage inspection, parcel delivery and agriculture among others. This research focuses on the development of an UAV's robust system capable of navigating around an aircraft safely and autonomously while doing video damage inspection. The UAV is expected to operate by virtually assuming a safety bubble surrounding the inspected vehicle that keeps the damage inspection safe by avoiding collisions. The collision avoidance system consists of multiple levels of risk respectively to the safe distance the UAV have to maintain from an object. The levels of risk will be enable by a collision avoidance system that will make use of sensor fusion techniques to combine multiple range finder sensors to increase accuracy and precision. The collision avoidance system will work in parallel with the inspection navigation system by autonomously taking control in worst case scenario conditions and repelling away from an almost certain collision with the aircraft. Adding to its autonomous functionality, the proposed collision avoidance system will alert the person supervising the inspection at any moment the operation. The human operator shall be capable to take control of the whole operation at any moment. Overall, the system is planned to minimize the risk of damage to the aircraft at all cost.

**Funding Source: Office of the Provost (SURPASS)**

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**Recommended Citation:**

Anguiano Chavez, Enrique; Rangel, Pablo; Gonzalez, Virgilio. "Collision-avoidance system for unmanned aerial vehicles for aircraft damage inspection" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1187

# Frobenius matrix norm of product of symmetric toeplitz matrices

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Toeplitz matrices possess constant diagonals, this give rise to properties that make them suitable for a wide range of applications such as image processing and the study of numerical solutions for differential equations, to name a few. We primarily have been focusing on the real-valued product matrix,  $\mathbf{C}$  (i.e.  $\mathbf{A}\mathbf{B} = \mathbf{C}$ ), of real-valued symmetric Toeplitz matrices  $\mathbf{A}$  and  $\mathbf{B}$  where  $\mathbf{A} = [a_{ij}]$  with  $a_{ij} = |i-j|$ . In our work, we are looking to generalize the Frobenius matrix norm using the norms of the matrices  $\mathbf{A}$  and  $\mathbf{B}$ . Calculating matrix norms of  $\mathbf{C}$  require the summation of various degrees of polynomial values, thus for large matrices, this would result in poorly performing computational processes. We are indeed looking to improve the efficiency of computational aspects of  $\mathbf{C}$  norms by focusing on the norms of  $\mathbf{A}$  and  $\mathbf{B}$  matrices. That is, our focus has been on relations between the norms of  $\mathbf{C}$  and that of the matrices  $\mathbf{A}$  and  $\mathbf{B}$ . We hope that our work will significantly speed-up the computation time of the norms of matrices with structures similar to  $\mathbf{C}$  matrix. So far, we have encountered interesting properties and symmetries in matrix  $\mathbf{C}$ . Thus, using these properties, we were able to generalize the Frobenius norm for 2x2 and 3x3 matrices, and we discovered patterns among any  $n \times n$   $\mathbf{C}$  matrices. In our presentation, we propose to introduce the structure of  $\mathbf{C}$  matrix, and discuss our findings on its norm.

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**Recommended Citation:**

Avendano, Jaime; Cuellar, Carlos; Dogan-Dunlap, Hamide. "Frobenius matrix norm of product of symmetric toeplitz matrices" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1115

# Language sample measures in bilingual preschool children

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Language sample analysis is a valuable method when evaluating oral language abilities in children to determine if a language impairment is present. This type of analysis has typically taken the form of narratives or story telling for bilingual children. However, narratives have been shown to be an inappropriate tool for preschool aged children. A picture description task had high diagnostic accuracy for use with monolingual preschool children and was adapted for the current study to review its validity with bilingual children. The current study sought to analyze language skills in twenty-four bilingual preschool children, between the ages of 3 and 5, using a picture elicitation task. Language samples were collected by asking the participants to describe 7 pictures based on 4 prompts in the elicited language, Spanish or English. The language samples were recorded, transcribed, and coded to analyze percent grammatical utterances (PGU), mean length of utterance (MLU) and number of different words (NDW). Results indicated that children had a lower PGU and were less grammatical in Spanish than in English language samples. Spanish language samples had more grammatical errors in fragments, argument errors, along with other syntax, and semantic errors. MLU and NDW were higher in English, meaning children produced longer utterances and had a greater variety of words in English than in Spanish. These results provide evidence for increased confidence in the use of language sample measures when analyzing bilingual preschool children and can contribute to improved accuracy in diagnosing language impairment for bilingual children.

**Funding Source:** Office of the Provost (SURPASS)

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**Recommended Citation:**

Cano, Isabel; Smith, Vanesa; Summers, Connie. "Language sample measures in bilingual preschool children" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1157

# The Effects of Increased HVAC Usage

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Global warming is a problem believed by many to be a pressing issue for our planet and all that inhabit it. In 2012, certain Chlorofluorocarbons (CFCs) which were highly used in HVAC units and aerosol cans began being phased out or replaced with safer compounds due to ozone depletion. This was only one solution to the complex hazard that global warming poses to livability on earth. With HVAC units becoming more affordable and in growing demand in climates where they were once not used as regularly, what effect will hot air being blown out from AC units have on the overall temperature in the environment? ArcGIS technology will be used to map and compare landsat imaging and thermal readings on different neighborhoods with and without large quantities of refrigerated AC units as opposed to swamp coolers or no air conditioning units in El Paso, Texas to see differences in temperature in those areas. A 5-year prediction will also be made based on data findings. I will be using ArcGis software and earthexplore.usgs.gov to view satellite imaging data of El Paso. I will use this to look for differences in neighborhoods with and without large volumes of refrigerated air conditioning units.

**Funding Source:** NIGMS RL5GM118969, TL4GM118971, UL1GM118970

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**Recommended Citation:**

Cranford, Derek; AlDourri, Raed. "The Effects of Increased HVAC Usage" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1215

# HITHMM Homolog Identification Tool using Hidden Markov Modeling

Jerry Duran Jr.<sup>1^</sup>, Daniel Carrillo<sup>2</sup>, Jennifer Apodaca<sup>1</sup>, Jonathan Mohl<sup>3</sup>, Ming-Ying Leung<sup>2\*</sup>

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While several eukaryotic parasites have been fully sequenced, such as the parasitic protozoan *G. lamblia*, the structure and function of many of their proteins remain unknown, specifically for well-established biological processes. Genome-scale annotation widely based on sequence similarity is an important step to identification of targets for possible treatments, vaccine design, and to help facilitate the experimental validation of their role in critical cellular processes; however traditional approaches often fail to identify functional annotations for genes across divergent taxonomic scales. To address this problem, we are currently developing a bioinformatic pipeline to search for homologous proteins in distantly related microbial eukaryotes. The first step in this process involves the implementation of an optimized version of OrthoMCL that will be further developed to leverage phylogenetic history utilize hidden Markov Models to identify homologous proteins across vast evolutionary distances.

**Funding Source:** COURI, BBRC-Bioinformatics Core, UPBiT,

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**Recommended Citation:**

Duran Jr., Jerry ; Carrillo, Daniel; Apodaca, Jennifer; Mohl, Jonathan; Leung, Ming-Ying. "HITHMM Homolog Identification Tool using Hidden Markov Modeling " (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1221

# Mucoadhesive chitosan nanoparticles for improved precorneal retention and corneal permeability of tobramycin

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The bioavailability of topically administered drugs is only 2-7% due to the natural protective mechanisms of eyes such as i) blinking, tear dilution and metabolism of drugs by tear enzymes, ii) low capacity of human cul-de-sac and iii) the nasolacrimal drainage and absorption into the systemic circulation [1]. In this era of evolving resistant microbial species, there is a need to increase bioavailability and achieve sustained release of topical tobramycin to keep it effective against microbes infecting eyes. This could be achieved by encapsulation of tobramycin into mucoadhesive nanoparticles coated with a mucoadhesive agent. Therefore, aim of present work is formulation development of tobramycin loaded chitosan nanoparticles (CSNPs) coated with polyvinyl pyrrolidone (PVP), a mucoadhesive polymer. The reasons for selecting chitosan as a nanoparticulate forming material are: i) it has intrinsic antibacterial activity and ii) it could result in synergistic antibacterial activity in combination with tobramycin. The CSNPs loaded with tobramycin have been prepared and further studies on coating with hyaluronic acid and characterization of nanoparticles in terms of size, polydispersity index, zeta potential and surface morphology is under way. The expected outcomes of this study are nano sized tobramycin loaded nanoparticles with excellent mucoadhesive property for sustained drug release for effectively treating eye infections. In short, this project will address a low bioavailability problem of tobramycin which is one of the causes of development of resistance by bacteria to an antibiotic.

Reference:

1. Kalam, M. A. Int. J. Biol. Macromol., 2016, 89, 127-136.

Funding Source: NIGMS RL5GM118969, TL4GM118971, UL1GM118970

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Recommended Citation:

Fernandez , Aleli ; Kalhapure , Rahul ; Renukuntla , Jwala . "Mucoadhesive chitosan nanoparticles for improved precorneal retention and corneal permeability of tobramycin" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1196

# Small-scale solar-powered point-of-use reverse osmosis desalination of brackish water

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Water has become a scarce resource, and it is projected to become even more scarce in the future. Despite major accomplishments in access to safe clean water and sanitation facilities, billions of people still lack access to clean water and adequate sanitation. Population growth, alongside with cultural, economic, political, and environmental factors constrict implementation of water and sanitary infrastructure. Point-of-Use (POU) water treatment through a solar powered reverse osmosis (RO) desalination system targets directly the most affected and addresses the immediate needs of the most disadvantaged. Through this research study, we aim to develop an inexpensive, energy efficient POU RO desalination system to help people around the world to have access to clean water. Data were collected from three RO systems modified from their commercially available version. A 100 W 12 VDC solar panel was integrated with each system with a charge controller and battery. Each system was tested during the summer season in El Paso, TX. To prove the functionality and efficiency of the systems, a range of water quality parameters will be tested such as: conductivity, pH, temperature, alkalinity, total dissolved solids (TDS), and dissolved ions and metals by ion chromatography and inductively coupled plasma. Feed water will be collected from three different sources: El Paso Water Utilities Tap Water (EPWUTW), Kay Bailey Hutchison Desalination Plant (KBH), and the Brackish Groundwater National Desalination Research Facility Well #3 (BGNDRF #3). To control water recovery, concentrate flow restrictors will be used to achieve a desired ratio of reject flow and permeate flow. A mathematical model of the system will be developed to perform system optimization that will minimize capital and operating costs and maximize water recovery for a given feed water salinity and solar irradiance.

**Funding Source:** NIGMS RL5GM118969, TL4GM118971, UL1GM118970, Nanosystems Engineering Research Center, NSF

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**Recommended Citation:**

Fraga, Miguel; Walker, William. "Small-scale solar-powered point-of-use reverse osmosis desalination of brackish water" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1190

# Manufacturing and materials for creating a multi-sensor liner

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In 2005, there were nearly two million people in the United States that had suffered from a form of limb loss, with a majority of those amputee's needing a prosthesis. Over the years, the number of amputations has increased, averaging near 185,000 amputations a year and continues to steadily increase. One of today's common issues is the lack of comfort an amputee feels when being fitted with a prosthetic socket and matching liner. Uneven balance, or distribution of an amputee's weight on the prosthetic socket can cause an amputee to suffer stress around the residual limb causing bruising, or prosthetic failure in the form of the prosthetic socket breaking and cause possible harm to the amputee. Manufacturing a method to collect physical data of a residual limb inside of a prosthetic socket would aid in more precise fittings. Using a silicone two-part based liner, there will be casted spaces within the liner which can house pressure sensors, where they will be tested by pressure analysis to ensure that the silicone material can handle the thinned spacing and possible heated material due to electronics. This will create a method of manufacturing a multi-sensor liner capable of improving the accuracy of well fitted prosthetic sockets and liners.

**Funding Source:** NIGMS RL5GM118969, TL4GM118971, UL1GM118970

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**Recommended Citation:**

Garibay, Steven; Mojica, Leticia; Kendall, Meagan. "Manufacturing and materials for creating a multi-sensor liner" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1205

# Robust optimization of dynamic systems

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In educational environments, problems are usually defined with exact-value parameters. In real world applications, this is seldom the case. Assuming a parameter has a nominal value and is not subject to uncertainty can lead to catastrophic oversights: even a small uncertainty in the given data can pose a large threat to the validity of the model. Being able to account for uncertainty is crucial in finding appropriate solutions and making robust decisions that are minimally affected by perturbation. Much of the work that has been done in robust optimization focuses on mathematical models of dynamic systems where uncertainty is either given, or at least equally weighted. In this research, we studied how uncertainty affects physical models that have parameters with varying degrees of time dependence and therefore perturbation by uncertainties. We also explored viable solving techniques, which include interval computation and programmatic simulation. Our preliminary work led us to consider a sample of ten problems, two of which are presented in our poster: a projectile problem and a car rollover problem. As a result of our algorithms factoring in uncertainty, we are able to extrapolate future values as an interval. In the future, we plan to expand our experiments to a wider set of applications. By implementing mathematical algorithms that are easily run on a computer or tablet, we also anticipate that "safer" and more accurate solutions can be made available to many industries. The chances for error and therefore disaster are dramatically reduced when more robust solutions are present.

**Funding Source: COURI**

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**Recommended Citation:**

Gutierrez, Joseph; Ceberio, Martine. "Robust optimization of dynamic systems" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1160

# The effects of cryopreservation and lyophilization on the viability of spray-on-cells

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There are many applications of human cells in the treatment of trauma, the most prominent being blood for transfusions and skin cells for burn victims. In the US, blood is readily available; but in countries where US troops are stationed, fresh blood is limited and it is often necessary to cryopreserve blood. Skin cells, however, are not readily available and have not yet been cryopreserved. The aim of this research was to determine if cells could be sprayed onto a thin layer of plastic, frozen, and lyophilized while remaining viable. HeLa cells were grown to confluence, trypsinized, resuspended in DMSO-free freezing medium (CryoSOfree, Sigma), and deposited into a 2mL spray bottle that had a constant concentration of 40,000 cells/spray. HeLa cells were sprayed into wells of a 48-well plate yielding wells with 40,000, 80,000, and 120,000 cells that were then frozen at -80OC at a rate of -1OC/ min. Control cells were also plated at these densities and then frozen. In addition, some cells were lyophilized after undergoing cryopreservation. To determine viability, a UV Vis spectrometer set to an absorbance of 490nm was used to perform a cell proliferation assay (MTS, Promega) after the cells had been incubated. It was established that spraying HeLa cells into the wells had a viability 13.4% less than that of the control. However, it also showed that cells can be sprayed onto plastic surfaces to create thin layers of cells. Future work can, therefore, be focused on the increase in cell viability.

**Funding Source:** National Institute of General Medical Sciences of the National Institutes of Health

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**Recommended Citation:**

Hands, Aubrey; Boland, Thomas. "The effects of cryopreservation and lyophilization on the viability of spray-on-cells" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1122

# Social media application in health care supply chain management

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This paper discusses social media applications in the information flow aspect of the health care supply chain modeling to improve the management decisions. Social media data is utilized in many industries to increase targeted audience outreach, understand demand trends, etc. However, health care supply chain management and inventory management has been given relatively less attention. Several researchers have estimated that inventory investment in health care accounts for 10%-18% of total revenues and hospital pharmacies can improve efficiency if the expenditures in this area can be controlled. The current health care supply chain has the ability to model the information flow of participants, but it lacks real-time, verifiable, and useful data. Thus, it is important that pharmaceutical inventory management of hospitals pharmacies have access to verifiable information from social media to potentially deal with uncertainty and frequently seasonality of drug demands. In the project, a conceptual framework for modeling surveillance of epidemics, such as influenza, through data mining of Twitter, is proposed that has the potential to prepare hospital pharmacy for outbreaks of flu effectively and accurately. With data classifiers and data visualization of the collecting data, it is easier to predict spread of influenza, compared to historical medical documents. Furthermore, Data analysis of information gathered from Twitter is utilized to analyze the frequent seasonal changes of uncertain drug demand for different kind of flu. Though there are drawbacks, both methodologies may help improve prediction of flu outbreak trends and improve the architectures of current health care supply chain.

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**Recommended Citation:**

He, Jiaqi; Lopes, Amit. "Social media application in health care supply chain management" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1169

# Fabrication of BaTiO<sub>3</sub>/MWCNT/PVDF composites for sensor and energy storage application via fused deposition modeling and electric in-situ poling

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The fabrication and characterization of piezoelectric and dielectric composites of poly(vinylidene fluoride) (PVDF), barium titanate (BaTiO<sub>3</sub>) (BT), and multi-walled carbon nanotubes (CNT) using fused deposition modeling (FDM) 3D printing are presented. A technique for in-situ poling during printing was developed to improve the piezoelectric property and ease of manufacture. PVDF and BT are well-known for their high piezoelectric coefficients among polymers and ceramics, respectively, while CNT was introduced to improve efficiency of stress reinforcement and conductivity for charge carriers between the two. It was found that increasing both BT and CNT improved the piezoelectric properties, and while increasing BT content improved dielectric properties, CNT had a threshold where increasing content switched from improving dielectric properties to being conductive. Applications in sensor technology were explored by measuring current and voltage while subjecting the materials to cyclic loads or manual stimulation with fingers, while applications in energy storage will be explored by calculating maximum energy density. Furthermore, the composites were subjected to tensile and fatigue tests to characterize their mechanical properties, and internal molecular structure was analyzed using scanning electron microscopy (SEM) and fourier transform infrared spectroscopy (FTIR). A dielectric constant of 43 was achieved with 24% BT and 1% CNT by weight in PVDF, and a piezoelectric coefficient of 129 pC/N was achieved with 18% BT and 0.4% CNT. An effective and scalable 3D printing technique for the manufacture of piezoelectric and dielectric materials was demonstrated.

Funding Source: NSF Grant DMR-1205302 (PREM)

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**Recommended Citation:**

Johnson, Jeffrey; Kim, Hoejin; Lin, Yirong. "Fabrication of BaTiO<sub>3</sub>/MWCNT/PVDF composites for sensor and energy storage application via fused deposition modeling and electric in-situ poling" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1172

# Hyperspectral remote sensing image analysis using MATLAB

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Remote sensing is a technology that enables collecting data from the environment without physical interaction. This is important when data collection may be hazardous to humans or the location is not accessible. Hyperspectral imaging is a specific remote sensing technology that collects hundreds of images simultaneously across the electromagnetic spectrum where for each pixel its reflectance spectral signature is collected. The goal is to understand how to accurately perform image analysis and identify objects by their specific spectral signatures. Our research revolves around the question, "How can we use analysis techniques such as clustering to identify objects in a remote sensing scene?." Hyperspectral imagery was collected around campus using a SOC710-SWIR imager. Collected images were analyzed using the Hyperspectral Image Analysis Toolbox (HIAT) from MATLAB. This analysis is done in MATLAB, which allows us to manipulate, visualize, and compare the spectral distribution of the captured images. We studied how clustering techniques can be used to segment the image and identify objects and classes on it. Spectral data was collected using a spectrometer to compare spectra measured with the imager.

Funding Source: NOAA-CREST

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**Recommended Citation:**

Johnson, Justin; Garcia, Roberto; Wood, Matthew; Velez-Reyes, Miguel. "Hyperspectral remote sensing image analysis using MATLAB" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1165

# Laboratory Validation of Wireless Sensors for Structural Health Monitoring

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Sensing technology applications for structural health monitoring (SHM) have been a growing field of study for several decades. In some cases, sensors have afforded us the ability to immediately respond to structural deficiencies to prevent structural failures from occurring (Noel, 2017). With the rapid advancement in technology that we have seen recently, wireless sensing has emerged as a quicker and less expensive installation method as compared to wired sensing technology. Despite many successful applications, wireless sensing has yet to be considered a trusted approach in industry. This research focuses on the challenges associated with both wireless and traditional wired sensing applications. The goal is to validate wireless sensing as a feasible alternative to wired approaches for SHM. Furthermore, their applicability to structural health monitoring will be tested in a lab setting. Our sensors, acquired as a donation from Resensys and purchased from LORD, will be placed on a steel bar to imitate steel structures. The steel will be subjected to a load or vibration, and the sensors will store the data which can be read on an application. A thorough comparison of the pros and cons of each sensor will be made.

**Funding Source:** University of Texas at El Paso Office of the Provost, Resensys

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**Recommended Citation:**

Mora, Daniela; Weidner, Jeffrey. "Laboratory Validation of Wireless Sensors for Structural Health Monitoring" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1249

# Oxy-combustion: Clean and efficient use of coal and fossil energy

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Twenty five percent of the world's coal supply is located in the US. Thirty percent of all generated electricity in the US originates from the burning of coal. Existing thermoelectric plants burn a mixture of coal and air that results in an exhaust product of NO<sub>x</sub>, considered to be harmful for the environment. In many coal plants, other fossil fuels are also used in conjunction with coal, such as methane. Methane can be used as tool for the burning of coal in a combustion unit. Thus, this research investigates the use of a High-Pressure Combustor fitted with a shear coaxial injector operating on a mixture of methane and oxygen. Burning with oxygen instead of air results in emissions of carbon dioxide and water, which can be processed and stored. The goals of the current project are twofold: 1) To design a feed system that will supply the combustor with methane, oxygen and carbon dioxide at predetermined flow rates and pressures and 2) To calculate the pressure drops across this system which include multiple components and fuel injector. Results presented include the final design of the piping layout, selection and list of components, and corresponding pressure drops. Detailed drawings of the feed system are also developed as part of this work. ANSYS Fluent is used to model the flow and pressure drop through the injector for carbon dioxide, oxygen, and methane lines. Pressure drops are presented as a function of flowrate for the system analysis.

**Funding Source:** Department of Energy

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**Recommended Citation:**

Morales Justiniano, Bryan; Love, Norman. "Oxy-combustion: Clean and efficient use of coal and fossil energy" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1139

# Speech recognition and listening effort in bilinguals' L1 and L2

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Understanding speech in background noise is more difficult for all listeners compared to understanding speech in quiet conditions. However, bilingual listeners may be at a greater disadvantage understanding speech in background noise than monolinguals due to an increased demand for cognitive processing resources required for recognition of speech. While it appears that the need for greater cognitive resources to identify speech may have no effect in quiet, it is unclear whether bilinguals may have poorer speech recognition performance compared to monolinguals when the target speech is degraded (e.g. by background noise). Furthermore, little is known regarding whether speech recognition performance is similar between bilinguals' first and second languages. Thus, the purpose of this study was to determine: (1) whether adult Spanish-English (S/E) bilinguals are at a greater disadvantage understanding speech in background noise than monolinguals, and (2) if there is a difference in speech recognition performance in bilinguals' first and second languages. Thirty individuals, 15 S/E bilinguals and 15 English monolinguals, between the ages of 18-30, participated in this study. Participants were administered the Hearing in Noise Test (HINT) in English (bilinguals and monolinguals) and Spanish (bilinguals only). Performance on the HINT was scored as the signal to noise ratio required for 50% correct sentence recognition. Results showed that monolinguals performed better than bilinguals on the English HINT. Bilinguals performed better on the Spanish than English HINT. Interestingly, bilinguals performed better in their L1 (Spanish) than monolinguals. We concluded that speech recognition in noise performance differs between monolinguals and bilinguals.

**Funding Source:** Office of the Provost (SURPASS)

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**Recommended Citation:**

Orozco, Jordan; Desjardins, Jamie. "Speech recognition and listening effort in bilinguals' L1 and L2" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1155

# Summary of effort at UTEP in the Consortium for integrating energy systems in engineering and science education

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The Consortium for Integrating Energy System in Engineering and Science Education (CIESESE) was established with the goal to prepare future engineers and scientist pursuing a career in energy systems. In order to accomplish these goals, The Universidad de Turabo created a partnership with several institutions such as Sandia National Laboratories, National Energy Technology Laboratory, and The University of Texas at El Paso. With improvement of research in technology, a demand for engineers in the field has increased. Teaching students about science and engineering at an early age has become fundamental to the growth of future engineers in order to further the development in energy systems. The Consortium focuses on creating opportunities for students of all grade levels to develop an interest and understanding in energy related topics. Undergraduate and graduate students are given the opportunity of acquiring professional experience through research under a mentor as well as developing educational modules for grade levels K-12 with the collaboration and guidance of the NASA MUREP Aerospace Academy (MAA). These educational modules cover concepts such as the storage, generation, and distribution of energy by using in-class projects that give students a hands-on experience and a better understanding of the real world applications. With assistance from MAA, the Consortium has helped educate groups of 13-20 students on renewable energy systems and encourage them to pursue a higher education in science and engineering.

