

THE FIFTH ANNUAL

# UCMERCED

## UNDERGRADUATE SUMMER RESEARCH SYMPOSIUM



**MCNAIR**  
SCHOLARS PROGRAM  
UC Merced • CSU Stanislaus



UNIVERSITY OF CALIFORNIA, MERCED  
*Center of Excellence on*  
**Health Disparities**



**UC AGE P**

UNIVERSITY OF CALIFORNIA ALLIANCE FOR  
GRADUATE EDUCATION AND THE PROFESSORiate



**UC LEADS**

LEADERSHIP EXCELLENCE  
THROUGH ADVANCED DEGREES

AUGUST 4, 2011



WELCOME TO THE

FIFTH ANNUAL

UCMERCED

UNDERGRADUATE SUMMER RESEARCH SYMPOSIUM



AUGUST 4, 2011

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## **THE ALLIANCE FOR GRADUATE EDUCATION AND THE PROFESSORiate (AGEP) AND LEADERSHIP EXCELLENCE THROUGH ADVANCED DEGREES (LEADS) RESEARCH AND GRADUATE PREPARATION PROGRAMS.**

AGEP is a partnership among the 10 UC Campuses. Funded by National Science Foundation, the goal is to increase the number of underrepresented minority students who acquire doctoral degrees in the Science, Technology, Engineering and Math (STEM) fields and ultimately enter the professoriate.

The UC LEADS Scholars Program, funded by UC's Office of the President, is designed to educate California's future leaders by preparing promising undergraduate students coming from underrepresented or disadvantaged backgrounds for advanced education in the STEM fields.



2011 UC LEADS and UC AGEP student researchers.

## **Longevity Of Near Infrared Lead Sulfide Quantum Dots Under Prolonged Excitement**

John Acker, Sayantani Ghosh

Through the course of the UC LEADS Summer Research Opportunity I present the longevity of a chemically synthesized Lead Sulfide (PbS) Quantum Dots (QDs) in varying concentrations. These varying samples are evaluated using Confocal Microscopy. Temporally dependent scans are utilized in analyzing and determining the functional lifespan of the PbS QDs.

Over -exposing the samples “burning” them allows for the functional lifespan to be determined. From similar relative measurements of samples of CdSe/ZnS QDs it is expected that PbS QDs will shift in the wavelength in which they emit and decrease in intensity rapidly. This property is a result of the lack of a shell on the QDs allowing for unhindered interaction within the sample in which self-absorption and the broad absorption of the QDs, cause a rapid change in the intensity of the dots.

John Acker is a junior classmen studying Computer Science and Engineering at the University of California, Merced. A transfer student from Sacramento, California; he participates in several on campus groups including the Martial Arts Club and Colligate Alumni Foundation. Interested in the field of Quantum Computing and Nano-scale Engineering, he plans to pursue a PhD in the field. His hobbies include short story writing, political activism, and campus related philanthropy. He currently has been accepted as a UC LEADS fellow for 2011-2012, and has participated in Sayantani Ghosh’s lab during the 2011 Summer Session.

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## **Between Language Competition in Early Learner Bilinguals**

Cynthia Carlson, Greg Wattonville, Stephanie Huette, Michael Spivey

Bilingualism provides a useful platform to investigate how the human brain processes language. Spivey and Marian (1999) argue for a theory of parallel simultaneous lexical processing in both languages in bilinguals, and others argue that each language is independently processed, with only one of them active at any one time. This research will examine early bilinguals, Spanish-English speakers in which the two languages were learned simultaneously.

Early bilinguals, a group typically under-studied, have been shown to have differences from bilinguals who learn a second language later in life (Kim, Relkin, Lee, & Hirsch, 1997), Two eye-tracking and mousetracking experiments will examine spoken language processing in Spanish-English bilinguals. The hypothesis is if both languages are active during processing, when “perro” is spoken in Spanish, participants will not only look at and click on a picture of a dog, but they will also look briefly at a picture of a pear (