**Funding Source:** Department of Energy

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**Recommended Citation:**

Perea, Norma; Santiesteban, Jareny; Love, Norman; Lin, Yirong. "Summary of effort at UTEP in the Consortium for integrating energy systems in engineering and science education" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1206

# Towards automatic registration of histological data to canonical brain atlases

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Few researchers map their spatial datasets to available online brain atlases due to the bottleneck of requiring trained domain experts to manually enter spatial data onto digital atlas plates, a very slow, laborious and error-prone process. Circumventing this manual mapping step will allow neuroscientists to rapidly and accurately populate the atlases with their newly generated spatial datasets. We have developed an image analysis method that given an image of a Nissl-stained tissue section of a rat brain automatically finds the likely location of the region in a rat brain atlas. Our method works by precomputing local features from each plate of the target atlas using the scale-invariant feature transform (SIFT), which has been shown to be robust to change in scale, orientation, noise, and illumination. Given an input Nissl-stained image, we compute its SIFT descriptors and then use the RANSAC stochastic search algorithm to find the best matching region in the atlas according to the similarity of their descriptors. As a proof of concept, we have used Nissl plates from the Paxinos & Watson 7<sup>th</sup> edition atlas and have registered them to corresponding plates within the Swanson 3<sup>rd</sup> edition atlas. Experimental results show the method is accurate and efficient, generating results that can be validated by comparing them to independently derived registration solutions obtained from craniometric data. This system will help facilitate the assignment of histological data sets within canonical reference spaces to accelerate the mapping efforts of trained domain experts.

**Funding Source: National Institutes of Health**

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**Recommended Citation:**

Perez, Jose; Khan, Arshad; Fuentes, Olac. "Towards automatic registration of histological data to canonical brain atlases" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1235

# Power generation using oxy-fuel based magnetohydrodynamics

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Magnetohydrodynamics (MHD) power extraction is a direct energy conversion process encompassing fossil fuel power technologies. One advantage of MHD is that since flame temperatures are high, which is needed to produce the conductive plasma to generate electricity, the potential efficiency for these systems is also very high. Also, since 80% of total electricity produced in the world is based on fossil energy, having efficient power from an MHD generator operating on fossil fuels is an attractive prospect. Furthermore, pollutant emissions are also a concern in modern power systems. Use of oxygen instead of air in the MHD combustor results in exhaust that is made of carbon dioxide and steam. So, it is possible to achieve high efficiencies that produce little to no emissions using MHD. However, one issue that plagues the MHD combustor systems operating on oxy-combustion is the ability to manage the large amounts of heat generated by the system. For this project, Ansys Fluent is used to model cooling channels that are used in an MHD generator. The heat generated from the combustor is simulated using a user-defined function. The amount of heat removed for cooling channels with different aspect ratios (ratio of channel height to width) is modeled using the software. Plots of the temperature for different aspect ratios are plotted as part of this work. It was determined that using an aspect ratio of 1 resulted in the lowest temperatures in the MHD combustor.

**Funding Source:** UTEP Office of the Provost

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**Recommended Citation:**

Perez, Paul; Cabrera, Luisa; Love, Norman. "Power generation using oxy-fuel based magnetohydrodynamics" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1183

# Phonological awareness training on the decoding abilities of children with Down Syndrome

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The ability to recognize words when reading for typically developing children is correlated with strong phonological skills or the ability to use letter-sound correspondence knowledge. Children with Down Syndrome have difficulty acquiring phonological skills which has led to reading interventions that focus on sight word learning in which an individual learns to recognize words in their entirety rather than being able to use letter-sound correspondence knowledge. Developing word recognition skills only by sight limits the literacy growth of an individual due to the virtual impossibility of teaching every word needed to read advanced text. For children with Down Syndrome, the evidence regarding the ability to acquire phonological skills is contradictory. The present study investigates whether a treatment involving phonemic awareness will lead to differences in the phonemic awareness skills related to recognizing words in children with Down Syndrome. The present study is a systematic replication of a study by Burgoyne, Duff, Snowling, Buckley, and Hulme (2013). A single-subject research design was used to test the efficacy of an intervention program involving phoneme blending in increasing phonological decoding skills in children with Down Syndrome. Research of this kind may lead to changes in the literacy instruction of this population.

**Funding Source:** Provost Office (SURPASS)

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**Recommended Citation:**

Peru, Leanna; Mueller, Vannesa. "Phonological awareness training on the decoding abilities of children with Down Syndrome" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1128

# Structure of West Nile antibodies in a silica matrix in the presence of carbon black

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Molecularly imprinted polymer particles (MIPs) are a robust and relatively low-cost alternative to natural recognition molecules such as antibodies. These materials are silica matrices with trapped protein templates. Upon washing, some of the template is removed, leaving a material that can selectively re-bind the template. Currently, polymer grafted carbon black is being used to make the imprinted particles more visible while potentially playing a role in the successful imprinting of the West Nile antibody (WNA) templates. For this study, we propose to characterize the effects of carbon black that is added to a silica during synthesis of the sol-gel matrix. Preliminary studies show that the MIPs with carbon black re-bound their template better than MIPs that were synthesized without carbon black in the silica matrix. MIPs against WNA were created with and without carbon black. Non-imprinted polymer particles (NIPs) were prepared in the exact same manner as MIPs with the omission of the WNA. A total of four materials were thus prepared: WNA MIPs with and without carbon black and NIPs. Circular Dichroism Spectroscopy (CD) is used to analyze each of the four materials in the following way: as prepared, rinsed to remove any bound template, re-bound with the template. Including the controls, a total of ten samples were thus tested. The CD data will elucidate how the structure of the WNA changes as the template is entrapped in the silica/carbon black matrix. We expect the carbon black to also affect the structure and amount of bound and re-bound template.

**Funding Source: National Institutes of Health**

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**Recommended Citation:**

Robles, Monica; De Santiago, Carolina; Rincon, Julio; Boland, Thomas. "Structure of West Nile antibodies in a silica matrix in the presence of carbon black" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1226

# The benefits and complications of using molten salt as a working fluid for a concentrated solar power tower system

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Molten Salt is considered as an excellent heat transfer medium for many applications including Concentrated Solar Power (CSP) processes. One of the advantages of utilizing Molten Salt is the ability retain heat more effectively, providing the ability to generate power over night, possibly up to 7 MW for three hours after the sunset. There are several potential complications with the use of molten salt for the CSP application including stability of nitrate molten salts at temperatures higher than 600 Celsius. Another potential complication arises from the lower thermal efficiency due to higher specific heat resulting in the higher heat rate. This results in higher entropy generation increasing irreversibility and adversely impact the system efficiency. Through utilizing the Rankine Cycle analysis for CSP, thermal efficiency equation was obtained. The resulting calculated efficiencies were twenty-two percent when using water and twenty percent for Molten Salt. The values used for the calculations were obtained from thesis and dissertations. For example, the heat provided by a 1 meter square heliostat is 0.6 KW incorporating convection heat transfer and without convection is about 1 KW. In order to provide a more realistic estimation of efficiency for use of molten salt in CSP applications, specific heat transfer mechanisms and other sources of irreversibility such as friction must be considered.

**Funding Source:** U.S Department of Energy, Air Force Office of Scientific Research

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**Recommended Citation:**

Rodriguez, Arturo; Madrid, Victor; Ghassemi, Abbas; Kumar, Vinod. "The benefits and complications of using molten salt as a working fluid for a concentrated solar power tower system" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1123

# Nanotechnology based solution to enhance solubility and antibacterial activity of silver-furosemide complex

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Bacterial infections have become a global threat to mankind due to the evolution of multidrug resistant bacteria [1]. In the present scenario, there is an increasing demand for the development of new and more effective antibacterials. However, due to stringent regulatory requirements for approval and low returns on investment, pharmaceutical companies are not investing more into antibiotic research. Therefore, recent research trend is to give new life to currently existing antibiotics by preparing their complexes and/or by delivering them as nanomedicines [1]. Although a newly reported silver-furosemide complex has been shown to have significant *in vitro* antimicrobial activity, it has poor solubility in water which may be an obstacle in its introduction into clinics [2]. Therefore, the aim of present study was to encapsulate silver-furosemide complex into chitosan nanoparticles to enhance its solubility and antimicrobial activity. The silver-furosemide complex has been synthesized as per the literature procedure [2] and studies on its encapsulation into chitosan nanoparticles using ionotropic gelation technique are under way. Ultrafiltration method will be used to determine encapsulation efficiency and dynamic light scattering to measure size, polydispersity index and zeta potential. Surface morphology of nanoparticles will be studied using transmission electron microscopy. Expected results are nano sized chitosan nanoparticles with a high encapsulation efficiency, sustained drug release, and enhanced antimicrobial activity.

## References

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2. Lustri, W.R., et al., *J. Mol. Struct.*, 2017. **1134**: p. 386-394.

Funding Source: NIGMS RL5GM118969, TL4GM118971, UL1GM118970

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## Recommended Citation:

Vigil, Jade; Kalhapure, Rahul; Renukuntla, Jwals. "Nanotechnology based solution to enhance solubility and antibacterial activity of silver-furosemide complex " (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1194

# UFP and VOC gradient profile across a central El Paso, Texas community near Interstate 10 Highway

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Research has shown that exposure to air pollution increases the risk of a wide range of health problems. Furthermore, disproportionate exposure to air pollution is considered a driver of health disparities. In the U.S., land value is commonly low near highways resulting in socially disadvantaged individuals enduring disproportionate exposure to vehicle-related air pollutants such as ultrafine particles (UFP; diameter < 100 nm) as well as volatile organic compounds (VOC). Studies show that residential proximity to highways is associated with a wide range of health problems including asthma, cardiovascular disease, type 2 diabetes, and depression. It remains unclear however, what the small-scale spatial variation of traffic-related air pollutants near-highways is. This study was conducted to determine the gradients of UFP and VOC within the neighborhood of Sunset Heights, a neighborhood located in central El Paso, Texas alongside Interstate 10 (I-10). During the summer of 2017, ambient UFP and VOC levels were measured within the Sunset Heights neighborhood and sensitive receptors were identified. UFP were measured with P-Traks, (TSI Inc. Shoreview, MN) and VOCs were monitored with a RAE3000 monitor (RAE Inc, San Jose, CA). UFPs concentrations ranged between 1,390 and 87,000 and averaged 5418.6 particles per cubic centimeter (Pt/cc) within the neighborhood. VOCs were only detectable very near (<10m) I-10. Across the community, VOC were below the detection limit of the instrument (0 ppb), granting the wind direction was wafting due SSW with an average of 4.7 mph away from area of study. Results demonstrated that higher levels of particle pollution were recorded near the highway compared to 600ft further away. Pollution gradient was evident throughout the sampling procedure creating a higher awareness of pollution exposure to people living near major roadways such as I-10.

**Funding Source:** NIGMS RL5GM118969, TL4GM118971, UL1GM118970

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**Recommended Citation:**

Voight, Derrick; Medina, Angel; Olvera, Hector; Beltran, Ismael. "UFP and VOC gradient profile across a central El Paso, Texas community near Interstate 10 Highway" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1202

# Social Media Application in Smartphone Supply Chain Management

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Social media applications currently utilized around the world to influence the information flow aspect of worldwide supply chain management. Verifiable real-time data can provide timely and insightful information about several key aspects of the products supply chain and enable the supply chain to adapt quickly to ever-changing market conditions. In this research, supply chain relevant information gathered from Twitter is utilized to understand how the tweets about smartphone can affect the smartphone supply chain and its management. Based on relevant hashtags and keywords found in the latest news about each smartphone brand, data mining skill is utilized to extract and analyze the tweets with the specific hashtags or keywords from Twitter. To reduce the loss of a significant amount of event related information due to Twitter's APIs data access restrictions, the concept of refined hashtags and Keywords is also used to enhance twitter crawling model. Support vector machine algorithm, a machine learning method is applied to carry out sentiment analysis. By analyzing people's emotion towards a specific smartphone brand and the reason why the emotion happens, it is possible to predict what would happen to each part of the supply chain and enable them to make real-time adjustments to ensure a more robust supply chain management model. The output of the research is a new model of smartphone supply chain management with social media built-in, where information flow is faster, compared to the traditional model. Besides, drawback and modification for the model are also mentioned in this research for improvement.

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**Recommended Citation:**

Wu, Jiamin; Lopes, Amit. "Social Media Application in Smartphone Supply Chain Management" (2017). CURI Symposium Abstracts, Summer 2017, ID= 1170

# Development of a user-friendly mobile app for PPG-based heart rate monitoring devices

Cody A Yazzie<sup>1^</sup>, Ahmed E Ahmed<sup>2</sup>, Jaime R Perez<sup>2</sup>, Daniel J Cruz<sup>2</sup>, Cesar Y Sanchez Zambrano<sup>2</sup>, Mohammad Ghamari<sup>2\*</sup>

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The Photoplethysmography (PPG) signal can be used to aid in the analysis and estimation of a heart rate signal by non-invasive measures that could be used to assess a patient's cardiac health. The PPG sensor is used to detect changes in blood volume in the microvascular bed of body tissue; that is used in measuring heart rate variability (HRV). The sensor itself consists of a Photodiode detector and Infrared LED, both which are used to detect variations in the intensity of light. PPG sensors are usually placed on certain body locations to detect the light that is transmitted through or reflected from the tissue. The collected analog data is then digitized through an Analog to Digital Converter (ADC) for further additional processing. Subsequently, a user-friendly mobile app was designed and developed to enable visualization of collected PPG data on a smart device via Bluetooth technology. The developed mobile app can display a graphical representation of the PPG data in real time. Real world implications of our mobile app would help in reducing the cost of healthcare, reducing the number of hospital readmissions as well as patient outreach in rural areas assisting them in self-diagnosis; ensuring that they stay within prescribed parameters set by their physician. Profiling this data can ultimately assist physicians in diagnosis and possible prevention of cardiovascular related diseases.

**Funding Source:** NIGMS Award Numbers RL5GM118969, TL4GM118971, and UL1GM118970

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**Recommended Citation:**

Yazzie, Cody; Ahmed, Ahmed; Perez, Jaime; Cruz, Daniel; Sanchez Zambrano, Cesar; Ghamari, Mohammad. "Development of a user-friendly mobile app for PPG-based heart rate monitoring devices" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1179

# Predicting Epileptic Seizures using Deep Learning

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Epilepsy is the most common neurological disease, affecting about 50 million people worldwide. Those suffering from epilepsy often deal with seizures, which severely diminish their quality of life. For patients who do not respond to either drug treatment or surgery, seizure prediction is the only potential alternative. For this reason, automated seizure prediction has been an active area of research for the last few decades. While results are promising, accurate prediction remains an open problem. Recently, deep learning algorithms, which rely on extracting progressively more abstract representations from the data in order to solve classification and prediction tasks, have been successfully applied to a wide variety of problems, including image analysis and speech recognition. We are exploring the application of a deep learning algorithm, Long Short-Term Memory (LSTM), to the problem of epileptic seizure prediction. LSTM has shown excellent results in complex time-series analysis in the presence of noise, which makes it a very promising approach for seizure prediction.

**Funding Source:** UTEP Office of the Provost

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**Recommended Citation:**

Zamudio Arias, Miguel; Romero, Rodrigo; Fuentes, Olac. "Predicting Epileptic Seizures using Deep Learning" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1244

# Pyroelectric energy harvesting for high temperature applications

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Energy systems like coal gasification unit or gas turbine waste a significant amount of thermal energy to the environment that can be harvested from pyroelectric devices. Wireless sensors can be completely self-powered and battery free by harvesting this wasted energy. Most sensors in energy systems are exposed to high temperature and harsh environment, therefore the use of materials that can withstand these conditions are desirable. The pyroelectric material used in this high temperature energy harvesting project is Lithium Niobate (LNB). LNB is used because of its high Curie temperature of 1142 °C, thus making it promising to be applicable for high temperature energy harvesting compared to other pyroelectric ceramics. In addition, LNB is a lead-free material perfect to avoid damage to the environment and human health. Pyroelectric materials have the potential to generate electrical power from temperature fluctuations. In this research, a custom testing setup was developed to create a controlled heating and cooling environment. The current and power output generated from the pyroelectric material at different temperature ranges was characterized. The energy harvested was characterized by varying the resistive electrical load applied to the sample until the highest power output was found. With a controlled temperature change in the range of 200 °C to 225 °C it was found that a single wafer of LNB (7.62cm diameter, 0.5 mm thickness) can generate a peak power of 80nW and a peak energy density of 35.09nWcm<sup>-3</sup> with an optimal resistance of 19MΩ.

Funding Source: CIESESE

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**Recommended Citation:**

Zayas, Fabian; Chavez, Luis ; Lin, Yirong. "Pyroelectric energy harvesting for high temperature applications " (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1158

## **LIFE SCIENCES**

# Desiccation and pigmentation effects on mortality in a model organism when exposed to UVR

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UV radiation (UVR) reaching the Earth's surface has increased due to climate change. UVR has been shown to mutate DNA, slow locomotion, and reduce lifespan in zooplankton. However, in some species (e.g., *Daphnia*) increased resistance to UVR can occur when they are pigmented. The zooplankton community in ephemeral rock pools in the Chihuahuan Desert are often dominated by highly pigmented bdelloids. It is also known that bdelloid rotifers exhibit a high tolerance to UVR. This may be due to periods of desiccation they go through as part of their life cycle. The objective of this study is to determine effects of desiccation on bdelloids that contain high or moderate pigmentation by investigating differences in mortality post UVR exposure. *Pleuretra lineata* was collected from rock pools located in El Paso Co., TX. They were desiccated for a period of one day or one week, then exposed to UVR wavelength 305nm (130  $\mu\text{W}/\text{cm}^2$ ) for 2 hrs. After 24 and 48 hrs, survival was recorded. Preliminary results indicate that the survival of highly pigmented bdelloids desiccated for 24 hrs (% , mean  $\pm$  SD, 84 $\pm$ 4) was greater than those desiccated for 1 week (53 $\pm$ 3%). In all cases, unexposed controls showed high survival (98 $\pm$ 2). In comparison, an initial experiment using bdelloids with moderate pigmentation desiccated for 24 hrs showed a lower recovery rate (60 $\pm$ 5%). Additional exposures are underway to determine impacts on bdelloids with moderate or no pigmentation under both desiccation regimes. This study will increase our understanding of how aquatic biota tolerate extreme environments.

**Funding Source:** NSF

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**Recommended Citation:**

Apodaca, Rachael; Baeza, Maribel; Walsh, Elizabeth. "Desiccation and pigmentation effects on mortality in a model organism when exposed to UVR " (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1149

# Exposure to fluoxetine induces long-lasting changes in sensitivity to the rewarding properties of cocaine in female c57bl/6 mice

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Preclinical literature demonstrates that exposure to psychotropic medications, during early development, results in long-term altered behavioral responses to drugs of abuse, suggesting heightened drug liability. However, to date, these studies have been conducted in male subjects only. This is surprising, given that females, when compared to males, are more likely to be diagnosed with mood-related disorders, and thus, be prescribed with psychotropic medications such as antidepressants. Therefore, the objective of this study is to assess whether exposure to the selective serotonin reuptake inhibitor fluoxetine (FLX) results in altered sensitivity to the rewarding properties of cocaine, using female mice as a model system. Specifically, adult female c57BL/6 mice were exposed to FLX (in their drinking water, 250 mg/l) from postnatal days (PD) 70-84, a time frame that corresponds to early adulthood. Twenty-one days later (PD105+), mice were assessed on behavioral responsiveness to cocaine (0, 2.5, 5, 7.5 mg/kg) using the conditioned place preference paradigm. Our data demonstrate that female mice, previously exposed to FLX, display decreases in the total time spent in the drug-paired side-compartment, when compared to saline-treated controls. Collectively, this suggests that exposure to FLX leads to enduring decreases in sensitivity to the rewarding properties of cocaine, in female mice.

Sensitivity to cocaine (0, 2.5, 5, 7.5 mg/kg) using the conditioned place preference paradigm. Our data demonstrate that female mice, previously exposed to FLX, display decreases in the total time spent in the drug-paired side-compartment, when compared to saline-treated controls. Collectively, this suggests that exposure to FLX leads to enduring decreases in sensitivity to the rewarding properties of cocaine, in female mice.

**Funding Source:** National Institute on Drug Abuse (NIH-NIDA)

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**Recommended Citation:**

Arenivar, Miguel; Iniguez, Sergio. "Exposure to fluoxetine induces long-lasting changes in sensitivity to the rewarding properties of cocaine in female c57bl/6 mice" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1209

# The effects of intermittent dietary supplementation with fish oil on high fat diet-induced enhanced sensitivity to quinpirole

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Eating a diet that is high in fat can lead to obesity, type 2 diabetes, and dopamine system dysfunction. For example, rats eating high fat laboratory chow are more sensitive than rats eating standard chow to unconditioned behaviors induced by quinpirole (a dopamine receptor agonist). Dietary supplementation with fish oil prevents this effect when added to the chow daily. Doctors recommend that their patients take fish oil 2-3 times a week to decrease the symptoms of hypertension, arthritis, and cardiovascular diseases. It is not known if two days a week of fish oil supplementation would also prevent the effects of eating a high fat diet on drug sensitivity. To test the hypothesis that intermittent (e.g., 2/7 days per week) dietary supplementation with fish oil would also prevent the effects of eating a high fat diet (e.g., weight gain and enhanced sensitivity to quinpirole) rats eating standard chow (17% kcal from fat), high fat chow (60% kcal from fat), and rats eating standard or high fat chow with 20% (w/w) intermittent fish oil supplementation were tested once weekly with quinpirole (0.0032-0.32 mg/kg). Although these experiments are ongoing, based on previous reports we expect that dietary supplementation with fish oil will prevent the effects of eating a high fat diet on drug sensitivity and body weight.

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**Recommended Citation:**

Beltran, Nina; Serafine, Katherine; Hernandez-Casner, Caroline; Serafine, Katherine. "The effects of intermittent dietary supplementation with fish oil on high fat diet-induced enhanced sensitivity to quinpirole" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1112

# Genetic variation and population structure of a Chagas Disease vector *Triatoma rubida* along the Western Mexico-Texas Border

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Chagas disease is caused by the parasite *Trypanosoma cruzi* and transmitted by various species of kissing bugs (Order Hemiptera, Family Reduviidae, Subfamily Triatominae). In the United States, *Triatoma rubida* is the most important vector species. These insects transmit the parasite among various vertebrates, including humans and domestic animals. Historically, in the US little importance has been given to this disease system, since there was little evidence of active transition of Chagas disease in the country. However, recent studies have shown that the disease is highly prevalent among some vertebrates in the region and that the disease is increasingly being transmitted to humans and domestic animals in the US. In order to understand if changes in the population of this vector are related with this such change in the disease incidence, we characterized the genetic variation and population structure of this vector along the US-Mexican border. We sampled different locations along the US-Mexico border that differ in their degrees of urbanization. We characterized various mitochondrial and nuclear loci in order to calculate genetic indexes, demographic estimators, and phylodynamics among sampled locations. The results from our study allows to potentially relating the vector population dynamics with the recent emergence of Chagas disease cases in the US. Our findings highlight the importance of ecological studies that investigate the interplay between ecological, environmental, and human factors that shape the genetic structure of disease systems.

Funding Source: NSF

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**Recommended Citation:**

Calderon, Olivia; Khatchikian, Camilo. "Genetic variation and population structure of a Chagas Disease vector *Triatoma rubida* along the Western Mexico-Texas Border" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1199

# Identification of Akt1 inhibitors for the treatment of colorectal cancer

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Akt/PI3K (phosphatidylinositol 3-kinase/ protein kinase B) is an important protein in cell signaling, especially in the PI3k pathway. Mutations that lead to activation of Akt1 are often observed in colorectal cancer. Inhibition of this protein is crucial in suppressing such colorectal cancer cells (1). Our study focuses on finding inhibitors of Akt1 using structure-based drug discovery approach. We have performed a combination of computational techniques such as pharmacophore modeling, docking, molecular dynamics and Free Energy Perturbation calculations to accurately model protein-ligand interactions and calculate the binding of free energies. Initially, we generated a structure based pharmacophore using Phase module of Schrodinger suite. We performed a pharmacophore based search on zinc library (~4 million compounds) (2). We selected the top 50,000 compounds for the docking using GLIDE module of Schrodinger suite and rescored using our VinaXB (inhouse docking program) (3). Then took the top 20 molecules and further subjected them to Molecular dynamics simulations and their energies were calculated using MMPBSA/GBSA methods. We have identified 19 new compounds that may have a strong affinity to AKT1. The identified compounds have docking scores ranging from (-9 to -12.5 kcal/mol). These scores suggest that these ligands will have an affinity in micromolar to nanomolar concentration range. These molecules are being tested for their activity in cancer cell lines. We have used an efficient protocol for computer aided drug discovery to identify lead compounds for AKT1. Computer-aided methods can give insights into protein-ligand interactions and reduce the time and cost in early stage drug discovery process.

1. Br J Cancer. 2014; 110:2081–9.
2. *J. Chem. Inf. Model.*, **2015**, 55 (11), pp 2324–2337
3. *Journal of Cheminformatics* 2016 **8**:27

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**Recommended Citation:**

Cano, Denise; Fratev, Filip; Sirimulla, Suman. "Identification of Akt1 inhibitors for the treatment of colorectal cancer " (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1130

# Development of mesoporous silica nanoparticles for anti- cancer platinum drug delivery

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Breast cancer kills approximately 40,000 women annually, making it the second most common killer of women in the United States. Breast cancers are cutaneous, which can metastasize to other areas of the human body such as the brain, posing a significant threat to an individual's health. This research explores the use of mesoporous silica nanoparticles (mpSiNPs) loaded with a platinum drug in cutaneous tumor treatment to evaluate drug loading capacity, drug release and cytotoxicity. Mesoporous silica nanoparticles are a mode of delivery that is easy to generate, size-tunable and surface customizable for more directed targeting. Facile synthesis of the mpSiNPs generates nanoparticles ranging in size from 30 nm to 50 nm verified by transmission electron microscopy (TEM). Inductively coupled plasma optical emission spectroscopy (ICP-OES) analysis can be exploited to predict absorption of platinum drug solutions into the nanoparticles to identify their loading capacity. Kinetic experiments *in situ* will predict the rate of drug effluence into the surrounding environment. *In vitro* assaying will consist of incubation with the naked drug cisplatin, empty mpSiNPs, drug-loaded mpSiNPs and functionalized-drug-loaded mpSiNPs against MDA-MB-231 triple-negative breast cancer cells. Hypothetically, drug loaded mesoporous silica nanoparticles will exhibit enhanced cytotoxicity towards cancer cells, offering a novel therapy mode for cutaneous tumors.

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**Recommended Citation:**

Carrillo-Alvarado, Miguel; Pardo, Andrew; Varela, Armando; Noveron, Juan. "Development of mesoporous silica nanoparticles for anti-cancer platinum drug delivery" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1216

# Early life stress may cause life-long changes in brain reward structures and vulnerability to addiction in female rats

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Strong links have been drawn between stress and addiction in humans. Stress increases the likelihood of developing an addiction and increases the risk for relapse. The objective of this project was to investigate, in an animal model, if exposure to stress in early life causes persistent changes in the reward circuitry. We examined the expression of dopamine transporter (DAT), tyrosine hydroxylase (TH), and the ghrelin and dopamine type 2 (D2) receptors in the caudate putamen (CPu) and nucleus accumbens (NAcc) of adolescent, adult and aged female rats. We hypothesized that stress would decrease markers of dopaminergic signaling and increase sensitivity to endocrine signals such as ghrelin. Litters of rat pups were subjected to maternal separation for 3h/d on postnatal days 2-14. Brain tissues were collected from female rats at 1.4, 2.5 and 17 months of age, and the CPu and NAcc isolated for Western blotting. Protein bands of interest were quantified by densitometry, normalized to actin. Within either the adult or aged groups, no significant effect of stress was observed. However, when comparing across age groups, the expression of both DAT and TH were significantly different. Aged control rats had reduced DAT and TH levels than adult controls, and maternally-separated aged rats had lesser DAT and TH expression than adults who received the same neonatal stress paradigm. These data show that age is a contributing factor in the expression of dopaminergic markers in the female brain, and may impact how the reward circuitry responds to stress.

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**Recommended Citation:**

Cohen, Alexis; Sierra Fonseca, Jorge; Hamdan, Jameel; Saucedo, Jr. , Sigifredo; Gosselink, Kristin. "Early life stress may cause life-long changes in brain reward structures and vulnerability to addiction in female rats" (2017). *COURI Symposium Abstracts, Summer 2017*, ID=1211

# Antioxidants may be a protectant against Parkinson's disease as evidenced by the sticky dot test

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For this study rotenone, a pesticide which lesions dopamine neurons by interfering with complex 1 of the electron transport chain in the mitochondrial and creates free radicals, was used to produce a Parkinson's model. Two antioxidants, Ellagic acid and Na-β-Hydroxybutyrate, were tested to determine if they could prevent rotenone's toxic effects by scavenging free radicals. For this pilot study, seven groups of Lewis rats were used with three rats per group. The prophylactic compounds, Ellagic Acid and Sodium-β-Hydroxybutyrate, were administered for the first 7 days. Then on the 8th day, they were injected with rotenone simultaneously with the Ellagic acid and Sodium-β-Hydroxybutyrate for 5 days. The rat's injections were all done intraperitoneally to be absorbed systemically and replicate environmental exposure. On the 15th and 30th day three behavioral assessments; the sticky dot test, cylinder test, and paw placement test, were conducted to determine if impairments in somatosensory and motor function were present. It is hypothesized that out of the 7 groups, control groups will present normal activity in somatosensory as well as motor ability. Rotenone only treated rats will show deficits in somatosensory and motor abilities. Finally rats which receive prophylactic treatment prior and throughout rotenone administration, will show little to no deficits in somatosensory sensitivity and motor ability. If the data supports the aforementioned hypothesis, antioxidants may serve as a key role in providing neuroprotective properties that may aid in preventing the development of Parkinson's.

Funding Source: NIH 1SC3GM111200-01A1, NIH 2R25GMO49011-17

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**Recommended Citation:**

Collins, Stephen; Mendez, Lois; Henriquez, Gabriela; Narayan, Mahesh; Corral, Karen; Castañeda, Edward. "Antioxidants may be a protectant against Parkinson's disease as evidenced by the sticky dot test" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1240

# Antioxidants may be used as a prophylactic against Parkinson's disease through Cylinder Test evidence.

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Parkinson's is a neurodegenerative disease that causes motor, cognitive, and sensory deficits; symptoms which are mainly attributed to dopamine depletion in the Substantia nigra. Parkinson's is largely known as a sporadic disease with little to no genetic correlation. Due to limited information, finding a prophylactic to Parkinson's is crucial as it could help understanding this disease. Studies report that Rotenone, a mitochondrial inhibitor used as a pesticide, can cause dopaminergic neurons death *via* free radical production. Thus, rotenone was used to produce a Parkinson's model, and two antioxidant compounds, Ellagic acid and Na- $\beta$ -hydroxybutyrate (Na $\beta$ HB) were tested for neuroprotective potential. We hypothesized that these two compounds would work as a prophylactic and help decrease the negative effects of rotenone. Lewis male rats were used; they were divided into a total of 7 groups with necessary controls and experimental groups (i.e. Ellagic acid with rotenone, Na $\beta$ HB with rotenone, and rotenone only). The effects of the group and differences were assessed through behavioral tests. The cylinder test, a commonly used behavioral test, was used to measure limb movement by exploiting rats' natural exploratory behavior. Results are predicted to show little to no differences in our control groups while a statistical significance in rotenone group, and a decrease in the significance in both groups that were treated with the compounds. Being able to find a compound that could work as a prophylactic for Parkinson's can help change the approach used in preventing this disease.

**Funding Source:** 1SC3GM111200-01A1

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**Recommended Citation:**

Corral, Karen; Mendez, Lois; Henriquez, Gabriela; Collins, Stephen; Castaneda, Edward; Narayan, Mahesh. "Antioxidants may be used as a prophylactic against Parkinson's disease through Cylinder Test evidence." (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1239

# The effects of a high fat diet and physical activity on mitochondria, PLIN3, and PLIN5 protein contents in humans

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**Background:** Lipid droplet associated protein perilipin 3 (PLIN3) and perilipin 5 (PLIN5) have been associated with greater lipid oxidation and mobilization following exercise, however little is known regarding dietary effects on PLIN3 and PLIN5. **Purpose:** To determine the effects of a three-day high fat diet with and without physical activity on insulin sensitivity, skeletal muscle mitochondria, PLIN3 and PLIN5 proteins. **Methods:** Using a randomized crossover design, participants were assigned to either a high fat diet group without (HFD) or with physical activity (HFD+PA). HFD+PA walked on a treadmill to achieve a physical activity level of 1.8 (PAL; Total Daily Energy Expenditure/Resting Metabolic Rate) whereas HFD group achieved a PAL of 1.4, while consuming an isocaloric HFD (35/15/50% Carbohydrate/Protein/Fat). Insulin sensitivity was measured by oral glucose tolerance test. Mitochondrial content, PLIN3 and PLIN5 proteins were measured using immunohistochemistry techniques in *Vastus lateralis* muscle (biopsy). Images were captured and analyzed by ZEN and ImageJ software. **Results:** HFD resulted in insulin resistance (AUC±SEM; 424.5±38.2 to 319.2±33; p=0.02) however prevented with PA (424.4±42.3 to 445.2±5.2; p=0.99). Mitochondrial and PLIN 3 contents were unchanged regardless of PAL. PLIN 5 protein content did not change with HFD (102.8±5.2 to 93.8±5.5; p=0.37), but increased in HFD+PA (83.3±4.3 to 99.1±5.4; p=0.03). **Conclusions:** Physical activity prevented HFD-induced insulin resistance and increased PLIN5 content in skeletal muscle. PLIN5 protein content may play important role in physical activity-induced lipid oxidation.

Funding Source: Provost Office (SURPASS), NIH-NIMHD- RCMC Grant No. 5G12MD007592

**Recommended Citation:**

De La Pena, Catalina; Meza, Cesar; Montenegro, Cynthia; Maldonado, Matthew ; Varela, Armando; Covington, Jeffery; Bajpeyi, Sudip. "The effects of a high fat diet and physical activity on mitochondria, PLIN3, and PLIN5 protein contents in humans" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1167

# Neural mechanism underlying ethanol sensitivity and tolerance

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Alcohol is one of the most widely abused drugs worldwide. When consumed, alcohol can have a wide range of effects from euphoria to sedation. Excess alcohol consumption can have more deleterious repercussions such as risky behaviors including driving under the influence, sexual assault, and death. In flies, exposure to ethanol, an active ingredient of alcoholic beverages, leads to altered dopamine levels in the brain and causes a range of behavioral responses including hyperlocomotor activity, disinhibited courtship and sedation. The goal of this study is to determine the role of the dopamine D2 receptor in ethanol sensitivity and tolerance. To accomplish this, we exposed wild-type *Canton-S* (*CS*) and D2 receptor mutant (*d2r*) flies to daily ethanol and monitored their sedation profiles. We also measured the sedation profile of a single fly or a group of 8 or 33 flies to identify the effect of social environment on ethanol sensitivity and tolerance. Initial sensitivity represents the time for the flies to sedate on the first ethanol exposure, while tolerance development was quantified by the change of sedation times from the first to the second exposures. Furthermore, we conducted immunohistochemical analyses of Bruchpilot (pre-synaptic molecule) and Discs large (post-synaptic molecule) to investigate whether ethanol exposure leads to changes in synaptic communication. Findings will be reported during the presentation. Our study may offer important information about the neurobiological basis of alcohol sensitivity and tolerance development that are associated with susceptibility to alcohol abuse and addiction. In addition, our research may provide novel insights on how changing social environments impact individual responses to alcohol.

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**Recommended Citation:**

Delgado, Nataly; Sabandal, John; Sabandal, Paul; Han, Kyung-An; Park, Michelle; Park, Grace. "Neural mechanism underlying ethanol sensitivity and tolerance" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1230

# Genetic factors influencing inhibitory control in *Drosophila*

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Inhibitory control in *Drosophila* is regulated by three major factors that include social context, environmental stimuli, and genetics. We have previously shown that hyper dopamine activity triggers social-context impulsivity through the cAMP pathway. In the study, the trans-heterozygote flies with mutation in *fumin* (*fmn*) coding for a dopamine transporter (DAT) that re-uptakes extracellular dopamine and *dunce* (*dnc*) coding for a phosphodiesterase that breaks down cyclic adenosine monophosphate (cAMP) show loss of inhibitory control or impulsivity, while each heterozygous mutation does not cause impulsivity. The major goal of the study is to identify additional genes that interact with *fmn* for impulsivity. We first focused on the X chromosome genes by utilizing deficiency (*Df*) lines containing a deletion of multiple genes. We crossed the *fmn* homozygous flies with each *Df* line to generate trans-heterozygote mutants, which were subjected to the go/no-go test. This test measures flies' capacity for movement inhibition. We identified two deficiency lines that interact with *fmn*. The progress of the study will be presented. The knowledge gained from this research will enhance our understanding of how genetic interactions regulate behavioral control. This may have critical implications for neurological and mental disorders associated with impulsivity such as autism, schizophrenia, and drug addiction.

Funding Source: NARSAD grant number NIMH R21MH109953 , NSF grant number HRD-1202008

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**Recommended Citation:**

Diaz Erives, Julieta; Sabandal, Paul ; Han , Kyung-An. "Genetic factors influencing inhibitory control in *Drosophila*" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1227

# Laser cutter engraving for fabrication of dissolvable microneedle for drug delivery

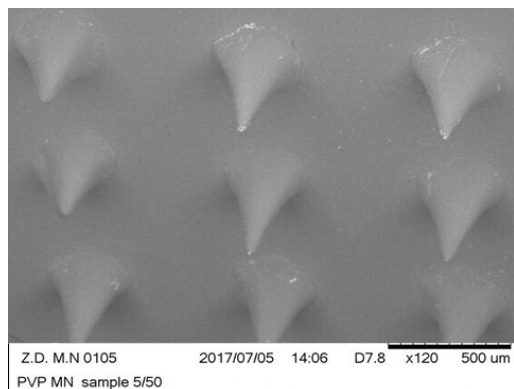
Zayra N Dorado<sup>1^</sup>, Rui Zheng<sup>2</sup>, Sharma Sanjay<sup>2</sup>, XiuJun Li<sup>3\*</sup>

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Conventional drug and vaccine delivery systems are limited in terms of targeted and effective delivery as they distribute the drug evenly and get degraded rapidly. Microneedles (MNs) mediated drug delivery has been developed to self-administer the medications into human's skin across the Stratum Corneum in a painless and patient-friendly manner alternative to hypodermic needle. Unlike other MNs, dissolving microneedles (DMNs) do not create any sharp bio-hazardous waste after its use. Current DMNs fabrication methods including photolithography are time consuming and complicated. In addition, harsh conditions required for loading of biological drugs and problems of standardizations also limit their applications. Herein, we report a novel, rapid, and efficient fabrication method of dissolvable microneedles for drug deliver A pre-designed template was used to create a PDMS mold by a single step laser engraving technique using a laser cutter. The parameters including, speed and power required for the laser cutter to obtain the desired PDMS mold were optimized. The mold was then placed to mold microneedles in a solution of polyvinylpyrrolidone (PVP) and polyethylene glycol (PEG). The DMN patch was then characterized using Scanning Electron Microscopy (SEM) to verify the shape and height of the DMNs. The purposed method of DMN fabrication is easy, low-cost, rapid, and efficient as compared to conventional method of fabrication. The DMN will be further tested for in vitro drug delivery using pigskin.



**Funding Source:** NIH R25GM60424

**Recommended Citation:**

Dorado, Zayra; Zheng, Rui; Sanjay, Sharma; Li, XiuJun. "Laser cutter engraving for fabrication of dissolvable microneedle for drug delivery" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1253

## *Anas platyrhynchos diazi* (Mexican Duck) nest surveys

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Part of the Mallard Complex, the Mexican duck is one of the least known of all waterfowl in North America, and its taxonomic standing (subspecies versus species) continues to cause controversy among the scientific community. Data ranging from basic biology to its evolutionary origins continues to be limited for this Chihuahuan desert endemic duck. By conducting nest searches, we aim to better understand the Mexican duck's nesting ecology, including habitat requirements, timing of nesting, etc. Here, we focused efforts in the 372 acre Rio Bosque Wetlands Park in El Paso, Texas. Nest searching was done by walking transects, with the entire area covered at least once. Data, including GPS location, presence/absence of hen, predation, hatching, etc., were taken for each nest. In total, 8 possible nest sites were located at Rio Bosque, with all but one having no hen. Whereas, five nests had nest structure, the remaining were laid on the ground with no additional cover. In general, habitat preference appeared to include the herbaceous plant, *Artemisia* sp. (sageweed). One nest was being incubated by a hen, which we monitored with a game camera. It was within two weeks of finding the nest that we found it abandoned, the cause being predation from a raccoon. In general, we found no broods and few nests being incubated, nest success appears to be low at Rio Bosque. Additional years of analyzing nest success, including expansion to other habitats or regions will be required to fully understand the breeding ecology of Mexican ducks.

**Funding Source: National Science Foundation**

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**Recommended Citation:**

Duenez, Esmeralda; Lavretsky, Phillip. "Anas platyrhynchos diazi (Mexican Duck) nest surveys" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1126

# Season and sex-specific variation in movement patterns by Western Diamond-backed Rattlesnakes (*Crotalus atrox*)

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Patterns of animal movement and space use reflect individual responses to spatiotemporal variation in the distribution of critical resources (e.g., food, water, shelter sites, mating partners) in the environment. In this context, patterns of habitat use are an important consideration due to variation in local resource distribution and abundance. We are investigating the effects of differential habitat use, season, and sex on variation in movement strategies by *Crotalus atrox* in an arid Chihuahuan Desert landscape. On our study site, Indio Mountains Research Station (IMRS), ephemeral cattle tanks or ponds have created discrete resource hotspots that contain an abundance of vegetation, prey, and water relative to surrounding native habitats, and, as a result, might influence movement and spatial strategies of snakes using these features. Through radio telemetry we have monitored movement and space use by 23 *C. atrox* (10 males and 13 females). Snakes display season and sex-specific patterns of movement expected under a polygamous mating system, with males increasing movement during mating seasons in mate-searching efforts and females showing no seasonal differences. However, relative to males in native habitats, male snakes using tank habitats display lower measures of movement and smaller home range sizes across seasons. During the mating season, this trend may be due to the spatial clustering of females around these resource hotspots. These results indicate that variation in local habitat quality on IMRS drives variation in movement strategies among individuals within a single population.

**Funding Source: National Science Foundation**

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**Recommended Citation:**

Ebert, Sarah; DeSantis, Dominic; Johnson, Jerry. "Season and sex-specific variation in movement patterns by Western Diamond-backed Rattlesnakes (*Crotalus atrox*)" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1151

# Effects of dietary fatty acid composition, in a high fat diet, on PLIN3 content

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High fat diets (HFD) are linked to the development of obesity and type 2 diabetes (T2D), characterized by impaired glucose homeostasis and glycogen storage in skeletal muscle. Excess lipid accumulation in muscle has been shown to disrupt insulin signaling and in turn, result in compromised glucose uptake and insulin sensitivity. Replacement of saturated fatty acids in HFD, with unsaturated (mono- and poly- unsaturated) fatty acids has been shown to reduce risks for insulin resistance, obesity and T2D. Conversely, PLIN3 – a lipid droplet associated protein – has been associated with greater lipid oxidation capacity and insulin sensitivity. The purpose of this study was to determine the effects of HFD, differing in fatty acid composition, on skeletal muscle PLIN3 content. Male Sprague Dawley rats were fed a mixed fat HFD (21% fat by weight) for 9 weeks to induce obesity, then divided into one of three HFD groups for 6 weeks; a control group followed a 15-week chow diet (CD). 6-week treatment diets included HFD rich in: mixed fat (WD), monounsaturated fatty acids (MUFA), or polyunsaturated fatty acids (PUFA). After 15 weeks, glycogen (periodic acid-schiff staining) mitochondria, GLUT4, and lipid contents were measured in extensor digitorum longus muscle, and PLIN3 will be measured in soleus muscle using immunohistochemical staining techniques and quantified with imageJ software. We hypothesize that HFD will result in lower PLIN3 contents, however a MUFA diet may attenuate deleterious reductions in PLIN3 compared to WD and PUFA.

Funding Source: NIH RL5GM118969, TL4GM118971, UL1GM118970, International Collaborative Research Grant Scheme

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**Recommended Citation:**

Fernandez, Dorian; Meza, Cesar; De La Pena, Catalina; Bajpeyi, Sudip. "Effects of dietary fatty acid composition, in a high fat diet, on PLIN3 content" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1213

# The effects of lorcaserin on high fat diet-induced enhanced sensitivity to quinpirole

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Eating a high fat diet can lead to negative health consequences, including obesity, type 2 diabetes, and can cause dysfunction to dopamine systems. For example, rats eating a high fat laboratory chow are more sensitive to dopamine receptor agonists (e.g., quinpirole). Specifically, quinpirole-induced unconditioned behavioral effects (i.e., yawning) are enhanced in rats eating high fat chow. Our laboratory is interested in potential preventative strategies or early interventions for the negative effects of eating a high fat diet. To test the hypothesis that lorcaserin, an FDA-approved obesity therapeutic, will prevent the enhanced sensitivity to quinpirole and weight gain associated with eating high fat chow, the behavioral effects of quinpirole (0.0032-0.32 mg/kg) were tested once weekly in different groups of rats that ate standard chow (17% kcal from fat) or high fat chow (60% kcal from fat), and received nightly injections of saline or lorcaserin (0.1, 0.32, 1.0 mg/kg). Although this experiment is ongoing, it is expected that sensitivity to quinpirole will be enhanced in rats eating high fat chow, and that lorcaserin will prevent this effect. This experiment would be the first to demonstrate that lorcaserin, which is currently used to treat obesity, might also be beneficial as a preventative measure for metabolic disease.

**Funding Source:** NIGMS Award Numbers RL5GM118969, TL4GM118971, and UL1GM118970

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**Recommended Citation:**

Flores-Robles, Grace; Hussain, Samirah; Serafine, Katherine. "The effects of lorcaserin on high fat diet-induced enhanced sensitivity to quinpirole" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1114

# Replacing saturated with monounsaturated fatty acids, in a high fat diet, protects against impaired skeletal muscle glucose transport.

Mario A Garcia<sup>1</sup>, Catalina De La Pena<sup>1</sup>, Cesar A Meza<sup>1</sup>, Cynthia Montenegro<sup>1</sup>, Lannie O'Keefe<sup>2</sup>, Shaan Naughton<sup>3</sup>, Anna Simcocks<sup>3</sup>, Deanne Hryciw<sup>4</sup>, Michael Mathai<sup>5</sup>, Armando Varela-Ramirez<sup>6</sup>, Andrew McAinch<sup>3</sup>, Sudip Bajpeyi<sup>1\*</sup>

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High fat diets (HFD) are linked to obesity and type 2 diabetes (T2D), characterized by reduced glucose uptake and increased lipid accumulation in skeletal muscle. Replacement of saturated fats in diet, with unsaturated (mono-and/or polyunsaturated) fatty acids may reduce risks for impairments in skeletal muscle metabolism. The purpose of this study was to determine effects of HFD, differing in fatty acid composition, on skeletal muscle glucose transporter protein-4 (GLUT4) content. Male Sprague Dawley rats were fed a mixed fat HFD (21% fat by weight) for 9 weeks to induce obesity, then divided into one of three HFD groups for 6 weeks; a control group followed a 15-week chow diet (CD). 6-week treatment diets included HFD rich in: mixed fat (WD), monounsaturated fatty acids (MUFA), or polyunsaturated fatty acids (PUFA). After 15 weeks membrane and cytosolic GLUT4, glycogen, lipid, and mitochondria contents were measured in extensor digitorum longus muscle using immunohistochemistry techniques. Total GLUT4 was lower in animals fed HFD rich in PUFA ( $p=0.01$ ) and mixed fat ( $p=0.02$ ) compared to controls (AU $\pm$ SEM; CD:25.1 $\pm$ 3.0, WD:13.0 $\pm$ 1.2, MUFA:21.9 $\pm$ 2.7, PUFA:11.5 $\pm$ 1.2). Membrane and cytosolic GLUT4 were also lower in WD and PUFA compared to control. Mitochondria content was lower in PUFA compared to CD ( $p=0.05$ ) and MUFA ( $p=0.03$ )(CD:59.7 $\pm$ 4.7, WD:45.8 $\pm$ 4.7, MUFA:60.3 $\pm$ 7.3, PUFA:37.4 $\pm$ 5.5). Glycogen content was lower in CD compared to WD ( $p=0.04$ )(CD:4.4.7 $\pm$ 0.04, WD:4.7.8 $\pm$ 0.1, MUFA:4.5.3 $\pm$ 0.1, PUFA:4.5 $\pm$ 0.1). There was no difference in lipid content between diets. Our data suggest that replacing saturated with monounsaturated fats, in HFD, subjects are protected from defects in skeletal muscle glucose transport fat oxidation capacity.

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#### Recommended Citation:

Garcia, Mario; De La Pena, Catalina; Meza, Cesar; Montenegro, Cynthia; O'Keefe, Lannie; Naughton, Shaan; Simcocks, Anna; Hryciw, Deanne; Mathai, Michael; Varela-Ramirez, Armando; McAinch, Andrew; Bajpeyi, Sudip. "Replacing saturated with monounsaturated fatty acids, in a high fat diet, protects against impaired skeletal muscle glucose transport. " (2017). *COURI Symposium Abstracts, Summer 2017*, ID=1241

# Multidrug resistant bacteria isolated from the Rio Grande River

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The Rio Grande River is an important water resource for domestic, agricultural, and recreational activities along the U.S.-Mexico border region. The river has been subject to quality issues including bacterial contamination, salinity, and low levels of dissolved oxygen in the El Paso TX- Juarez, Mexico segment. The objective of this study is to identify multidrug resistant bacteria in the Rio Grande River. Samples of water and sediment were taken from three different sites of the river. One-liter samples were collected and filtered using 0.45 µm filters. Filters were placed in selective and differential media and incubated for 24h at 37 °C. Using the Microscan automated bacterial identification system, 17 isolates were characterized with a 99.99% probability of correct identification and 32 isolates with a probability of correct ID of 90% or above. Bacteria included *Staphylococcus*, *Enterococcus*, *Aeromonas*, *E. coli*, *Yersinia* and *Vibrio*. From a total of 49 identified isolates, 15 of them showed resistance to at least 3 of the single antibiotics including Ampicillin, Cefazolin, and Gentamicin and 23 were resistant to at least one of the synergistic combinations, which include Ampicillin/Sulbactam, Amoxicillin/KClavulanate, Piperacillin/Tazobactam. The results indicate that potentially pathogenic bacteria displaying resistance to multiple antibiotics are found in the river.

**Funding Source:** NIH R25GM60424

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**Recommended Citation:**

Gomez, Jose ; Sahagun, Daniella; Mendoza, Jose; Alvarez, Maria. "Multidrug resistant bacteria isolated from the Rio Grande River" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1251

# The effects of eating a high fat diet on sensitivity to the behavioral effects of dopamine D1 receptor agonist SKF 82958 and methamphetamine

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Eating a high fat diet can cause obesity, type 2 diabetes, and dopamine system dysfunction. For example, rats eating high fat laboratory chow are more sensitive than rats eating standard chow to the behavioral effects of drugs that act on dopamine systems (e.g., methamphetamine). Despite robust sex differences regarding obesity and substance use disorder, most of the previous preclinical research in this area has used male rats exclusively. In order to test the hypothesis that eating high fat chow will enhance sensitivity of both sexes to the behavioral effects of a direct (SKF 82958; 0.01-3.2 mg/kg) and indirect-acting (methamphetamine; 0.1- 10 mg/kg) dopamine receptor agonist, 16 male and 16 female rats ate either standard chow (17% kcal from fat) or high fat chow (60% kcal from fat) and were tested once per week. Although these experiments are ongoing, it is expected that females will be more sensitive than males to both drugs, and that eating high fat will increase sensitivity of rats to both drugs. These results will provide a viable behavioral assay for both sexes and will potentially provide evidence to support that dopamine D<sub>1</sub> receptors contribute to the underlying mechanisms responsible for enhanced drug sensitivity due to a diet high in fat.

Funding Source: NIH-NIDA

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**Recommended Citation:**

Gonzalez, Adrian; Ramos, Jeremiah; Serafine, Katherine. "The effects of eating a high fat diet on sensitivity to the behavioral effects of dopamine D1 receptor agonist SKF 82958 and methamphetamine" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1113

# The effects of alcohol on social behavior

Ruta Grinceviciute<sup>^</sup>, Quiana W Vidal, Adam N Perry, Bruce S Cushing\*

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Drinking alcohol affects social behavior and it is associated with heightened aggression, intimate partner violence, and changes in parenting styles. Prairie voles (*Microtus ochrogaster*) are socially monogamous rodents which display pair bonding and biparental care. These characteristics make them an ideal model for studying effects of alcohol usage on social behavior relevant to humans. We hypothesize that drinking alcohol disrupts the normal social behavior of the prairie vole breeding pair. To test this hypothesis, adult female and male prairie voles were paired and allowed to produce 3 litters. Breeding pairs were placed into one of two groups: ethanol or water. The ethanol group had 24-hour access to 10% ethanol and water while the control group only had access to water. Ethanol was replaced with water after the second litter was born in order to examine recovery in the ethanol group. The latency to begin mating and affiliation were examined during the initial 72-hour cohabitation. Parental care tests were conducted after the birth of each litter to evaluate parental behavior of breeding pairs towards their pups. Our preliminary results suggest that drinking alcohol has negligible effects on parental care and mating. However, we found sex differences and effects of experience in the parental care tests. Overall, males sniffed pups more than females, and the approach towards pups was more rapid after the test with the first litter. We are currently conducting more detailed analysis of the behaviors to determine if there are shifts in the patterns of behavioral interaction.

Funding Source: NIH (2R25GM049011-17), NIH (5G12MD007592)

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**Recommended Citation:**

Grinceviciute, Ruta; Vidal, Quiana; Perry, Adam; Cushing, Bruce. "The effects of alcohol on social behavior" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1200

# Sex differences and the role of ovarian hormones in the expression of nicotine withdrawal in rats

Grace G Hendricks<sup>1</sup>, Rodolfo J Flores<sup>2</sup>, Kevin Uribe<sup>2</sup>, Bryan Cruz<sup>2</sup>, Victor Correa<sup>2</sup>, Luis M Carcoba<sup>2</sup>, Laura E O'Dell<sup>2\*</sup>

<sup>1</sup> *Department of Chemistry, New Mexico State University.*

<sup>2</sup> *Department of Psychology, The University of Texas at El Paso.*

The present study utilized a rodent model of nicotine withdrawal to compare sex differences and the role of ovarian hormones in the expression of the physical signs and negative affective states produced by nicotine withdrawal. Female rats received either a surgical sham or ovariectomy (OVX) procedure. Fifteen days later, all rats were implanted with an osmotic pump that delivered nicotine for 14 days. On test day, rats received an injection of vehicle or the nicotinic receptor antagonist, mecamylamine (1.5 or 3.0 mg/kg) to precipitate withdrawal. On the test day, rats were tested for physical signs of withdrawal and anxiety-like behavior (elevated plus maze and light/dark transfer procedure). Immediately after testing, trunk blood was collected for plasma analysis of the stress hormone-corticosterone and the gonadal hormones-testosterone, progesterone and estradiol using ELISA procedures. Female rats also received vaginal lavage procedures to verify the phase of the estrous cycle during testing. Our results suggest that females display a larger magnitude of physical signs and anxiety-like behavior during withdrawal as compared to males and OVX rats. The latter effect appears to be most strongly correlated with high levels of corticosterone. Although the males did show signs of withdrawal, this effect did not appear to be correlated with testosterone levels. Our results provide evidence for a relationship between stress peptides and the expression of nicotine withdrawal in females.

**Funding Source:** National Institute of General Medical Sciences of the National Institutes of Health

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**Recommended Citation:**

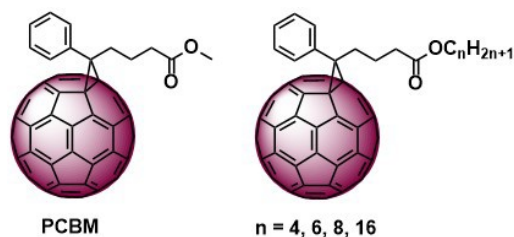
Hendricks, Grace; Flores, Rodolfo; Uribe, Kevin; Cruz, Bryan; Correa, Victor; Carcoba, Luis; O'Dell, Laura. "Sex differences and the role of ovarian hormones in the expression of nicotine withdrawal in rats" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1245

# Large-Scale Production of Therapeutic Monoclonal Antibodies against Co-Inhibitory Immune Receptors PD-1 and BTLA

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Co-inhibitory receptors regulate immune cell activation and play a vital role in maintaining immune homeostasis by delivering “turn off” signals. Members of the CD28 family of co-inhibitory receptors are expressed on a variety of hematopoietic cells and include PD-1 and BTLA receptors. Manipulation of these negative signals may provide therapeutic strategies for the treatment of autoimmune diseases, transplantation tolerance and cancer. In fact, the FDA has approved the use of monoclonal antibodies (Ipilimumab) against CD28 family member, CTLA4, for the treatment of Stage 3 metastatic melanoma as well as Atezolizumab, against PD-1 ligand (PD-L1), for the treatment of urothelial carcinoma. However, little is known about the therapeutic value of monoclonal antibodies toward BTLA. To address this deficiency, we have developed novel monoclonal antibodies against the extracellular domains of human BTLA and PD-1. Because in vivo testing to establish anti-cancer properties requires large quantities of purified antibody, we have grown PD-1 and BTLA hybridoma cells in serum free media within a bioreactor flask for two months. Antibody rich media was collected every 3 days and screened for antibody production by SDS-PAGE analysis. Fractions found to contain antibody were purified by column chromatography and subjected to BCA analysis to determine total protein concentration. Studies are currently underway to test these purified antibodies within a mouse model breast cancer system. It is envisioned that such antibodies could potentially be used to block the activation of signaling pathways that turn off the immune response thus “super charging” the immune system against cancer.



Funding Source: BUILDing Scholars, Lizanell and Colbert Coldwell, MARSH foundation

#### Recommended Citation:

Hernandez, Juan; Acuna, Rosabril; Rodriguez, Georgialina; Kirken, Robert. "Large-Scale Production of Therapeutic Monoclonal Antibodies against Co-Inhibitory Immune Receptors PD-1 and BTLA" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1246

# The role of serotonin in movement inhibition

Samantha J Hinojos<sup>^</sup>, Paul R Sabandal, Kyung-An Han\*

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Serotonin (5-hydroxytryptamine; 5-HT) is a major neuromodulator that mediates diverse brain functions like mood, anxiety, and sleep. Our previous studies have shown that 5-HT is an important regulator of inhibitory control in flies. Specifically, chronic inhibition of 5-HT activity through tetanus toxin that blocks synaptic output causes abnormal movement inhibition or impulsivity. This suggests 5-HT is crucial for suppressing impulsivity. The major goal of this study is to investigate the mechanism that 5-HT regulates movement inhibition. We used the Go/No-Go paradigm to test movement inhibition in *Drosophila*. To modulate 5-HT activity, we utilized the pharmacological and genetic approaches. In the pharmacological approach, we fed flies with the 5-HT precursor 5-hydroxytryptophan (5-HTP) to increase, and the inhibitor of tryptophan hydroxylase 4-Chloro-DL-phenylalanine (PCPA) to decrease 5-HT levels. In the genetic approach, we expressed the heat-sensitive cation channel TpA1 or Shibiri(ts) to temporarily activate or inhibit 5-HT neuronal activity, respectively. The progress of the study will be presented. Inhibitory control is an important cognitive process that allows individuals to suppress inappropriate actions in order to have goal-directed behavior. Findings of this study may offer important insights into the neurological disorders associated with impulsivity including insomnia, depression, attention deficit-hyperactivity disorder (ADHD), seizure disorder, and Parkinson's disease.

**Funding Source: NIMH R21MH109953, Brain & Behavior Research Foundation NARSAD**

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**Recommended Citation:**

Hinojos, Samantha ; Sabandal, Paul; Han, Kyung-An. "The role of serotonin in movement inhibition" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1231

# Structural significance of the R136W point mutation in Hsp27 that leads to neurodegenerative disease

Anna K Orta<sup>^</sup>, Ricardo A Bernal\*, Janelly Villalobos, Bianka Holguin, Jay Bhatt, Ricardo A Bernal\*

*Department of Chemistry, The University of Texas at El Paso.*

Chaperones are protein complexes that aid during the refolding of misfolded proteins to prevent aggregation. Hsp27 is a stress induced chaperone, member of the small heat-shock protein family, associated with cytoskeleton remodeling and apoptosis inhibition. The replacement of amino acid arginine to tryptophan in the 136 position has been correlated with the conversion of Hsp27 to a hyperactive state leading to the degeneration of peripheral neurons manifested as Charcot-Marie Tooth neuropathy (CMT). This project focuses on the structural characterization of the wild type Hsp27 and of the mutation R136W in Hsp27. It aims at utilizing the 3D structure of Hsp27 WT and mutant, to obtain a better understanding of the effect if a single point mutation in the activity of Hsp27. Structure characterization and activity assays were used to link the mutation's effect on the protein structure to the associated disease CMT. Hsp27 WT and mutant were purified through anion exchange and size-exclusion chromatography (SEC). Astonishingly, based on results obtained through SEC, Hsp27 forms a range of both large and small complexes. Both the wild-type and the mutant have similar activities of the small complex, unexpectedly, the wild-type large complex can inhibit protein aggregation while the mutant large complex is unable to do so. Mutant complexed Hsp27 appears to readily bind a substrate without preventing protein aggregation despite being able to form complexes as the wild-type. A 3D reconstruction of both the mutant and the wild type large complexes will aid towards determining any structural changes the mutation may cause on Hsp27.

**Funding Source:** Welch Foundation (AH-1649), NIH-NIGMS (SC3GM113805)

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**Recommended Citation:**

Orta, Anna; Bernal, Ricardo; Villalobos, Janelly; Holguin, Bianka; Bhatt, Jay; Bernal, Ricardo. "Structural significance of the R136W point mutation in Hsp27 that leads to neurodegenerative disease" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1176

# Evaluation of anti-tuberculosis and cytotoxic activity of ursolic acid and osthole with *Mycobacterium marinum* and in vitro cell infection models

Zongyu Huang<sup>1^</sup>, Wanyu Tao<sup>1^</sup>, Javier Aguilera<sup>1</sup>, Mei Han<sup>2</sup>, Jianjun Sun<sup>1\*</sup>

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<sup>2</sup> *Department of Chemistry, Beijing Normal University.*

As a major infectious disease caused by *Mycobacterium tuberculosis* (Mtb), tuberculosis (TB) is now affecting millions of people's health in the world. Because of the emergence of some drug-resistant strains, the development of new drugs has become a necessity. In previous studies, two compounds (Ursolic acid and Osthole) extracted from Chinese herbs showed protective effect on *M. marinum*-infected Raw 264.7 macrophages. But the mechanisms and their MICs (minimum inhibitory concentrations) for mycobacteria remain unknown. In this study, we aim to find out the MICs of the two compounds for mycobacteria and reveal the possible mechanisms of their protective effect. ESAT-6 is a pore-forming toxin in Mtb that is required for its virulence. We also want to find out if the two compounds can inhibit its activity. In the lack of sources for TB, we substituted it with *Mycobacterium marinum* in our study because of their close relationship to each other including their similar ESAT-6 secretion systems. We used high-throughput screening to test the compounds on DH5 $\alpha$  E.coli, *Mycobacterium smegmatis* and *Mycobacterium marinum*. In our experiments neither of the compounds showed direct and significant inhibitory effect on growth of the bacteria in flask. There is a possibility that ursolic acid and osthole may stimulate the ability of macrophage to inhibit mycobacterial growth inside cells. In order to find out if ESAT-6 is the possible target(s) of the compounds, we used both wild-type *M. marinum* and ESAT-6 knockout strain to infect Raw 264.7 macrophages to establish the infection models. The on-going experiment is to test if the compounds inhibit the mycobacterial infection through stimulating the defense mechanisms of macrophages.

Funding Source: 2SC1 GM095475.

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#### Recommended Citation:

Huang, Zongyu; Tao, Wanyu; Aguilera, Javier; Han, Mei; Sun, Jianjun. "Evaluation of anti-tuberculosis and cytotoxic activity of ursolic acid and osthole with *Mycobacterium marinum* and in vitro cell infection models" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1218

# Environmental factors affecting fly inhibitory control

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Environmental factors influence how humans and animals behave. For example, animals encountering a predator will either hide, fight or escape from it. However, it is unclear how the brain selects appropriate behavioral responses to specific stimuli. Our goal is to test how different environmental stimuli affect the *Drosophila* behavior particularly inhibitory control. Inhibitory control is an essential cognitive process that allows flies to control their movements or actions appropriate in a given context. Here, we exposed wild type *Canton-S(CS)* flies to various stimuli such as changing light, weather-associated sounds, and predator pictures and sounds. Then, the flies were subjected to the Go/No-Go test. This test measures the flies' ability to suppress their movement upon exposure to salient stimuli such as strong wind. We found that the different manipulations had distinct effects on fly movement suppression ranging from no effect to delayed inhibition. Also, we investigated whether these external cues cause changes in synaptic activity in the fly brain by visualizing the synaptic molecules Bruchpilot (presynaptic) and Discs-large (post-synaptic). The progress in this study will be presented. Our innovative study is likely to fill the knowledge gap on the environmental factors influencing animal behavior and the underlying mechanisms.

**Funding Source:** NIMH R21MH109953, Brain & Behavior Research Foundation NARSAD

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**Recommended Citation:**

Li, Linlin; Sabandal, Paul; Han, Kyung-An. "Environmental factors affecting fly inhibitory control" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1223

# Expression and purification of human Neuronal PAS domain protein 2 (hNPAS2) for structural studies

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Circadian rhythm is the internal time-keeping system that dictates the physical and mental processes of organisms in a 24-hour cycle. The circadian rhythm is vital to maintaining homeostasis in organisms, and the long-term disruption of the circadian rhythm in humans has been linked to various physical and psychological diseases. The protein Circadian Locomotor Output Cycles Kaput (CLOCK) forms a heterodimer together with Brain and Muscle Arnt-like protein-1 (BMAL1) and activates the cycle through a time delayed transcriptional/translational feedback loop. Neuronal PAS domain protein 2 (NPAS2) is a functional analogue paralog of CLOCK protein, but is expressed in special tissues such as the prefrontal cortex of the brain. Both CLOCK and NPAS2 are key proteins to maintain the circadian rhythm. The purpose of this project is to determine the structure of full length human NPAS2 (hNPAS2). Full length hNPAS2 gene was cloned into a pCold-TF expression vector. Expression and purification has been previously tested in BL21 (DE3) cells. However, the recombinant protein was not soluble. Therefore, the expression construct has been transformed into E. coli BL21(DE3) cells that carries molecular chaperones. After expression has been optimized, purification of hNPAS2 will be performed through affinity chromatography. The solubility and folding of the protein will be assessed by size exclusion chromatography and circular dichroism. Once obtaining pure and soluble hNPAS2, crystallization and structural determination will be performed. Determination of the atomic structure of hNPAS2 will provide important information for understanding the circadian rhythm; contribute to developing therapeutic agents for circadian related disorders.

**Funding Source:** NIGMS-NIH

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**Recommended Citation:**

Li, Diyang; Rodriguez, Jose ; Moriel, Karla; Ray, Supriyo; Xiao, Chuan. "Expression and purification of human Neuronal PAS domain protein 2 (hNPAS2) for structural studies" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1131

# Octopamine regulates movement suppression in flies

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2 Department of Biological Sciences, The University of Texas at El Paso.

Octopamine, a homolog of the vertebrate norepinephrine, is a neuromodulator that mediates diverse physiological processes in invertebrates. Behavioral inhibition allows a person or an animal to stop an ongoing action that is not proper in a given context. This behavior is essential for fitness and survival. The major goal of this study is to investigate the mechanism that octopamine regulates inhibitory control. We have previously identified that the wild type Canton-S(CS) flies showed sustained locomotor suppression under strong airflow (i.e. wind). The flies with increased octopamine activity showed abnormal inhibition, suggesting that octopamine is an important regulator of inhibitory control. To identify the octopamine mechanism critical for inhibition, we tested the flies lacking individual octopamine receptors OAMB (oamb), Octb1R (oar1) and Octb2R (oar2) as well as the flies lacking octopamine (tbh). Also, we investigated whether the flies with abnormal octopamine or octopamine receptor mutants have altered synaptic communication by examining Bruchpilot (presynaptic) and Discs-large/PSD-95 (postsynaptic). The findings of this study will be presented. This study will help enhance the knowledge of how the adrenergic system regulates inhibitory control, which is largely unknown.

**Funding Source: NIMH R21MH109953, Brain & Behavior Research Foundation NARSAD**

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**Recommended Citation:**

Liu, Yan; Sabandal, Paul; Han, Kyung-An. "Octopamine regulates movement suppression in flies" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1229

# The effects and the correlation of *Francisella tularensis* infection amongst alcoholic humans, nonalcoholic humans, alcoholic rats and mice.

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*Francisella tularensis* (F. Tularensis) infection stimulates an exuberant inflammatory response, culminating in a hypercytokinemia also known as cytokine storm. The cytokine storm is responsible for much of the symptomatology of Tularemia. Previous studies have suggested that elevated basal inflammation may predispose individuals to greater disease and death from F. Tularensis exposure. In order to determine whether chronic inflammation from alcohol abuse influences susceptibility to F. Tularensis, a blind study is being conducted. Blood samples will be taken from both alcoholic and nonalcoholic human patients, along with alcoholic rodents. Different biomarkers of stress, inflammation, physiology and addiction are being interrogated. These experiments will determine if there is a similarity between the allostatic load of alcoholic humans and rodents. Knowing that humans and rodents have the same physiological response to alcohol allows us to translate rodent studies to alcoholic humans using the data gathered from the use of Milliplex kits. Subsequent experiments utilizing the Milliplex kits and the Luminex maps computer program will then test the susceptibility of alcoholic rodents to the bacteria *Francisella tularensis* disease and death.

Funding Source: NIGMS, NIH, Award Numbers RL5GM118969, TL4GM118971, and UL1GM118970

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**Recommended Citation:**

Lovato, Cicilia; Spencer, Charles. "The effects and the correlation of *Francisella tularensis* infection amongst alcoholic humans, nonalcoholic humans, alcoholic rats and mice." (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1243

# Water potential variations in dryland shrubs before and after a rainfall event

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The amount of water stress a plant is under can influence the ability of the plant to take up and transport nutrients and water. Water potential measurements allow us to determine the direction in which the water flows through a system. These measurements, along with volumetric soil water content, allow us to identify points of increased and decreased activity in dryland grasses after a rainfall event. Water potential measurements will be taken from 3 individuals of *Gutierrezia sarothrae* (C3 shrub) along with the soil water potential and soil water content of the surrounding area. Root water potential measurements will be taken at three time points using a pressure chamber: 1) before an artificial rainfall event in the evening, 2) the following day at predawn (water added after evening measurement), and 3) at midday. A Campbell Scientific data logger will be recording the soil water potential and soil water content every hour throughout this event. We expect the plant to be more active at predawn followed by a state of inactivity by midday. This will provide a reference point for when plant activity is at its lowest and provide a greater understanding to processes influenced by water, such as nutrient translocation.

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**Recommended Citation:**

Lozano, Javier; Darrouzet-Nardi, Anthony . "Water potential variations in dryland shrubs before and after a rainfall event" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1154

## Abstract Falls in Men

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*School of Nursing, The University of Texas at El Paso.*

Many studies have been done on falls of elderly men, but not very many studies have been done on falls of men ages 40-60. Men are at very high risk to die of injuries from their falls, and it is more serious for middle-aged men since they are more frequently found in the work place than elderly men. This was a quantitative, retrospective study of falls of men from January 1st, 2014- December 31st, 2017. The data was provided from emergency response records to falls in 2014 provided by the El Paso Fire Department. It was found in the data that middle-aged men fell significantly more than other age groups. There was an increase in falls from the age groups 36-40 and 41-45 and up. This indicates that middle-aged men tend to fall more. Based on the times of day the falls occurred, they were more than likely at work, possibly on a construction site or any other dangerous jobs that require climbing ladders or doing blue collar work. This study showed that middle-aged men are at a very high risk for injurious falls. These falls more than likely occur outside and in the workplace, causing them to be more deadly. It shows that there are very high rate in falls in middle-aged men and it brings attention to the risk that they are at. This study will influence health care by bringing attention to the situation and help to inform health care workers and patients of steps that need to be taken to prevent this problem.

**Funding Source:** NIMGMS RL5GM118969, TL4GM118971, UL1GM118970

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**Recommended Citation:**

Martinez, Mary Ann; Solis, Guillermina. "Abstract Falls in Men" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1237

# Root, fungal, and microbial biomass spatial distribution in the fungal loop hypothesis

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Aridland ecosystems often possess lower amounts of soil organic matter (SOM) than mesic systems, leading to reduced nutrient availability to plants. This is a result of the lower and water-limited activity of decomposer microbes. Microbes in arid ecosystems are often aggregated in biological soil crusts (biocrusts), which are clusters of autotrophic and heterotrophic bacteria, fungi, and lichens serving also as major N input points. The fungal loop hypothesis asserts that fungal hyphae in arid ecosystems serve as conduits between plants and biocrusts, by translocating N to plants (from biocrusts) and C (from plants) to biocrusts. The hypothesis thus far is supported by several lines of direct and circumstantial evidence including observations of translocation from isotopic labeling studies with C and N compounds. Theoretically, the hypothesis predicts a specific distribution of root, fungal, and microbial biomass in the soil profile. Roots should be mostly restricted to deeper layers, and not in the upper 0-5 cm where biocrusts reside, while fungi should be ubiquitous throughout the soil profile (as a network between the crusts and roots), and microbial biomass should be aggregated in the upper 0-5 cm of the soil. In the present study, these predictions were tested using a radial distance and depth sampling design centered about a *Bouteloua eriopoda* individual. Root biomass was found to follow this pattern, and fungal biomass was homogeneously distributed. These data help eliminate the possibility that roots are associating with the biocrusts directly, and that a fungal network may indeed exist between them.

**Funding Source:** NSF REU Program

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**Recommended Citation:**

Mettler, Charles ; Darrouzet-Nardi, Anthony . "Root, fungal, and microbial biomass spatial distribution in the fungal loop hypothesis " (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1146

# Purification of GST-SAE1/SAE2 for GAM1 interaction studies

Brenda Moreno<sup>1^</sup>, Jose E Rodriguez<sup>1</sup>, Hengwei Zhu<sup>1</sup>, Andres Rubio<sup>1</sup>, Yuejiao Xian<sup>1</sup>, Supriyo Ray<sup>1</sup>, German Rosas-Acosta<sup>2</sup>, Chuan Xiao<sup>1\*</sup>

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SUMOylation is a post-translational modification system that covalently conjugates small ubiquitin-like modifier (SUMO) tags to target proteins. SUMOylation has many important functions in protein stability, cellular protein localization, and other protein pathways. Recent studies show this post-translational regulatory mechanism is used by viruses to benefit their replication. Investigations of virus-host protein-protein interaction are key to understand the mechanism by which viruses achieve this. GAM1, a protein coded by the avian CELO adenovirus, has been found to completely disrupt the SUMO pathway to promote viral replication. GAM1 inhibits the function of SUMO activating enzyme-1, SAE1/SAE2, heterodimer, whose activation initiates the pathway. Understanding the interaction between GAM1 and SAE1/SAE2 will be critical to understand the molecular mechanism of the inhibition. To achieve this goal, sufficient amounts of SAE1/SAE2 will be needed. SAE1/SAE2 has been cloned as a fused protein into bacterial expression vector with N-terminal GST tag. GST-SAE1/SAE2 has been expressed by bacteria using optimized conditions. With enough pure protein, the interaction analysis will be studied through pull-down assays, affinity chromatography, and electron microscopic reconstruction. The results will provide knowledge about virus-host protein-protein interaction and will build the foundation to develop antiviral inhibitors targeting the SUMOylation pathway.

**Funding Source:** NIGMS-NIH, Office of the Provost (SURPASS)

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**Recommended Citation:**

Moreno, Brenda; Rodriguez, Jose; Zhu, Hengwei; Rubio, Andres; Xian, Yuejiao; Ray, Supriyo; Rosas-Acosta, German; Xiao, Chuan. "Purification of GST-SAE1/SAE2 for GAM1 interaction studies" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1129

# Less is more: Nutrient enrichment of small arctic aquatic ecosystems

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Nowhere is global warming observed more keenly as in the Arctic, where temperatures have increased by 2 degrees over the past half century. With increasing temperatures in the Arctic comes an increase in the amount of nutrients being released from thawing permafrost into the surrounding ecosystems. These greater nutrient levels can have important implications for primary production and landscape-level estimates of carbon uptake and efflux. Previous results showed that carbon dioxide efflux was greatest from freshwater sites tightly linked to the landscape, such as small ponds and thermokarst ponds. We wanted to test if similar patterns would be observed for other nutrients. Water samples were collected from five different site types in Barrow, Alaska (ponds, thermokarst ponds, lakes, rivers, saline rivers) and were tested for ammonia concentrations. Preliminary results show that ammonia levels were significantly higher in thermokarst ponds compared to other sites. These sites, which are characterized by accelerated permafrost thaw and slumping of surrounding land, are large nutrients sources in the landscape. Understanding the consequences on higher nutrients into the surrounding ecosystems will help aid in further research on how to accommodate to these rising temperatures and increasing nutrient levels.

**Funding Source:** NSF

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**Recommended Citation:**

Ornelas, Lydia; Lougheed, Vanessa. "Less is more: Nutrient enrichment of small arctic aquatic ecosystems" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1254

# Structural significance of the R136W point mutation in Hsp27 that leads to neurodegenerative disease

Anna K Orta<sup>^</sup>, Janelly Villalobos, Bianka Holguin, Jay Bhatt, Ricardo A Bernal\*

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Chaperones are protein complexes that aid during the refolding of misfolded proteins to prevent aggregation. Hsp27 is a stress induced chaperone, member of the small heat-shock protein family, associated with cytoskeleton remodeling and apoptosis inhibition. The replacement of amino acid arginine to tryptophan in the 136 position has been correlated with the conversion of Hsp27 to a hyperactive state leading to the degeneration of peripheral neurons manifested as Charcot-Marie Tooth neuropathy (CMT). This project focuses on the structural characterization of the wild type Hsp27 and of the mutation R136W in Hsp27. It aims at utilizing the 3D structure of Hsp27 WT and mutant, to obtain a better understanding of the effect if a single point mutation in the activity of Hsp27. Structure characterization and activity assays were used to link the mutation's effect on the protein structure to the associated disease CMT. Hsp27 WT and mutant were purified through anion exchange and size-exclusion chromatography (SEC). Astonishingly, based on results obtained through SEC, Hsp27 forms a range of both large and small complexes. Both the wild-type and the mutant have similar activities of the small complex, unexpectedly, the wild-type large complex can inhibit protein aggregation while the mutant large complex is unable to do so. Mutant complexed Hsp27 appears to readily bind a substrate without preventing protein aggregation despite being able to form complexes as the wild-type. A 3D reconstruction of both the mutant and the wild type large complexes will aid towards determining any structural changes the mutation may cause on Hsp27.

**Funding Source:** Welch Foundation (AH-1649), NIH-NIGMS (SC3GM113805)

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**Recommended Citation:**

Orta, Anna; Villalobos, Janelly; Holguin, Bianka; Bhatt, Jay; Bernal, Ricardo. "Structural significance of the R136W point mutation in Hsp27 that leads to neurodegenerative disease" (2017). COURI Symposium Abstracts, Summer 2017, ID= 1176

# Improving El Paso area land conservation and public education

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<sup>2</sup> *Staff, Frontera Land Alliance .*

According to the 2014 *Outdoor Recreation Report*, more than 50% of the United States did not participate in a single recreational outdoor activity in 2013. Of the ethnic groups surveyed, Hispanics are the second lowest rate with only 8% of them participating in recreational outdoor activities nationwide. The Frontera Land Alliance is a local non-profit dedicated to land conservation by establishing land conservation easements in the area which heavily relies on local support. The Frontera Land Alliance does not currently have an established educational outreach program, but decided to build a baseline in the summer of 2017. This research internship took place with Frontera with the goal of studying different methods to engage the community. Throughout various activities like El Paso Times op-eds, presentations at different locations, guided hikes and several educational Facebook posts, progress was monitored to compare the amount of people reached during this baseline project versus previous summers without any educational outreach activities. This project focused on monitoring different methods of outreach to engage locals in a predominantly Hispanic community to study if the activities impacted new members to join, current members to actively participate in new activities, and overall how many new people were reached as a result.

**Funding Source: National Science Foundation**

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**Recommended Citation:**

Paredes, Magdalen ; Reneaud-Field , Janae . "Improving El Paso area land conservation and public education" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1168

# Differential expression of glycine receptors in the globus pallidus, thalamus and striatum

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<sup>2</sup> *Department of Biological Sciences, The University of Texas at El Paso.*

The brain is a complex system of cells, proteins, and neurons acting together to carry many of the functions of the body. A specific type of receptor in the brain, known as the glycine receptor (GlyR), is responsible for interpreting the signals of the neurotransmitter glycine which initiates a change in the conformation of the receptor allowing chloride to enter a neuron and reducing its probability to elicit an action potential. The glycine receptor is comprised of differing combinations of five subunits, known as alpha-1, alpha-2, alpha-3, alpha-4, and beta. In our study, the different alpha isoforms of the glycine receptor subunits were identified in different parts of the brain, specifically in the cortex, striatum, thalamus, globus pallidus, and brainstem. We hypothesize that GlyR alpha subunits are differentially express in different brain regions. The results from our study suggest that high concentrations of alpha-1, 2, and 3 are fund in the striatum and the thalamus, compared to the cortex. In the case of the alpha-4 subunit, the highest concentration was in the thalamus and brainstem, and low levels were observed in the striatum. Based in our results, we concluded that alpha-1 subunit was the least specific and appeared at high levels in all samples, whereas the alpha-4 subunit appeared to be more specific with lower levels in the cortex and striatum.

**Funding Source:** NIH-NIDA

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**Recommended Citation:**

Paul, Jeremiah; Miranda, Manuel. "Differential expression of glycine receptors in the globus pallidus, thalamus and striatum" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1186

# A viral vector approach to understanding the roles of estrogen receptors in behavior

Guadalupe Pena Contreras<sup>^</sup>, Adam N Perry, Manuel Miranda, Bruce S Cushing \*

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Estrogen is a key regulator in the organization and expression of sociosexual functions in mammals and its signaling is mediated through the estrogen receptors (ER). The two main cellular ERs are encoded by two genes *ESR1* which codes for ERa and *ESR2*, which codes for ERb. The receptors consist of 599 and 565 amino acids, respectively. The two receptors are similar to one another in the mechanism of activation, which consists of both ligand dependent and ligand independent pathways. Moreover, it has been shown that both a and b can form homodimers and heterodimers resulting in different downstream effects. Even though they are very similar at a molecular level, their effects on behavior can be quite different. For instance, ERa is most commonly associated with sociosexual behavior, aggression and anxiety, whereas ERb enhances cognition and reduces aggression. Given the importance of their roles in regulating sexual as well as social behavior the ability to manipulate the expression of these receptors in the brain provides important insight in the role of steroids in regulating male and female behavior. Therefore, the goal of this study is to clone both genes by reverse transcription, sequence and then produce a cDNA plasmid that can be packaged into Adeno Associated Viral vectors (AAVs) under control of the neuronal promoters, synapsin and calcium-calmodulin kinase II. The plasmids will be tested for expression in cell culture while the AAV vectors will be used to transfect specific brain regions in prairie voles and other laboratory rodents to verify expression.

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**Recommended Citation:**

Pena Contreras, Guadalupe ; Perry, Adam ; Miranda , Manuel; Cushing , Bruce . "A viral vector approach to understanding the roles of estrogen receptors in behavior " (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1162

# Sex differences in ghrelin receptor expression in the hypothalamus of maternally separated adult rats

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Obesity is a national problem. Nearly 40% of American adults and 17% of children and adolescents are obese, with women having higher rates of obesity than men for reasons that are not fully understood. Women report higher stress levels, and stress-induced secretion of the hormone cortisol can affect food intake and energy storage and has been implicated in obesity. The orexigenic hormone ghrelin is also linked with stress, as increased circulating ghrelin levels have been reported in stressed individuals. The ghrelin receptor is found in regions of the hypothalamus that control food intake, but few studies have examined the effect of stress on ghrelin receptor expression in the female brain. The purpose of our study, therefore, was to evaluate the effects of early life stress on blood ghrelin levels and hypothalamic ghrelin receptor expression in adult female rats compared to males. We hypothesized that stress-induced increases in circulating ghrelin and ghrelin receptor protein levels would be seen in both sexes, but to a greater degree in females. Rats were exposed to 3h/d of maternal separation on postnatal days 2-14, or not stressed (controls), and evaluated in adulthood. Hypothalamic tissues were analyzed for ghrelin receptor expression by Western blot, and quantified by densitometry normalized to actin. Plasma ghrelin was assayed by ELISA. In partial support of our hypothesis, a trend toward increased ghrelin receptor expression was seen in stressed female rat hypothalami, and these findings indicate a potential pathway through which stress may promote the development of obesity.

**Funding Source:** BBRC grant (G12 MD007592), VIDA (NIH) - DA029989, Office of the Provost

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**Recommended Citation:**

Pillai, Akshita; Sierra, Jorge; Lodoza, Gabe; Hamdan, Jameel; Saucedo, Sigifredo; Gosselink, Kristin. "Sex differences in ghrelin receptor expression in the hypothalamus of maternally separated adult rats" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1175

# Localized migration of T-Cell Acute Lymphoblastic Leukemia into the Central Nervous System

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Acute lymphoblastic leukemia is the most common childhood cancer; caused by the superfluous production of immature white blood cells. Of these cases, 20% develop T-Cell Acute Lymphoblastic Leukemia (T-ALL). Traditional chemotherapies cannot kill all T-All cells due to their ability to migrate into the CNS. Currently, physicians must inject harmful chemotherapies directly into the CNS (intrathecal) or irradiate the cranium. To minimize the use of intrathecal chemotherapies, new treatments must be produced. Developing new treatments requires understanding the ability of T-ALL to invade the CNS. A mouse model of human T-ALL will be used to investigate the mechanisms of the leukemic cell migration. Previous studies regarding this model have shown that C-C Chemokine Receptor 7(CCR7) and its ligands CCL19 and CCL21 promote the migration of T-ALL in the CNS. The focus of this research is to determine if CCR7 promotes migration of T-ALL into the CNS at specific sites or random areas. Both *in vitro* and *in vivo* methods will be used to determine migration patterns of T-ALL cells to specific areas of the CNS. CEM T-ALL cell lines that express CCR7 or lack CCR7 will be used. CEM cells will also be transduced to express fluorescent markers for imaging and data collection.

Funding Source: NIGMS RL5GM118969, TL4GM118971, UL1GM118970

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**Recommended Citation:**

Rizvi, Kumail; Brissette, Michael ; Bill, Charles; Vines, Charlotte. "Localized migration of T-Cell Acute Lymphoblastic Leukemia into the Central Nervous System " (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1212

# Plant compounds reduce Alzheimer's radical damage in cells

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Alzheimer's is a neurodegenerative disease responsible for 65% of cases of dementia, thus incurring exorbitant resources. Parkinson's disease is another debilitating contender with ~30% of patients present with dementia. These two diseases have not been associated conventionally; however, recent evidence suggests they may be linked. In a previous study, we presented in vitro data indicating that simply the (25-35) 11-mer of the Alzheimer's hallmark amyloid- $\beta$  protein can induce Parkinsonian Lewy Bodies, which are defined by the co-localization of  $\alpha$ -synuclein and synphilin-1. Our study suggests that higher concentrations of amyloid- $\beta$  result in greater concentration of reactive nitrogen species. These unstable nitrogen are implicated in sporadic misfolded protein pathogenesis through the S-nitrosylation of cysteine residues in protein disulfide isomerase, a key oxidoreductase chaperone in endoplasmic reticulum. In the present study, we will investigate the ability of phenolic phytochemicals to scavenge free radicals that break down the proteins guiding the folding process. Gallic acid and myricetin have been selected due to their bioavailability, low cytotoxicity, and blood brain barrier permeability parameters. Using SHSY5Y cells, we have separately applied a range of concentrations of gallic acid and myricetin in a 20  $\mu$ M solution of amyloid- $\beta$ . After cytotoxic analysis, flow cytometry will be used to measure apoptosis and necrosis of amyloid- $\beta$  with the treatments, followed by a western blot to assay the presence of amyloid- $\beta$ ,  $\alpha$ -synuclein, and synphalin-1 of each treatment group. We predict these compounds will attenuate amyloid- $\beta$  induction of Lewy Bodies.

**Funding Source:** NIH

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**Recommended Citation:**

Roe, Orlena; Mendez, Lois; Henriquez, Gabriela; Narayan, Mahesh. "Phytochemical radical scavengers to decrease amyloid-beta induction of Lewy Bodies" (2017). COURI Symposium Abstracts, Summer 2017, ID= 1247

# Techniques and Methods in Neuroscience Research

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Neuroscience is a branch of science that focuses primarily on the role and function of the nervous system and brain, but more specifically how these systems work in concert to maintain proper homeostasis of the human body. By studying these systems and delving into the roles they play, scientists have the opportunity to elucidate the origins and causes of mental disorders and neurodegenerative diseases. Most importantly, the findings from research enables scientists to develop or improve treatments for these diseases that afflict millions of people across the globe. In most respects, this specific branch of scientific research can most easily be characterized as the interdisciplinary field of the sciences creating a vast network of techniques used in many other disciplines. In their quest to find answers, neuroscientists employ a diverse range of protocols spread across many fields including biology, anatomy, physiology, chemistry, psychology, and medicine. The goal of this project is to gain experience in a research laboratory setting in order to provide students, at the secondary level, with insight on the methods and techniques utilized in the field of neuroscience research while presenting a firsthand account of some of the groundbreaking work being done at The University of Texas at El Paso. The experience gained in a laboratory setting is invaluable as an educator, using these skills to help nurture and grow the next generation of scientists to one day continue the work and ask new questions.

**Funding Source: National Institute on Drug Abuse (NIH-NIDA)**

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**Recommended Citation:**

Rosa, Clarissa; Carcoba, Luis; Cruz, Bryan; Flores Garcia, Rodolfo ; Correa Rodriguez, Victor; O'dell, Laura . "Techniques and Methods in Neuroscience Research" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1207

# Food availability and waterfowl behavior in Chihuahuan Desert wetlands

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The non-migratory subspecies of the Mexican duck (*Anas platyrhynchos diazi*) is endemic to the Chihuahuan Desert and relies on the existence and productivity of temporary and semi-permanent wetlands throughout their range. Understanding Mexican duck use of these wetlands and the wetland's capacity to support waterfowl allows for more informed conservation decision-making. We used time activity budgets as well as sediment samples to analyze the behavior of Mexican ducks, and understand trophic interactions and the effects of food availability on daily behavior at one larger temporary wetland and one smaller semi-permanent wetland. Given the temporary wetland status of our first study site, and the small size of our second, we expect the amount of seeds and viable food sources to be limited, which will reflect more resting behavior. We surveyed over 50 individuals across both wetlands for 5 to 15 minutes, recording 1 of 8 different behavior categories every 15 seconds. Additionally, seeds from 16 sediment samples were processed through a series of sieves and identified to family. Preliminary data show an increase in feeding during early morning hours, followed by a shift towards preening and resting. The most common seeds found were those of Gramineae and Cyperaceae, which are known food sources of dabbling ducks. The presence of common waterfowl food sources and the higher proportion of early morning feeding supports the notion that these wetlands are useful feeding grounds for waterfowl and they should be managed as such to maintain long-term success of Mexican ducks.

**Funding Source:** UTEP STEMGROW program

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**Recommended Citation:**

Salyer, Matthew; Brown, Joshua; Lavretsky, Philip. "Food availability and waterfowl behavior in Chihuahuan Desert wetlands" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1201

# Long-term effect of alcohol exposure/withdrawal in neuronal differentiation and morphology of PC12 cells

Luisa M Sanchez<sup>1^</sup>, Jason T Small<sup>2</sup>, Sukla Roychowdhury<sup>1\*</sup>

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Alcohol is one of the most accessible and abused drugs worldwide, and a major public health concern. Despite this, little is known about the effects of alcohol at the molecular level. Previous studies from our laboratory have shown that short-term exposure of ethanol in PC12 cells inhibited neuronal outgrowth and differentiation, and altered microtubule (an important component of neuronal cytoskeleton) organization; and Gβγ, an important component of GPCR pathway was involved in this process. The goal of this research is to elucidate the effects of long-term ethanol exposure/withdrawal on the neuronal morphology and the expression of Gβγ and its downstream effector PGSK3β. To conduct the study, PC12 cells were used because they can differentiate to neuronal phenotype in the presence of nerve-growth-factor (NGF). NGF-differentiated PC12 cells were exposed to ethanol for two weeks followed by 2 weeks of withdrawal from the drug. The samples were subjected to either whole cell lysis followed by western blotting, or confocal microscopic examination during different stages of treatments and withdrawal. Ethanol inhibited NGF-induced neurite outgrowth and altered cellular morphology similar to that observed in short-term treatments. Confocal microscopy showed irregularities in the processes of ethanol treated cells. Ethanol withdrawal did not show significant signs of reversal and morphological alterations were still present in many cells. Western blot analysis showed that tubulin/Gβγ expression was not significantly altered by long-term ethanol exposure. This study provides an insight to possible effects of long term abuse of ethanol to the morphology of neurons and subsequent neuronal function.

Funding Source: COURI, BBRC (NIH)

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**Recommended Citation:**

Sanchez, Luisa; Small, Jason; Roychowdhury, Sukla. "Long-term effect of alcohol exposure/withdrawal in neuronal differentiation and morphology of PC12 cells" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1184

# Psychological stress induces depression-related outcomes in female C57BL/6 mice

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Stress is a prevailing risk factor for mood-related illnesses, wherein women represent the majority of those afflicted with major depression. Despite the growing literature suggesting that affective disorders can arise after a traumatic event is vicariously experienced, this relationship remains understudied in females at the preclinical level. Thus, the objective of the current investigation was to examine whether exposure to emotional/psychological stress (ES) mediates depression-related outcomes, as a function of sex, in C57BL/6 mice. To do this, female and male C57BL/6 mice (8-week old) vicariously experienced the defeat bout of a separate male conspecific, by a male CD1 aggressor, for 10 consecutive days (10 min per day). Twenty-four hours after the last stress exposure, mice were tested in the social interaction paradigm, a behavioral measure that is commonly used to evaluate depression-related phenotypes in rodents. The results indicate that, when compared to respective controls, both female and male mice exposed to ES display decreases in the total time spent in the social interaction zone of the open field arena. Importantly, no differences in total locomotor activity (distance traveled, cm) were noted between the groups, as a function of sex or stress exposure. Collectively, the data indicate that exposure to ES leads to decreases in social behavior in C57BL/6 mice. As such, this experimental model may be adopted to examine vicarious stress-induced mood-related disorders, in a sex specific manner.

**Funding Source:** National Institute on Drug Abuse (NIH-NIDA)

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**Recommended Citation:**

Sanchez, David; Iñiguez, Sergio. "Psychological stress induces depression-related outcomes in female C57BL/6 mice" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1210

# Using GIS to understand the effect of bathymetry on vegetation coverage at a created desert wetland

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<sup>2</sup> *Department of Biological Sciences, The University of Texas at El Paso.*

This research was conducted utilizing Geographic Information Systems (GIS) to evaluate the bathymetry and vegetation coverage at the two newly flooded wetland ponds in created desert wetland. The Rio Bosque Wetlands are located in southwest Texas, in the area known as the Lower Valley of the Rio Grande river within the limits of El Paso county. We hypothesized that with GIS's geostatistical tools, it would be possible to create a model to predict how the bathymetric variations within the ponds will influence the plant population and vegetation coverage. We used geostatistical kriging interpolation within ArcGIS to map the relationship between the bathymetry and vegetation coverage. Water depth in pond 1 varied from 0m to 0.7m (0cm to 70cm), whereas pond 2 was slightly shallower, with a maximum depth of 0.66m (66cm). Preliminary results indicate that open water areas, without aquatic vegetation, were the deepest points in both ponds. With the bathymetric model, it will be possible to understand the inundation patterns of the ponds, to predict future vegetation communities, and to locate the areas going on transitioning from upland (UPL) vegetation to one dominated by obligated wetland plants (OBL).

**Funding Source:** U.S. Department of Education

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**Recommended Citation:**

Saucedo, Julieta; Baughman, Lisa; Lougheed, Vanessa. "Using GIS to understand the effect of bathymetry on vegetation coverage at a created desert wetland" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1173

# Nicotine effect on alcohol-induced alterations of the G $\beta$ $\gamma$ -Microtubule dependent signaling pathway

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<sup>2</sup> Department of Biological Sciences, The University of Texas at El Paso.

Alcohol and Nicotine are two most commonly used drugs of abuse with the most serious comorbidity among their users. However, the underlying molecular mechanism of alcohol/nicotine abuse is not well understood. Previous reports from our laboratory have shown that G $\beta$  $\gamma$ , a signaling protein in the GPCR signaling pathway, induces neurite outgrowth, and promotes microtubule (MT) assembly; exposure to alcohol/nicotine interfere with this pathway both in vivo and in vitro. The goal of the present study is to determine if nicotine modulates the alcohol-induced alterations of G $\beta$  $\gamma$  signaling (G $\beta$  $\gamma$  and pGSK3 $\beta$ ) and neuronal morphology. PC12 cells were utilized in this study due to their ability to exhibit neuronal phenotypes when exposed to nerve growth factor (NGF). The long-term effect of nicotine (7 days) on PC12 cells chronically exposed to ethanol and withdrawal is examined for modifications in G $\beta$  $\gamma$  expression/neuronal morphology. Whole cell lysis, immunoblotting and confocal microscopy were used to conduct the study. In addition, brain tissues from alcohol/nicotine exposed rats were studied using immunoblotting. We found that G $\beta$  $\gamma$  expression was reduced by 10mM nicotine (~32%) in alcohol treated cells and subsequent withdrawal from nicotine reversed this process similar to that observed in alcohol/nicotine exposed rat brains. Chronic treatment with Alcohol (7days) inhibited NGF-induced neurite formation and altered cellular morphology, which was not significantly affected by nicotine exposure/withdrawal. Additional experimentation and analysis are underway to determine the role of nicotine on alcohol treated PC12 cells/brain tissues.

**Funding Source:** NIH-NIDA

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**Recommended Citation:**

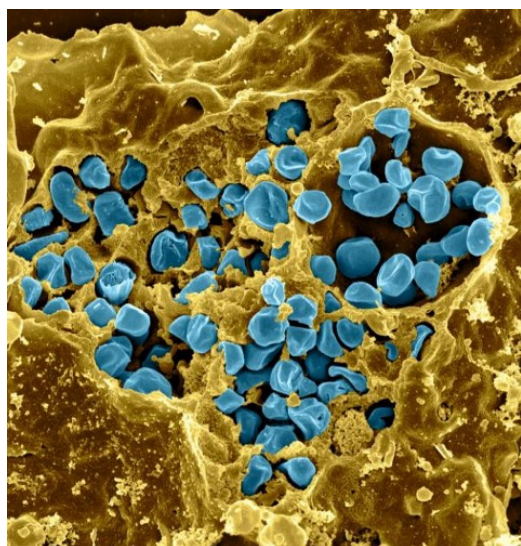
Small, Jason; Sanchez, Luisa; Aranda, Michelle; Roychowdhury, Sukla. "Nicotine effect on alcohol-induced alterations of the G $\beta$  $\gamma$ -Microtubule dependent signaling pathway" (2017). COURI Symposium Abstracts, Summer 2017, ID= 1189

# NKT cell-controlled reduction of inflammation due to the regulation of Cytokine

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Our immune system is supposed to be our body's defense, but what happens if it is turned against us? The bacterium *Francisella tularensis* (Francisella) is a pathogen which triggers an overactive pro-inflammatory response of the body's immune system which leads to the death of the host. During *in vivo* experimentation mice succumbing to Francisella infection developed a high pro-inflammatory cytokine response as measured by serum cytokine analysis compared with a mild response in mice surviving the infection. Therefore, we hypothesized that reducing the pro-inflammatory response could prevent death. Natural Killer T (NKT) cells are a subset of leukocyte with regulatory and pro-inflammatory functions that potentially could control the overactive immune response. Indeed, mice lacking NKT cells are more prone to infection and were observed to have a higher cytokine response than mice sufficient in NKT cells. This shows a regulatory role for NKT cells in controlling the infection and the reducing the cytokine response, thereby reducing lethality. In addition, *in vitro* experiments have shown that purified NKT cells can directly suppress the inflammation caused by infected macrophages. Preliminary experiments have suggested that CD40/CD40L interactions are critical for mediating this suppression. Since CD40L exists in both membrane bound and soluble forms, we seek to determine whether cell-cell contact is necessary for suppression. Lastly, there are two types of NKT cells and its unknown which subset is causing this suppression. Consequently, these investigations will lead to understanding of the specific mechanisms within NKT cells in Francisella immunity and other pro-inflammatory infections.



Funding Source: National Institute Of General Medical Sciences of the National Institutes of Health

**Recommended Citation:**

Storey, Matthew; Setzu, Nicole; Miller, Gabrielle; Ramos, Mireya; Spencer, Charles. "NKT cell-controlled reduction of inflammation due to the regulation of Cytokine" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1134

# Evaluate anti-micobacterial and cytotoxic activity of stemona extract using high-content screening

Wanyu Tao<sup>1^</sup>, Zongyu Huang<sup>1^</sup>, Javier Aguilera<sup>1</sup>, Mei Han<sup>2</sup>, Jianjun Sun<sup>1\*</sup>

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Tuberculosis (TB) is a serious infectious disease of human caused by *Mycobacterium tuberculosis* (*Mtb*). The emergence of drug-resistant *Mtb* makes it necessary to develop new anti-TB drugs. Some natural herbs are used to treat TB in ancient China, and the study on the active components of these herbs provides an effective way for the development of new drugs. Stemona is an herb commonly seen in traditional Chinese prescription and is often used clinically in multi-drug treatment of TB. But its minimum inhibitory concentration (MIC) and the Inhibitory mechanism on mycobacteria are still unknown. The current study evaluated the antimycobacterial activity and cytotoxicity of stemona extract towards macrophages. *Mycobacterium marinum* replaced the real *Mtb* here for sake of safety. Intracellular high-content screening is used in this study. In the antimycobacterial experiment we tested the effect of various concentrations of stemona extract separately on *E. coli*, *Mycobacterium smegmatis*, and *Mycobacterium marinum*, in comparison with the positive control (relative antibiotics, e.g. carbenicillin & hypromycin). Then we titrated the concentrations of the drug and see its cytotoxicity on RAW 264.7 macrophage. In the infection experiment, in which an in vitro model was built, different concentrations of drug were added to the RAW 264.7 macrophage and incubated with and without the *M. marinum* infection. The amount of live cells reflects the effect. We further repeated the infection experiment using *M. marinum* without ESAT-6, to specify the pharmacological action site of the drug. This study revealed the anti-mycobacterial activity and cytotoxicity of stemona extract, laying a foundation for the study of new drugs in the future.

Funding Source: 2SC1 GM095475

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#### Recommended Citation:

Tao, Wanyu; Huang, Zongyu; Aguilera, Javier; Han, Mei; Sun, Jianjun. "Evaluate anti-micobacterial and cytotoxic activity of stemona extract using high-content screening" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1224

# Does sleep disruption affect ethanol-induced locomotor activity in *Drosophila*?

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Studies have shown, on average, Americans consume approximately 556 alcoholic drinks per year, contributing nearly 10% of all deaths in working adults. Additionally, the National Sleep Foundation has found that as people age, they begin to show signs of interrupted or fragmented sleep. The goal of this study is to determine if a change in normal sleep patterns, specifically fragmented sleep, affects the alcohol response in *Drosophila melanogaster*. *Fruit flies* is a well-established animal model for both alcohol research and sleep. Ethanol, an active ingredient of alcoholic beverages, has biphasic effects, hyper- and hypo- activity that makes it possible to measure changes in duration of movement under the influence of ethanol or sedation rate after sleep disruption and alcohol exposure. To achieve the goal, two types of sleep disruption will be employed. The first approach is physical disruption, a type of stimulus characterized by the active provocation on the fly keeping it "awake" for periods of 6 and 24 hours. The second approach is more passive in nature, caffeine consumption at doses of 1 and 10 mg/ml for 24 hours. Control (age-matching and no sleep deprived) and sleep deprived male or female flies will be exposed to ethanol and their movements will be quantified using the fly tracking software to measure ethanol-induced activity. If changes are seen with sleep disruption in the locomotor activity or sedation, follow-up studies will address whether the effect of sleep disruption is mediated by the dopamine system, which is known to mediate both sleep and ethanol effects.

**Funding Source:** NIH

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**Recommended Citation:**

Villanueva, Ernesto; Sabandal, John; Saldes, Erick; Han, Kynung-An. "Does sleep disruption affect ethanol-induced locomotor activity in *Drosophila*?" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1255

# Expression and purification of Human Brain and Muscle Arnt-like 1 protein (hBMAL1)

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The circadian rhythm is a 24-hours cycle that coordinates a variety of biological activities and physiological processes. Studies have found that disruption to the circadian rhythm contributes negatively to human health leading to cardiovascular diseases, metabolic diseases, sleep disorders, and the higher risk of cancer. At the molecular level inside a cell, the circadian rhythm is a negative feedback loop that regulate transcription and translation of certain proteins. The circadian transcriptional activator consists of a heterodimer of two core proteins: Circadian Locomotor Output Cycle Kaput (CLOCK) and Brain and Muscle ARNT-Like 1 (BMAL1). Currently, the lack of C-terminal structural information of BMAL1 prevents us from fully understanding its regulatory role in the circadian rhythm. The purpose of this project is to obtain the full length structure of hBMAL1. The gene hBMAL1 has been previously cloned into a pCOLD-TF vector and transformed into E. coli BL21 (DE3) cells. However, after purification, most recombinant protein of TF-hBMAL1 is in aggregated form. In order to obtain soluble protein, the expression construct has been transformed into new bacteria cell with molecular chaperones to help folding of the protein. Affinity chromatography will be used to extract TF-hBMAL1 from the cell. Solubility of the recombinant TF- hBMAL1 will be analyzed by size exclusion chromatography and circular dichroism. After obtaining high purity soluble hBMAL1, structural and functional studies will be performed. The atomic structure of hBMAL1 will provide a clearer understanding of the regulatory mechanism of the circadian rhythm, and facilitate the development of treatment for circadian- related diseases.

**Funding Source:** National Institute of General Medical Sciences of NIH under award number SC3GM109870

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**Recommended Citation:**

Xi, Dongman; Rodriguez, Jose; Choi, Jennie; Sarabia, Alejandro; Ray, Supriyo; Xiao, Chuan. "Expression and purification of Human Brain and Muscle Arnt-like 1 protein (hBMAL1)" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1156

# Effects of shrub removal on soil carbon during grassland restoration in New Mexico

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Over the previous century encroachment by shrubs has resulted in areas dominated by grasslands to be replaced by shrub dominated deserts in south-central New Mexico. Beginning in the 1980's there have been efforts to reduce the encroachment of shrubs in the Chihuahuan Desert with the goal of restoring native perennial grasses. While these efforts are ongoing there has been little examination of the ecological effects these treatments have had on the soil. We asked whether the shrub removal treatments affect soil carbon content, nutrient availability and particle size. We worked in experimental areas where shrubs were removed by aerially spraying herbicide over designated areas. At four of these experimental sites we sampled soil from both treated and control plots. We measured total, organic and inorganic carbon as well as pH and particle size. Results of these analyses are still pending. We hypothesize that with shrub removal the carbon that was held in the woody stems of shrubs will instead be present in soil causing soil carbon content to be higher in treated plots. The pH of the soil should also be greater at treated plots because shrubs are taking up less nutrients resulting in higher nutrient availability. Finally, we hypothesize that the clay/silt content of the soil should be lower in treated plots due to erosion of finer soil particles with the loss of shrub vegetation. With these results we will be able to characterize the effects on soil giving the program a new and important perspective.

Funding Source: REU Funding, UTEP Funding, USDA/BLM Funding

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**Recommended Citation:**

Zaret, Max; McLaren, Jennie; Schaeffer, Kathleen. "Effects of shrub removal on soil carbon during grassland restoration in New Mexico" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1159

## **PHYSICAL SCIENCES**

# The properties of room temperature ionic liquids and water confined inside microporous carbon

Alice M Alayón<sup>1^</sup>, José L Bañuelos<sup>2\*</sup>, José A Espitia<sup>2</sup>, José L Bañuelos<sup>2\*</sup>

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The total amount of energy that an electrical double layer capacitor (EDLC) can store depends on the voltage and the accessible surface area for ion electrosorption. Nanoporous carbon electrodes with a high specific surface area are ideal materials for EDLC devices, however, the properties of the electrolyte fluid in such confined spaces are not well understood. To address this problem, the structure of the room temperature ionic liquid (RTIL)  $[C_4mim]^+[Tf_2N]^-$  and water confined inside the micropores ( $<2nm$ ) of carbide derived carbon (CDC) were investigated using small- and wide-angle x-ray scattering (SAXS/WAXS). RTILs, being composed entirely of ions, have high thermal and electrochemical stability and good conductivity and are currently incorporated into some supercapacitor designs. Water is usually removed from working devices due to the breakdown of  $H_2O$  at low voltages, but recent studies suggest that water may increase RTIL dynamics, allowing faster charge/discharge cycles. SAXS/WAXS measurements were carried out on dry CDC, samples which were partially (50%), completely (100%), and over-filled with RTIL (150%), as well as RTIL-filled samples exposed to 100% water-saturated air. This study provides information on the length scales of the CDC porosity, the extent to which RTIL enters micropores, and how confinement affects the charge-ordered structure of the RTIL. The competing effects of liquid-liquid miscibility and carbon surface adsorption inside the small CDC pores influence the molecular-scale structural properties and must be considered in the analysis of the results. Interpretation of the effect of water on this system is underway and preliminary results will be discussed.

**Funding Source:** Department of Energy

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**Recommended Citation:**

Alayón, Alice; Bañuelos, José; Espitia, José; Bañuelos, José. "The properties of room temperature ionic liquids and water confined inside microporous carbon" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1166

# Magnetic graphene oxide coupled with ZIF-67 as efficient adsorbents of water pollutants

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*Department of Chemistry, The University of Texas at El Paso.*

An efficient organic pollutant and common ions nano-adsorbent was developed using a Zeolitic Imidazolate Framework (ZIF) containing Co and Zn metals (ZIF-67). The prepared ZIF was used as a building block for three layer nanocomposites. Synthesis of the composites were developed by the successful preparation of the Fe<sub>3</sub>O<sub>4</sub>/ZIF@GO and ZIF@GO hybrid nanocomposites. The prepared adsorbents were used to remove methylene blue (MB) as a model for common organic pollutants and modeled fresh water was used for the removal of common ions. The adsorption capacity for each sample was measured using ultraviolet visible (UV-Vis) spectroscopy. These findings show that the newly developed adsorbents can remove organic pollutants, and simple ions which makes them suitable candidates for water and wastewater treatments.

Funding Source: NEWT

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**Recommended Citation:**

Aldama, Edgar; Ventura, Karen; Villagrán, Dino. "Magnetic graphene oxide coupled with ZIF-67 as efficient adsorbents of water pollutants" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1188

# Synthesis and characterization of protein-carrying nanoparticles for the treatment of cancer

Laila Alsaihati<sup>^</sup>, Sarah C McKinney<sup>^</sup>, Andrew Pardo, Luis A Barrera, Juan C Noveron\*

*Department of Chemistry, The University of Texas at El Paso.*

Every year, 7.6 million people die from cancer, making it one of the leading causes of deaths worldwide. Current cancer chemotherapy involves the use of systemic pharmaceutical agents that exhibit unwanted side effects due to their broad distribution in the body. Thus, developing a delivery system for localized therapeutics that targets tumors directly are highly warranted because they are expected to lower the minimum effective doses and lower or remove side effects. Our project focuses on developing an innovative delivery system based on a semibiological strategy that consists of gold nanoparticles that use copper (II) ions to bind lipoproteins that are known to localize on cancer tissue. To accomplish this, we synthesized a thiol- containing tridentate ligand that use N-donors to bind Cu(II) and form coordination bonds with the polyhistidine-tag of lipoproteins. We will present the multi-step synthesis and characterization of the ligand. Advanced microscopy analysis of the gold nanoparticles and its metal-mediated ligand-protein assembly will be presented. With this unique molecular system, it will be possible to deliver to specificity several kinds of anticancer drugs such as siRNA, antisense DNA, and other small particle drugs.

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**Recommended Citation:**

Alsaihati, Laila; McKinney, Sarah; Pardo, Andrew; Barrera, Luis; Noveron, Juan. "Synthesis and characterization of protein-carrying nanoparticles for the treatment of cancer" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1220

# Estimating groundwater discharge into the ocean in the Yucatán Peninsula

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The Yucatán peninsula is an emerged and almost entirely flat carbonate block abundant in soluble rocks. The high permeability and dissolution of the rock, facilitates the development of channels, sinkholes and caves where underground rivers discharge into the ocean. There are no rivers or streams acting as a surface drainage system all rainfall water entering the peninsula is discharge either as evapotranspiration (ET) or as underground discharge from the aquifer into the ocean. To date, there are no estimates of the groundwater discharges from peninsula into the sea, thereby hindering efforts to understand the dynamics of a complex groundwater system. This study intends to estimate this discharge(Q) by solving the water balance equation,  $\Delta S = PPT - ET - Q$ , using remote sensing products accounting for the terms in the equation. The change in storage( $\Delta S$ ) was retrieved from the satellite GRACE; precipitation(PPT) from the Tropical Rainfall Measuring Mission; and evapotranspiration(ET) from the Moderate Resolution Imaging Spectroradiometer. The divergence between  $\Delta S$  and PPT-was calculated using data over a period of 12 years. Results show that freshwater discharge via evapotranspiration are significant to groundwater runoff, depending on the climatic conditions throughout the year. Also, we observe high recharge-discharge variability relations in the peninsula, with clearly defined zones. Our analyses indicate that on average, the dryer northern and northeastern part of the peninsula acts as a recharge zone (where the influx of water is higher compared to the outflux) while the more humid northern and eastern part of the peninsula act as a discharge zone (outflux is higher than influx).

**Funding Source:** UTEP Office of the Provost

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**Recommended Citation:**

Alvarez, Guadalupe ; Gutierrez-Jurado, Hugo. "Estimating groundwater discharge into the ocean in the Yucatán Peninsula" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1233

# A short and efficient synthesis of a photoreactive amino acid

Huiwen An<sup>1</sup>, Hector P Del Castillo<sup>2</sup>, Katja Michael<sup>2\*</sup>

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In the past, our group has explored the photochemical properties of N-acyl-7-nitroindolines in Fmoc strategy-based solid phase peptide synthesis (SPPS) generating glycopeptides, peptide thioesters, peptide hydrazides, and cyclic peptides under mild and neutral conditions. Most of these syntheses required the attachment of an Fmoc-protected amino acid to 5-allyl carboxylate-7-nitroindoline followed by palladium-catalyzed deallylation to obtain the desired photoreactive amino acid linker in seven steps and an overall yield of 65%. This linker already contains the first (C-terminal) amino acid, which is being linked to the solid support via a 7-nitroindoline moiety. A shorter synthesis of a similar photoreactive amino acid linker using a Suzuki cross-coupling reaction was recently accomplished in our laboratory in only four steps with an overall yield of 79%. The goal of this project was to discover an even shorter, less time-consuming, and more efficient synthesis of N-acyl-7-nitroindoline-based linkers useful for SPPS. Here, we demonstrate our new synthesis of the same amino acid derivative in only two steps from commercially available starting materials. Two different synthetic strategies were explored: 1. a Suzuki cross-coupling reaction between 5-bromo-7-nitroindoline and 4-carboxyphenylboronic acid pinacol ester followed by coupling with the amino acid Fmoc-Gly-Br; 2. coupling of Fmoc-Gly-Cl (generated in situ) with 5-bromo-7-nitroindoline followed by a Suzuki cross-coupling reaction with 4-carboxyphenylboronic acid pinacol ester. The latter approach was successful as it was able to overcome problems due to the poor nucleophilicity of the highly unreactive nitroindoline. Optimizations of the reaction conditions are currently underway.

**Funding Source:** Beijing Normal University; UTEP

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**Recommended Citation:**

An, Huiwen; Del Castillo, Hector; Michael, Katja. "A short and efficient synthesis of a photoreactive amino acid" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1217

# Concentration and solvent effects on the solution-state structure of asphaltenes

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Asphaltene is a group of planar molecules found in crude oil and are prone to aggregation which often causes blockage of pipes along the oil production stream. The objective of this study is to determine the impact of asphaltene concentration and solvent composition on the structure of asphaltene in solution to obtain a better understanding of the factors governing the onset of aggregation and the morphology of such aggregates. Small-angle x-ray scattering, a technique to study nanostructure, was used to study samples of asphaltene in toluene at concentrations of 1, 5, 10, and 50 mg/ml. Experiments with samples with similar concentrations of asphaltene in dichlorobenzene are underway to compare the effect of solvent type on the resulting asphaltene nanostructure. The experimental methods and analysis of collected data and application of structural models to interpret the experimental results will be presented. Future work will include the use of other solvents, as well as the impact of pressure and temperature on the nanostructure of these systems.

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**Recommended Citation:**

Arzabala , Eduardo ; Cano, Samuel ; Speer, Juan Pablo; Banelos , Jose . "Concentration and solvent effects on the solution-state structure of asphaltenes" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1181

# Synthesis of titanium complexes supported by Imidazolin-2-Iminato ligands

Miguel A Baeza Cinco<sup>^</sup>, Skye Fortier\*, Josue R Aguilar Calderon, Skye Fortier\*

*Department of Chemistry, The University of Texas at El Paso.*

It has been recently shown that organometallic Ti(IV) complexes of the type Cp\*Ti(CH<sub>2</sub>SiMe<sub>3</sub>)<sub>3</sub> (Cp\* = η<sup>5</sup>-C<sub>5</sub>Me<sub>5</sub>) bearing cyclopentadienyl (Cp) ligands are capable of splitting dinitrogen under mild conditions. In our laboratory, we have been investigating the coordination chemistry of imidazolin-2-iminato ligands (ImN), which can be considered as Cp-ligand analogs. Motivated by the recent nitrogen fixation chemistry of Cp-[Ti] compounds, we have begun to investigate the reactivity of ImN-[Ti] electronic analogs where all ImN ligands are *dipp*-based (*dipp* = 2,6-diisopropylphenyl). Herein, we describe the synthesis of a handful of Ti(IV) and Ti(III) compounds of the form (ImN)TiX<sub>3</sub>, (ImN)<sub>2</sub>TiX<sub>2</sub> (X = Cl; alkyl), and [ImNTiCl<sub>2</sub>]<sub>2</sub>. The complexes have been fully characterized by NMR spectroscopy and X-ray crystallographic analysis. Preliminary results suggest that although Cp and ImN are isoelectronic, the latter exhibits stronger electron donation making these systems more electron-rich and less susceptible to reduction. Moreover, attempts to utilize these complexes towards N<sub>2</sub> activation, via chemical reduction and photochemical routes, will be discussed.

**Funding Source:** Office of the Provost (SURPASS)

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**Recommended Citation:**

Baeza Cinco, Miguel; Fortier, Skye; Aguilar Calderon, Josue; Fortier, Skye. "Synthesis of titanium complexes supported by Imidazolin-2-Iminato ligands" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1163

# Three dimensional printed nanoparticle-templated porous nanomaterials for water treatment

Carmen A Chavez<sup>^</sup>, Andrew Pardo, Juan C Noveron\*, Luis A Barrera

*Department of Chemistry, The University of Texas at El Paso.*

Metal ion contamination of natural water sources is a major concern. In particular, heavy metals such uranium pose a threat to all living organisms that get exposed due to its chemical and radioactive properties. About 6 million residents in the United States are exposed to uranium contaminated water. Thus, selective high-surface adsorbents for uranium salts are warranted. Our approach to solve this problem is to design a 3D printable materials with designed flow control that incorporate nanocavities selective for uranium salts. We synthesized copper-nanoparticles coated with acrylate molecules that photopolymerize into 3D structures using stereolithography. Upon removal of the copper nanoparticles, we obtain organic zeolites with nanoscale cavities capable of adsorbing heavy metal ions. We will present the synthesis and characterization of the nanoparticles used for templates using advanced microscopy such Atomic Force Microscopy (AFM), Transmission Electron Microscopy (TEM), and Scanning Electron Microscopy (SEM), and spectroscopy studies such as Electron Paramagnetic Spectroscopy (EPR). In addition, we will present 3D printed models that control water flow and maximize ion interactions at the nanoporosities. Ion-selective studies using these nanomaterials against several metal ions, including uranyl salts will be presented.

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**Recommended Citation:**

Chavez, Carmen; Pardo, Andrew; Noveron, Juan; Barrera, Luis. "Three dimensional printed nanoparticle-templated porous nanomaterials for water treatment" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1219

# Water-soluble cobalt (II) porphyrin supported on zirconium phosphate as a highly efficient electrocatalyst for hydrogen generation from water

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Molecular hydrogen is a clean fuel candidate for energy storage and transfer. Improving the efficiency of Hydrogen evolution reactions (HERs) is a current area of global research. Our laboratory is focused on the synthesis and design of highly active and cheap catalyst to efficiently store energy by the electrochemical proton reduction to hydrogen gas. Cobalt (II) tetrakis-(p- sulfonatophenyl) porphyrin (CoTSPP), is being investigated as a stable and efficient water-soluble catalyst for electrocatalytic hydrogen gas generation from neutral water without any organic additives. We report here the synthesis and characterization of CoTSPP by means of UV-Visible, infrared and NMR spectroscopies, and X-ray powder diffraction. This compound is evaluated as a HER electrocatalyst through cyclic voltammetry (CV) in an aqueous phosphate buffer solution at pH 7, showing a sharp increase in cathodic catalytic current beginning at  $-0.735$  V vs. SCE. An inorganic layered nanomaterial, Zirconium phosphate (ZrP), is studied as a catalyst support and CoTSPP is intercalated in ZrP layers. This CoTSPP-modified ZrP material is being investigated as potential enhanced HER electrocatalyst in neutral water.

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#### Recommended Citation:

Chu, Tong; Barraza, Isabel; Wu, Yanyu; Villagrán, Dino. "Water-soluble cobalt (II) porphyrin supported on zirconium phosphate as a highly efficient electrocatalyst for hydrogen generation from water" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1198

# Detergent free protein purification for *M. tuberculosis*

Erika C De Santiago<sup>^</sup>, Jianjun Sun, Ilse Hernandez , Jianjun Sun\*

*Department of Biological Sciences, The University of Texas at El Paso.*

Tuberculosis (TB) is a contagious bacterial disease that infects human tissues, especially in the lungs, caused by *Mycobacterium tuberculosis* (Mtb). *M. tuberculosis* is a pathogenic bacterial species in the genus *Mycobacterium* and the causative agent of tuberculosis due to its ability to manipulate and evade host innate and acquired immune responses. Early secreted antigenic protein (ESAT-6) is a secreted protein of *Mycobacterium tuberculosis* which is an important virulence factor, inactivation of which leads to reduced virulence of *M. tuberculosis*. ESAT-6 is very potential as diagnostic for differentiation between the mycobacterial infection and a therapeutic agent. The objective of protein purification is to purify and extract a specific secreted protein that is grown in bacteria. In this study, the secreted protein and bacteria being used is ESAT-6 and *E. coli*. As a part of the protein purification process, detergent enables manipulation (disruption or formation) of cell membranes. Detergents are used to lyse cells and solubilize membrane proteins and lipids, thereby expediting lysis of cells and the extraction of soluble protein. The question in this research that is trying to be addressed is if the detergent is necessarily needed in the protein purification protocol. Using a detergent may represent the protocol required to use it and as compared with non-detergent preparation. The method planned to use was to follow the protein purification protocol as the controlled experiment, and also followed the same protocol but excluded the use of detergent as the non-controlled experiment. Results showed that ESAT-6 genes were successfully expressed and purified with non-detergent preparation. In this study, expressed and purified sufficient amounts of ESAT-6 and could potentially be tested for the development of a therapeutic for *M. tuberculosis* in future.

**Funding Source:** NIGMS Award Numbers RL5GM118969, TL4GM118971, and UL1GM118970

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**Recommended Citation:**

De Santiago, Erika; Sun, Jianjun ; Hernandez , Ilse; Sun, Jianjun . "Detergent free protein purification for *M. tuberculosis*" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1141

# Organic, biodegradable, high surface area, free of petrochemicals active material for water filters

Alma C Escobosa<sup>^</sup>, Luis A Barrera, Juan C Noveron\*

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Clean water, besides being a basic human right, is an essential need for all of us. Despite this, clean water is becoming scarcer than ever due to the rise in population and pollution. Current water-purification methods can be expensive or not fully efficient. This is why we should focus on finding ways to give easy and affordable access to clean water to as many people as possible. What we seek to do is to create a high surface-area nanofoam that would be 100% biodegradable and free of petrochemicals. To build the core of the foam, iron oxide nanoparticles would be carbonized along with glucose in a furnace. Iron oxide nanoparticles will then be dissolved, leaving a nanoporous carbon foam with high surface area. This super-hydrophobic nanofoam is expected to have the ability to trap organic pollutants such as polycyclic carbons, fluorocarbons, and aromatics, among others. The filter would be biodegradable and organic in its entirety because the only thing contained at the end will be carbonized glucose. Tests will be carried out in methylene orange proving the capacity of the filter. Additionally, XRD, TEM, and BET analysis will be performed on the material to determine the size of the nanocavities, the image of the material, and the surface area of the compound. With this organic nanofoam it will be possible to produce drinking water with a small amount of material capable of cleaning more water than the average activated carbon filter.

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**Recommended Citation:**

Escobosa, Alma ; Barrera, Luis; Noveron, Juan. "Organic, biodegradable, high surface area, free of petrochemicals active material for water filters" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1197

# Exploring the biological properties of *Datura stramonium*

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From ancient times, human beings have used plant-derived natural products for the treatment of a variety of diseases including cancer, infections, and neurological maladies. Currently, plants continue to be of major interest in drug discovery and serve as natural sources of remedies due to the safety of their consumption as well as due to the perception of their highly therapeutic value. *Datura stramonium*, a known deliriant and toxic member of the Nightshade family, has been used for centuries throughout the world's cultures as a therapeutic medicine in the treatment of human maladies. *D. stramonium*, also known commonly as Jimson Weed, is known to contain a variety of compounds of interest including tropane alkaloids, withanolides, and lectins, which have been shown to possess therapeutic potentials in various disease models throughout the world. In this study, the active constituents of the leaves/stems and seeds of *D. stramonium* were isolated through maceration and Soxhlet extraction techniques using seven solvents ranging in polarity from hexane to water. The extracts were analyzed for their anti-oxidative potentials through a DPPH assay, as well as their cytotoxicities on liver cells through a HepG2 assay to determine their therapeutic ranges. Based on these results, extracts were selected for further analysis against a disease panel of cell lines. Those extracts displaying anti-oxidant qualities were selected for testing against neurodegenerative cell line SH-SY5Y that mimics Parkinson's and Alzheimer's diseases. Extracts found to be minimally cytotoxic were tested on a variety of cancer cell lines including pancreatic, Leukemia, and Neuroblastoma cancers.

Funding Source: NSF, NIH

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**Recommended Citation:**

Ezri, Roger; Skouta, Rachid. "Exploring the biological properties of *Datura stramonium*" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1191

# Crystallization of the phi-EL chaperonin in the APO conformation

Jesus Garcia<sup>1</sup>, Daniel H Von Salzen<sup>2</sup>, Jay M Bhatt<sup>2</sup>, Ricardo A Bernal<sup>2\*</sup>

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Proteins are the basis for all life because they are responsible for all biological activity in cells. These proteins are composed from a set of 20 amino acids arranged in a linear format, not unlike pearls on a string. The amino acid chain folds on itself to form a globular structure that is able to gain biological activity. On occasion, proteins are unable to fold properly or are unfolded with age and need help regaining their biological structure and activity. Chaperonins are large structures that help all misfolded proteins fold correctly. Phi-EL chaperonin is one such protein folding complex and it originates from a virus that infects *Pseudomonas* bacteria. It seems that the virus must carry its own chaperonin because the bacterial chaperonin is unable to fold the virus proteins correctly. Our laboratory has already determined the mechanism phi-EL uses to fold a misfolded protein, however more refined structural details are required to fully understand this mechanism. The goal of this project is to crystallize the viral chaperonin to obtain a high-resolution crystal structure in the APO conformation. The chaperonin was purified by size exclusion and anion exchange chromatography columns. The purified protein was concentrated to 2.0 mg/mL and used to set up crystallization trials. Successful crystal formation will be followed by exposure to high-intensity X-rays to obtain a diffraction pattern that will then be processed to obtain the final crystal structure. A successful structure determination will allow for more detailed view of the protein folding mechanism.

**Funding Source:** NIGMS-NIH

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**Recommended Citation:**

Garcia, Jesus; Von Salzen , Daniel ; Bhatt, Jay; Bernal, Ricardo . "Crystallization of the phi-EL chaperonin in the APO conformation" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1145

# Phytoremediation of toxic metals using Texas Bermuda grass in El Paso, Texas

Prescilla Garcia-Trevizo<sup>1^</sup>, Maria S Arteaga<sup>1\*</sup>, Jose Mendoza<sup>2\*</sup>

<sup>1</sup> *Department of Chemistry, El Paso Community College.*

<sup>2</sup> *Department of Biological Sciences, El Paso Community College.*

The increase of brownfields has generated interest in remediation techniques to clean up contaminated sites. Phytoremediation is an inexpensive way to clean contaminated soils. In El Paso area, industrial activity has contributed to contamination in the soil. The objective of this project is to determine if Texas Bermuda grass can be a good phytoremediator for El Paso area. Texas Bermuda Grass was chosen due to its low maintenance and its resistance to extreme weather conditions. Increasing concentrations of Cd, Cr, Cu, and Pb were used to irrigate grass. ICP-OES was used to quantify the uptake of metals by the Bermuda Grass. The soil before planting the grass seeds was found to contain Cd, Cr, Cu and Pb. Therefore, the control grass irrigated with only tap water showed metal uptake and contained: 128ppm Cd, 136 ppm Cr, 160 ppm Cu and 134 Pb. Grass watered with 0.5 ppm metal solution contained 146 ppm Cd, 144 ppm Cr, 166 ppm Cu and 134 ppm Pb. Grass watered with 1 ppm solution contained: 179 ppm Cd, 159 ppm Cr, 195 ppm Cu and 150 ppm Pb. Grass watered with 5 ppm solution contained: 222 ppm Cd, 187 Cr, 226 Cu and, 181 ppm Pb. Grass watered with 10 ppm solution contained: 486.67 ppm Cd, 405.42 ppm Cr, 664.42 ppm Cu and, 445.75 ppm Pb. These results showed increased metal uptake with increasing metal concentrations in irrigation water, indicating that Texas Bermuda Grass can be used as a phytoremediator for El Paso area.

Funding Source: NIH R25GM60424

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**Recommended Citation:**

Garcia-Trevizo, Prescilla; Arteaga, Maria; Mendoza, Jose. "Phytoremediation of toxic metals using Texas Bermuda grass in El Paso, Texas" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1252

# Estimation of the number of discoveries in multiple tests at low sample numbers

Amairani Giner<sup>^</sup>, Marian Manciu\*

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Statistical significance in multiple tests is commonly tested via widely accepted methods, such as the Bonferroni corrections or the Benjamini-Hochberg procedure. However, at low sample numbers and large number of simultaneous tests, these methods fail to detect even ONE discovery. We will illustrate this with a simple "experiment" in which many "fair" and "biased" coins are flipped a few times and we suggest an algorithm to estimate the most likely number of the discoveries. Whereas in a few special cases the method might even be able to detect statistically significant discoveries, in all the cases we can estimate roughly the total number of existing discoveries (biased coins) and calculate the probability that certain coins are biased. The method has direct applications in detecting the likelihood of possible differentially expressed genes in a very small size experiment (preliminary data) and consequently narrowing down by one or two orders of magnitude the pool of genes that warrant further investigation.

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**Recommended Citation:**

Giner, Amairani; Manciu, Marian. "Estimation of the number of discoveries in multiple tests at low sample numbers" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1124

# Electrocatalytic hydrogen gas evolution by an iron porphyrin-based organic polymer

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As of today, 80% of the current energy consumption is provided by fossil fuels which include coal, oil, and natural gas. Concerns over the use of fossil fuels have arisen as a result of their unsustainability and environmental impacts. Hydrogen evolution reactions (HERs) have received attention due to their potential applications in clean-energy technologies. In this work we study the use of an iron porphyrin-based organic polymer [Fe(Por)OP] as promising, efficient and stable HER catalyst. This material was characterized by x-ray powder diffraction (*p*-XRD), Fourier transform infrared spectroscopy (FT-IR), and scanning electron microscopy (SEM). The assessment of the HER electrocatalytic performance of Fe(Por)OP is done through cyclic voltammetry in the presence of 0.5M H<sub>2</sub>SO<sub>4</sub>. Fe(Por)OP requires an overpotential of – 0.3 V to achieve 10 mA/cm<sup>2</sup> cathodic current density. As comparison, the non-metallated (Por)OP shows significant less efficient catalytic functions for HER. Stability and efficiency of the Fe(Por)OP is retained after 20 hours of chronoamperometry. We will present the synthesis and characterizations of a porphyrin organic polymer [(Por)OP] and its metalation process by Fe<sup>2+</sup>, and their use as potential HER catalysts.

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**Recommended Citation:**

Grajeda, Maria; Barraza, Isabel; Wu, Yanyu; Villagrán, Dino. "Electrocatalytic hydrogen gas evolution by an iron porphyrin-based organic polymer" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1192

# A novel maximum likelihood estimator for survival analysis

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*Department of Physics, The University of Texas at El Paso.*

A novel Maximum-Likelihood estimator for the Average Survival Time Difference (MLASTD) between two groups is suggested. The estimator is calculated based on the additional time, which should be added to one group, to produce the maximum entropy of the result (the one that makes the two groups most similar). The estimator is calculated only from time to event data, does not assume hazard proportionality and provides directly the magnitude of the clinical differences between the groups. Monte Carlo simulations were employed to show that, even at low sample numbers (much lower than the ones needed to prove that the two groups are statistically different), the MLASTD estimator is a reliable predictor of the clinical differences between the groups.

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**Recommended Citation:**

Guzman-Gonzales, Joscelyne; Hosseini, Sorour; Manciu, Marian. "A novel maximum likelihood estimator for survival analysis " (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1117

# Electron spin resonance studies of Mn doped CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> crystals

Delgado Jose<sup>1</sup>, Christian Saiz<sup>1</sup>, Luis Martinez<sup>1</sup>, Sohan Hennadige<sup>1</sup>, Jesse Murillo<sup>2</sup>, Eduardo Romero<sup>2</sup>, Skye Fortier<sup>2</sup>, Srinivasa Singamaneni<sup>1\*</sup>

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Hybrid inorganic/organic perovskite solar cells have shown very high photoconversion efficiencies up to 22%. By doping optically active transition metal ions (in place of Pb), for example, Mn<sup>2+</sup>, it is possible to modify the electronic, magnetic and photophysical properties of perovskite materials. The dopant creates electronic states in the mid-gap region and thus alters the charge separation and recombination dynamics. The dopant states lead to long charge carrier lifetimes since the transitions can be spin and/or orbitally forbidden. Doping Mn in place of Pb should create long-lived charge carriers and boost the efficiency of the solar cells. Most importantly, this approach will provide emerging new research directions to look at the magnetic properties of perovskite solar cells. We prepared Mn (10%) doped CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> crystals using the method reported previously.<sup>1</sup> We have measured temperature-dependent (28-300 K) x-band (9.43 GHz) ESR spectra on these samples. The ESR signal characterized by a g-value of 2.0311 and a peak-to-peak line width ( $\Delta B_{pp}$ ) of 488 G clearly confirmed the presence of Mn in the CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> crystals, consistent with a literature report for a Mn<sup>2+</sup> concentration of 10%. The near temperature independent ESR signal width (488-467 G) measured from 28-300 K infers that the material is paramagnetic. The absence of additional ESR lines in the entire magnetic field range (0-6000 G) recorded indicates that the magnetic phase is homogeneous, and the material is free of secondary phases, thus asserting the high purity of the crystals under study. <sup>1</sup>Na'fra'di, B et al. *Nat. Commun.* **2016**, 7, 13406.

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**Recommended Citation:**

Jose, Delgado; Saiz, Christian; Martinez, Luis; Hennadige, Sohan; Murillo, Jesse ; Romero, Eduardo ; Fortier, Skye; Singamaneni, Srinivasa. "Electron spin resonance studies of Mn doped CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> crystals" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1111

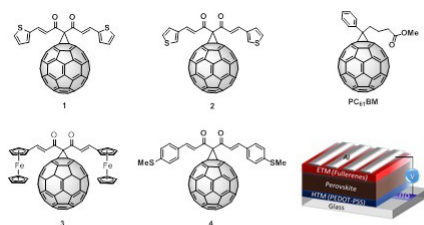
# Curcumin C60 fullerene derivatives as electron transporting materials in inverted perovskite solar cells

Quentin Y Kim<sup>1^</sup>, Edison Castro<sup>2</sup>, Luis Echegoyen<sup>2\*</sup>

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<sup>2</sup> *Department of Chemistry, The University of Texas at El Paso.*

Power conversion efficiencies (PCEs) in perovskite solar cells (PSCs) have risen from 3.8% in 2009 to 22.1% in 2016.[1, 2] Fullerene derivatives are effective when used as electron transporting materials (ETMs) in Inverted PSCs because of their exceptional electron transporting properties: high LUMO levels, 3-D electron transport ability, and low reorganization energy. Inverted PSCs based on fullerene derivatives as the ETMs have achieved PCEs up to 20.15%.[3]reduced hysteretic behaviors, and improved device stability.[4-6]Here, four new curcumin C 60fullerene derivatives ( 1-4) were used as ETMs in inverted PSCs. Preliminary results show a maximum PCE of 12.1% for the curcumin derivatives, whereas the [6,6]-phenyl C61butyric acid methyl ester (PC61BM) control had a preliminary maximum PCE of 11.5%.



Funding Source: PREM

**Recommended Citation:**

Kim, Quentin; Castro, Edison; Echegoyen, Luis. "Curcumin C60 fullerene derivatives as electron transporting materials in inverted perovskite solar cells" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1193

# Addition of nitrogen during arcing and its effect on the production of uranium metallofullerenes

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<sup>2</sup> Department of Chemistry, The University of Texas at El Paso.

Actinide Endohedral Metallofullerenes (EMFs) represent an intriguing and unexplored area of chemistry. Recently there have been successes in producing the mono-uranium EMF species U@C<sub>74</sub>, U@C<sub>82</sub>, and U@C<sub>86</sub> when using arc reactor gasses O<sub>2</sub>, SO<sub>2</sub>, and CO<sub>2</sub>. However, fullerene species were missing between U@C<sub>74</sub> and U@C<sub>82</sub>, as well as U@C<sub>84</sub>. Surprisingly, when a little N<sub>2</sub> was added to the reactor, new species were observed for the first time. Soot containing uranium EMFs was obtained from graphite rods filled with uranium oxide and graphite powder (weight ratio of U/C = 4:1) under an atmosphere of 200 torr He, 20 torr O<sub>2</sub>, and 10 torr N<sub>2</sub> in a conventional Kratschmer-Huffman arc-discharge reaction. The soot was then Soxhlet-extracted for three and a half hours using CS<sub>2</sub>. Besides the U@C<sub>74</sub>, U@C<sub>82</sub>, and U@C<sub>86</sub>, the most abundant species produced was U@C<sub>80</sub>, followed by U@C<sub>76</sub> and U@C<sub>84</sub>. Multistage HPLC separation yielded pure isomers of U@C<sub>80</sub> in a relatively large quantity. In addition, after further separations, other uranium metallofullerenes such as U<sub>2</sub>C<sub>80</sub> and U<sub>2</sub>OC<sub>78</sub> were obtained. (see Figure 1). From these successes, it can be concluded that N<sub>2</sub> plays an important mechanistic role to produce these species. In this case, it helps to generate the various species of uranium EMFs in relative abundance.

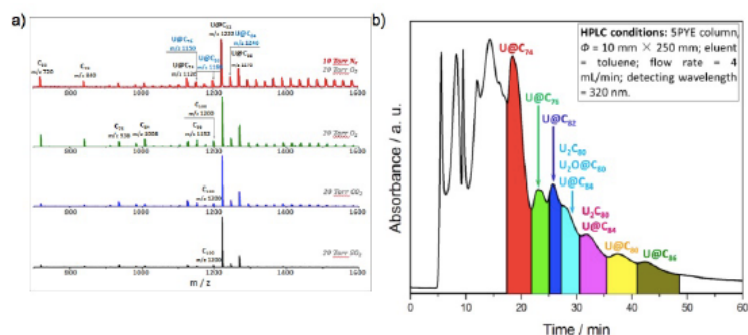


Figure 1. a) LDI-TOF mass spectra of the extracts synthesized with different gas sources. b) HPLC chromatogram of the extract arced under N<sub>2</sub> and O<sub>2</sub>.

Funding Source: NSF

Recommended Citation:

Koopman, Allison; Cai, Wenting; Echegoyen, Luis. "Addition of Nitrogen During Arcing and its Effect on the Production of Uranium Metallofullerenes" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1232

# Surface spectroscopic analysis of the Maya Blue pigment

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The Maya Blue pigment has been known for its distinct color and ability to resist degradation over centuries throughout the harsh climate of Mesoamerica [1]. However these properties have yet to be fully explained due to the unique bond between the indigo and palygorskite structure [2]. Using the surface techniques of X-Ray Fluorescence (XRF) and X-Ray Photoelectron Spectroscopy (XPS), which were created consequent to the discovery of the photoelectric effect, we hope to find information regarding the electronic structure that will allow this phenomenon to be understood to a further extent.

[1] José-Yacamán, M., et al. "Maya Blue Paint: An Ancient Nanostructured Material." *Science* JSTOR, vol. 273, no. 5272, 1996, pp. 223–225.

[2] Doménech, Antonio, María Teresa Doménech-Carbó, Manuel Sánchez Del Río, María Luisa Vázquez De Agredos Pascual, and Enrique Lima. "Maya Blue as a Nanostructured Polyfunctional Hybrid Organic–inorganic Material: The Need to Change Paradigms." *New Journal of Chemistry*. The Royal Society of Chemistry, 01 July 2009. Web. 12 July 2017.

**Funding Source:** United States Department of the Army

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**Recommended Citation:**

Lopez, Jeremiah; López Gallardo, Jorge; Díaz-Moreno, Carlos. "Surface spectroscopic analysis of the Maya Blue pigment" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1133

# Dynamic Porous Nanomaterials from 3-D Printed 6-(benzyloxy) hexa-2,4-diyne-1-ol Nanocomposites for the Removal of Heavy Metals from Water

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Water contamination with heavy metals is a serious health concern worldwide. According to a recent survey, there are more than 200 kinds of organic and inorganic contaminants in water from natural resources. For example, heavy metal ions such as lead, mercury, and uranium have high levels of toxicity and are harmful to most living organisms. We are developing a nanoparticle-templated photopolymerization strategy using 6-(benzyloxy)hexa-2,4-diyne-1-ol ( $L^{xy}$ ) that binds and polymerizes nanoparticles using 3-D printing stereolithography. This results in a material that upon removal of the nanoparticles exhibits macropores and nanopores, which are utilized for flow control and metal adsorption, respectively. The synthesis involves the formation of  $Fe_3O_4$  nanoparticles and coating them with poly- $L^{xy}$ . Polymerization of  $L^{xy}$  is achieved by the UV irradiation. Upon removal of  $Fe_3O_4$  using strong acids etching, the nanoporous polymer is produced. Advanced microscopy characterization such as TEM, SEM, and AFM will be presented. Similarly, advanced spectroscopy studies such as EPR, zeta potential, and FTIR will be presented. Adsorption studies for the removal of transition metal ions from water will also be reported. Competing adsorption of lead, arsenic, chromium, mercury, uranium and organic contaminants are undergoing and will be presented. In addition, the method of stereo-lithography will be used to develop 3-D structures with enhanced flow conditions. Our molecular design improves on existing membrane separation because it introduces dynamic pores, low-cost production, and 3-D printable macroscopic shapes for flow control and filter adaptation.

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**Recommended Citation:**

Peng, Xiaohui; Chen, Yuwei; Juan, Noveron; Kalagara, Sudhakar. "Dynamic Porous Nanomaterials from 3-D Printed 6-(benzyloxy) hexa-2,4-diyne-1-ol Nanocomposites for the Removal of Heavy Metals from Water " (2017). *COURI Symposium Abstracts, Summer 2017*, ID=1250

# Automation of a high precision stage for X-Ray Grazing Incidence Small-Angle Scattering (GI-SAXS) and Reflectivity (XR) studies

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<sup>2</sup> *Department of Physics, The University of Texas at El Paso.*

GI-SAXS and XR are experimental techniques for investigating the nanoscale structure and composition of thin films: GI-SAXS gives information about the in-plane structure of nanotextured films, and XR gives the information on how the nanostructure changes as a function of depth. Such studies are traditionally carried out at synchrotron radiation facilities so this capability will improve access to these techniques for surface scientists in the region. A Labview program was developed to control a sample stage that is able to precisely orient a sample and control the x-ray beam incidence angle for use in GI-SAXS and XR studies on the Xeuss 2.0 HR SAXS system in the UTEP department of physics. The program takes a user-specified angular range, total number of points for the desired resolution, and duration of x-ray collection time per point for the experiment as inputs. The program outputs the start time, end time, and stage position information into a graphical display and a log file to synchronize with the x-ray detector data. Tests of this new experimental setup as well as the data processing routines to extract standard reflectivity curves are underway. A 50-100 nm glassy carbon thin film deposited on a sapphire substrate is being used to test the XR setup. Future tests will involve studying the lateral structure of the film (using GI-SAXS) as well as the behavior of complex fluids at the fluid-solid interface with applied electric fields. Details of the control program, x-ray techniques, and preliminary measurements will be presented.

**Funding Source:** Department of Energy

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**Recommended Citation:**

Puentes, Daniel; Banuelos, Jose. "Automation of a high precision stage for X-Ray Grazing Incidence Small-Angle Scattering (GI-SAXS) and Reflectivity (XR) studies" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1161

# Conservation and sustainability education in the Chihuahuan Desert

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<sup>2</sup> *Department of Geological Sciences, The University of Texas at El Paso.*

About three fourths of the Earth is made up of water. From this total amount, ninety-seven The city of El Paso is a city located in the Chihuahuan Desert. In this region, water is scarce and there are long periods of droughts, making the role of water conservation crucial. The Tech<sub>2</sub>O Water Resources Learning Center with El Paso Water is an educational facility that aims to educate and train customers about water management in the Chihuahuan Desert. The present study is focused on water education and aims to raise awareness among elementary and middle school students. Over the course of two months educational outreaches were scheduled and "A Drop in the Bucket" from Project WET curriculum was presented. Every week between thirty to sixty students were provided with a model representing Earth's water and information about ways they can conserve water. The model consists of a beaker filled with 100 mL of water, representing all the water on Earth. The water is then split into three smaller containers labeled: frozen freshwater, non-frozen freshwater, and potable. From the initial 100 mL of water only one drop represents Earth's potable water. The goal of this project is to target young children and educate them about water conservation and environmental stewardship, so they can spread the information they have learned to their families and instill these habits at a young age.

**Funding Source:** El Paso Water

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**Recommended Citation:**

Rodriguez, Christina; Bane, Jessica ; Chaleshtori, Maryam. "Conservation and sustainability education in the Chihuahuan Desert" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1203

# HSA solution-state protein structure: Native conformations, and temperature-induced aggregation using small-angle X-ray scattering

Crystal Rodriguez<sup>1^</sup>, Jacquelyn Kim<sup>2</sup>, Emmanuel Zubia<sup>2</sup>, Mahesh Narayan<sup>2</sup>, Jose L Bañuelos<sup>1\*</sup>

<sup>1</sup> *Department of Physics, The University of Texas at El Paso.*

<sup>2</sup> *Department of Chemistry, The University of Texas at El Paso.*

The ability of proteins to change their conformation in response to their surrounding environment enables them to perform their biological functions. Protein concentration, pH, and temperature are some of the factors which influence a protein's binding ability and propensity to aggregate. Mis-folding and aggregation processes are linked to several debilitating diseases and understanding the guiding environmental factors which give rise to different protein structures may shed light on such diseases. Small-angle x-ray scattering (SAXS) measurements over a Q-range of 0.01-0.4 Å<sup>-1</sup> were used to study the solution-state structure of Human Serum Albumin (HSA) in several conditions. The structure of non-delipidized 2mg/ml solutions was compared to delipidized HSA at concentrations of 5 mg/ml in acetate buffer (pH=3.26) and 4 mg/ml in a Tris buffer (pH=8). The samples were measured in a temperature control holder developed in our laboratory which allows temperature variation from -10°C to 90°C. Measurements were carried out from 25-75°C at 10°C intervals. Results of temperature induced aggregation will be presented. The current effort to explore the structural properties of temperature induced aggregation of the protein HSA offers the opportunity to further and better understand protein folding, mis-folding and aggregation.

Funding Source: Office of the Provost (SURPASS)

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**Recommended Citation:**

Rodriguez, Crystal; Kim, Jacquelyn; Zubia, Emmanuel; Narayan, Mahesh; Bañuelos, Jose. "HSA solution-state protein structure: Native conformations, and temperature-induced aggregation using small-angle X-ray scattering" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1148

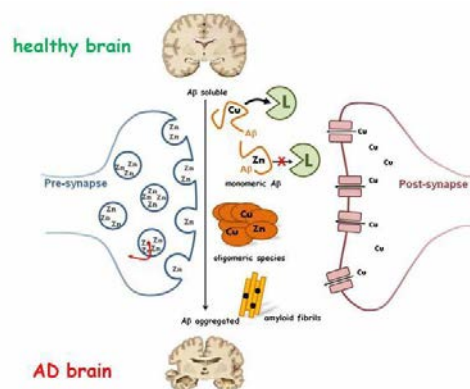
# Inorganic biochemical aspect on amyloid-beta peptides

Jose A Rosales<sup>1^</sup>, Emmanuel Gras<sup>2</sup>, Mahesh Narayan<sup>1\*</sup>, Christelle Hureau<sup>2\*</sup>

<sup>1</sup> *Department of Chemistry, The University of Texas at El Paso.*

<sup>2</sup> *LCC (Laboratoire de Chimie de Coordination), CNRS (Centre National de la Recherche Scientifique).*

Alzheimer's disease (AD) is the conventional basis of dementia in the senior populace with an occurrence of 30 million individuals globally, therefore, an improvement of therapeutic remedies is required. This necessitates an interpretation of the treatment concerning the prescription selection and the biological parameters. In AD, aggregation of the amyloid- $\beta$  peptide ( $A\beta$ ) creates amyloid plaques that have been studied to be a principal development and a premature consequence in the pathology. Metal ions such as Cu(I/II) and Zn(II) are associated with the occurrence of  $A\beta$  aggregation. In addition Cu, due to its redox capability, produces Reactive Oxygen Species (ROS) that contribute to the oxidative stress observed in AD. For this main reason, it is considered as the therapeutic target of choice. The objectives of this study are proposing, synthesizing and investigating novel drug candidates proficient at selectively targeting Cu(II)- $A\beta$  interactions within the synaptic cleft where Zn is contained and to interrupt the Cu(II)- $A\beta$  interactions participating in the ROS production and  $A\beta$  aggregation. A water- soluble salophen complex with D-glucose moieties was synthesized and characterized to have more rigidity and that could cross the blood brain barrier.



Funding Source: NSF, CNRS LCC

#### Recommended Citation:

Rosales, Jose; Gras, Emmanuel; Narayan, Mahesh; Hureau, Christelle. "Inorganic biochemical aspect on amyloid-beta peptides" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1132

# High capacity absorbent for the removal of chromium from water

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*Department of Chemistry, The University of Texas at El Paso.*

Chromium (Cr) is a naturally occurring element that can be found in rocks, soil and volcanic ash. Chromium is used in many industries, such as elaboration of stainless steel, leather tanning, paint and others. The wastewaters that these industries produce contain chromium, which is a potential health hazard. According to the EPA, chromium (VI) is highly toxic and mostly affects the respiratory track, causing bronchitis, decreased pulmonary function, and pneumonia. Chromium (VI) is also a carcinogen that increases the risk of developing lung cancer. According to a report published by the EPA in 2016, seven million Americans are consuming tap water with levels of chromium (VI) that are higher than 10 ppb, the legal limit set by California, which is the only state which has set a maximum contaminant level for chromium (VI). As a solution to this problem, we will test the chromium removal capabilities of two novel absorbents, one based on scrap tire and the other on phenol- formaldehyde resin. The absorbents will remove the chromium (IV) by reducing it to chromium (III) and then absorbing the Cr (III). The experiments shall be conducted taking into consideration variables such as pH, concentration of chromium in water, amount of absorbent used, temperature and time. The samples taken during the experiment will be tested with UV spectroscopy. The UV-vis spectrophotometric tests showed excellent performance for the absorption of chromium. It was also noted that both of the absorbents have a higher capacity of absorption at higher temperature and lower pH.

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**Recommended Citation:**

Saenz-Arana, Ricardo; Islam, Tariqul; Noveron, Juan. "High capacity absorbent for the removal of chromium from water" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1150

# Unexpected Signals from the Glass Substrates used in CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> Solar Cell Thin Film Devices: An Electron Spin Resonance Investigation

Chris Saiz<sup>1</sup>, Edison Portillo<sup>2</sup>, Luis Martinez<sup>1</sup>, Sohan Hennadige<sup>2</sup>, Luis Echegoyen<sup>2</sup>, Srinivasa Singamaneni<sup>1\*</sup>

<sup>1</sup> *Department of Physics, The University of Texas at El Paso.*

<sup>2</sup> *Department of Chemistry, The University of Texas at El Paso.*

In this presentation, we report low-temperature electron spin resonance (ESR) investigations carried out on solution processed three-layer inverted solar cell structures: PC<sub>61</sub>BM/CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub>/PEDOT:PSS/Glass, where the PC<sub>61</sub>BM and PEDOT:PSS act as electron and hole transport layers, respectively. ESR measurements were conducted on *ex-situ* light (1 sun) illuminated samples, moisturized samples, and samples exposed to N<sub>2</sub>, O<sub>2</sub> gases, separately. We find two distinct ESR spectra. First ESR spectra resemble a typical powder pattern, associated with  $g_x = g_y = 4.2$ ;  $g_z = 9.2$ , found to be originated from Fe<sup>3+</sup> extrinsic impurity located in the glass substrate. Second ESR spectra contains a broad (peak-to-peak line width ~ 10 G) and intense ESR signal appearing at  $g = 2.008$ ; and a weak, partly overlapped, but much narrower (peak-to-peak line width ~ 4 G) ESR signal at  $g = 2.0022$ . Both sets of ESR spectra degrade in intensity upon light illumination. The latter two signals were found to stem from light-induced silicon dangling bonds and oxygen vacancies, respectively. Our controlled measurements confirm that these centers were generated during UV-Ozone treatment (30 min) of glass substrate – a necessary step to be performed before PEDOT:PSS is spin coated. We detected no new signals from samples under other external stimuli such as moisture treatment, O<sub>2</sub> and N<sub>2</sub> exposure. This work forms a significant step in understanding the glass (substrate)-breakage under real world settings in photovoltaic solar cell devices.

Funding Source: NSF-PREM, UTEP Startup grant

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**Recommended Citation:**

Saiz, Chris; Portillo, Edison; Martinez, Luis; Hennadige, Sohan; Echegoyen, Luis; Singamaneni, Srinivasa. "Unexpected Signals from the Glass Substrates used in CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> Solar Cell Thin Film Devices: An Electron Spin Resonance Investigation" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1110

# Comprehending the water quality and water level changes through time in the Mesilla Bolson Aquifer at El Paso County

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<sup>1</sup> *Department of Geological Sciences, The University of Texas at El Paso.*

<sup>2</sup> *Department of Biological and Agricultural Engineering, Texas A&M AgriLife Research Center.*

El Paso, Las Cruces and Cd. Juarez must rely on the Hueco and Mesilla bolson aquifers to meet their water demand, which is continuously growing. It is crucial to monitor the water quality and the water levels of the ground water system to understand groundwater flow and water availability of the aquifers. This project focuses primarily on changes in water level and water quality through the 20<sup>th</sup> and 21<sup>st</sup> centuries of the Mesilla Bolson aquifers. We have gathered the lithological record and historical data of the water level, and the water chemistry of approximately 298 wells in the Mesilla Valley within El Paso County. We selected the collection of information of 85 of the wells to create a profile and generate a map which can illustrate the change in water levels and water quality over time which will aim visualize the groundwater system to interpret the aquifer's behavior. The map will help us be conscious of the patterns of salinity and other chemical components such as sulfates, fluoride, calcium, and the total dissolved solids in groundwater. Using the location of the wells, well datum and lithology description, our team will be creating a hydrostratigraphy model and a MODFLOW model to better characterize the structure and understand the groundwater flow of the Mesilla aquifer. This project will then be incorporated to an ongoing research involving the major aquifers of the region.

**Funding Source:** NSF

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**Recommended Citation:**

Soto-Montero, Paola; Solis, Carolina; Sheng, Zhuping. "Comprehending the water quality and water level changes through time in the Mesilla Bolson Aquifer at El Paso County" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1238

# Synthesis and characterization of N-heterocyclic olefin ligated early transition metal coordination complexes

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N-heterocyclic olefins (NHOs), a derivative of the popular N-heterocyclic carbene ligand, are a relatively new class of ylide-type donors which have been shown to exhibit stabilization of low valent metal species. With a similar steric structure but weaker electron donation than their NHC counterparts, NHO ligands are likely to exhibit diverging bonding patterns that may potentially lead to new reactivity with promise for catalytic applications. This work describes an efficient, four-step synthesis of the NHO  $\text{IPrCH}_2$  ( $\text{IPr} = [\text{HCNDipp}]_2\text{C}$ ,  $\text{Dipp} = 2,6\text{-diisopropylphenyl}$ ) from 2,6-diisopropylaniline in good yield. A survey of its capability to ligate early transition metals is also reported.  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectroscopy were employed to verify the identity and structure of the generated  $[\text{IPrCH}_2]_x\text{M}$  coordination complexes. Finally, the possibility of changing the R-groups on the NHO unit, and its consequent effects on the bonding and stabilization of metal cations is under exploration.

**Funding Source:** NSF

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# XRF and XPS Analysis of Columbite-Tantalite (COLTAN)

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The uses of X-Ray Fluorescence (XRF) and X-Ray Photoelectron Spectroscopy (XPS) have been deemed of crucial importance in material science when analyzing the surfaces of different materials. In this case, the XRF and XPS techniques were performed on a sample of Columbite-Tantalite, or COLTAN for short, to further understand its chemical properties. This substance is a dull metallic ore found abundantly in the eastern regions of Congo [1]. When refined, COLTAN becomes a heat-resistant powder that can hold high electric charges. XPS and XRF have been performed by using electron emission induced by 1253.6 eV and 40 kV, respectively.

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**Funding Source: Army Educational Outreach Program**

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## Recommended Citation:

Valdez-Rivas, Andrea; Diaz Moreno, Carlos; Lopez, Jorge. "XRF and XPS Analysis of Columbite-Tantalite (COLTAN)" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1140

# Crystallization of ADP and ATP bound Phi-EL Chaperonin for X-Ray Crystallography

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Protein folding is an important process that determines a protein's proper conformation to preserve biological function. However, many proteins may become misfolded and may lead to disease from an accumulation of misfolded protein aggregates. Chaperonins aid cells by targeting misfolded proteins and providing a safe space to allow them to refold back into their native conformation. Phi-EL, a chaperonin encoded by bacteriophage EL that infects *Pseudomonas aeruginosa*, has been found to be homologous to the human chaperonin, Gro-EL. However, what makes Phi-EL unique is its ability to refold larger proteins due to a ring separating mechanism. Phi-EL can be seen in three different conformations, ATP bound, ADP bound, and a conformation with no nucleotide, termed APO. The goal of this project is to determine the structure of both the ADP and ATP conformations of Phi-EL by X-ray Crystallography. A Hampton Index HT crystal screening kit was used to test crystal growth on 96 different conditions. The best crystals with sharp edges and of larger size grew in the presence of 0.2 M Ammonium Citrate tribasic pH 7.0 with 20% polyethylene glycol 3,350. Optimization of the favored condition was tested at different concentrations of polyethylene glycol using a sitting drop method, revealing 16-18% PEG 3000 would form the best crystals. These crystals were then sent to a synchrotron, where they were found to diffract to a maximum resolution of 8 Angstroms. From here we hope to improve our methods in order achieve an even higher resolution.

Funding Source: BUILD

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**Recommended Citation:**

Von Salzen, Daniel; Garcia, Jesus; Bhatt, Jay; Bernal, Ricardo. "Crystallization of ADP and ATP bound Phi-EL Chaperonin for X-Ray Crystallography" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1152

# Method development of urinary volatile organic compounds detection for prostate cancer diagnosis

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Cancer has become the second cause of death after cardiovascular disease in America, and there will be an estimated 1,688,780 new cancer cases in 2017 (American Cancer Society, ACS). According to ACS, 1 in every 8 men will be diagnosed prostate cancer (PCa) during his lifetime, which is third cancer-related cause of death in men in US. Although prostate specific antigen (PSA) is widely used as the early PCa detection tool, it could lead to over-diagnosis and over-treatment because high level of PSA does not always result from PCa. In an earlier study, dogs were reported to be able to distinguish the PCa patients from healthy people by sniffing the urine with a good sensitivity and specificity (both at 91%). As the odor profiles are constituted by volatile organic compounds (VOCs), the overarching goal of our research is to find the VOC biomarkers by comparing the urine samples from PCa patients with healthy people by using Gas chromatography/mass spectrometry (GC/MS) coupled with Stir Bar Sorptive Extraction. In this particular project, we focused on optimizing the analytical method for VOCs detection. The factors to be tested included storage conditions and sample size. We tested sample storage condition under room temperature, 4°C, -20°C and -80°C with different length of storing time (ranging from 1 hour to 28 days). As for the sample size, we tested the volume of urine in 0.1ml, 0.2ml, 0.5ml and 1ml. Results of various conditions will be analyzed by t- test and will be presented.

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**Recommended Citation:**

Xiang, Tianqi; Gao, Qin; Lee, Wen-Yee. "Method development of urinary volatile organic compounds detection for prostate cancer diagnosis" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1171

# New chemiluminescence method coupled with Loop-mediated isothermal Amplification (LAMP) for portable and sensitive DNA detection

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DNA detection is of great importance and widely applied in medicine, criminal investigation, archaeology and many other fields of science. Compared to traditional methods based on polymerase chain reaction (PCR) with sophisticated procedures and expensive instruments, we have developed a low-cost and sensitive method for DNA detection based on LAMP-coupled with luminol chemiluminescence (CL) detection using a smart phone as a portable readout. In the luminol system, the emission intensity of the luminol chemiluminescence is proportional to the copper ion concentration over a linear working range from 100nM to 1000nM. After adding the pyrophosphate (PPi), the copper ions will conjugate with PPi forming CuPPi complex and quench the CL signal. Since LAMP reaction can produce numerous PPi by target DNA, the detection of DNA is finally achieved by the transduction from target DNA to a sensitive CL signal output. Through this approach, we can achieve sensitive and portable DNA detection on a smart phone. Using this low-cost and user-friendly method, various target nucleic acid of diseases can be analyzed for medical diagnosis at the point of care.

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**Recommended Citation:**

Xiong, Helei; Wei, Xiaofeng; Li, Xiujun(James). "New chemiluminescence method coupled with Loop-mediated isothermal Amplification (LAMP) for portable and sensitive DNA detection" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1185

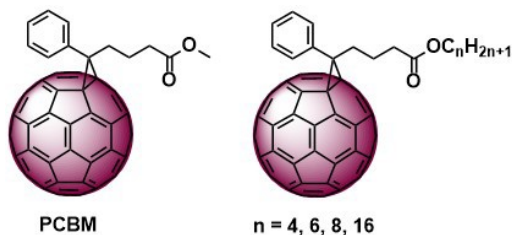
# Synthesis and characterization of variable chain-length fullerene derivatives for perovskite solar cells

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Perovskite solar cells (PSCs) have recently attracted much attention due to their rapid improvement in power conversion efficiency (PCE), from 3.8% in 2009, to over 22% in 2017. The excellent electron transporting and solution processable properties make fullerene derivatives excellent electron transporting materials (ETMs) in PSCs. It was demonstrated that the solubility of C<sub>60</sub> derivatives in organic solvents increases with the increase in the length of attached alkyl addends. To our knowledge, the influence of adducts with different alkyl ester chain lengths on [6,6]-phenyl C<sub>61</sub>-butyric acid alkyl esters (PC<sub>61</sub>BM-like) on fullerene-based PSCs has not been studied. In this work, a series of PC<sub>61</sub>BM-like derivatives with variable C<sub>n</sub>H<sub>(2n+1)</sub> where n=4, 6, 8 and 16 were synthesized and tested as ETMs in PSCs. Preliminary results show a maximum PCE of 15.9% when PC<sub>61</sub>BH (n = 6) was used as ETM in PSCs, while a PCE of 15.2% was achieved using PC<sub>61</sub>BM-based devices.



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#### Recommended Citation:

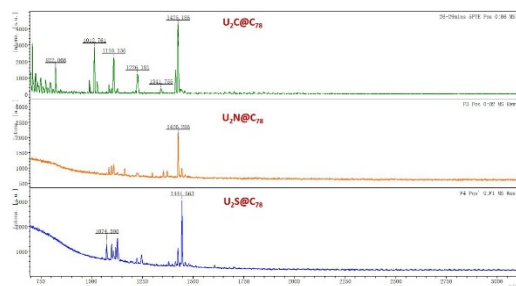
Yang, Tingyuan; Castro, Edison; Echegoyen, Luis. "Synthesis and characterization of variable chain-length fullerene derivatives for perovskite solar cells" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1164

# Synthesis and Purification of Uranium-based Clusterfullerenes

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Endohedral metallofullerenes (EMFs), which feature the encapsulation of metallic atoms, clusters or small molecules inside fullerene cages, have been extensively studied since the first discovery of  $\text{La@C}_{82}$  in 1991. These compounds exhibit unique properties that differ distinctly from those of empty fullerenes due to the interactions between the encapsulated species and the carbon cages via electron transfer. Though endohedral metallofullerenes containing lanthanides have been intensively studied in recent years, actinide endohedral fullerenes remain largely unexplored. Except for the recently reported monometallic uranium endohedrals  $\text{U@C}_{2n}$  ( $2n=74, 82$ ), investigations of actinide endohedrals has been limited to theoretical study. In this work, we report our recently developed methods for optimization of synthesis of a series of never before reported uranium- based cluster EMFs  $\text{U}_2\text{C@C}_{78}$ ,  $\text{U}_2\text{N@C}_{78}$  and  $\text{U}_2\text{S@C}_{78}$ . Multistage HPLC methods are utilized to isolate and purify these compounds. We demonstrate the effectiveness of our methods by purification and characterization of some isolated uranium- containing cluster EMFs.



**Funding Source: Welch Foundation**

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**Recommended Citation:**

Zhuang, Jiaxin; Echegoyen, Luis; Jesse, Murillo. "Synthesis and Purification of Uranium-based Clusterfullerenes" (2017). *COURI Symposium Abstracts, Summer 2017*, ID= 1225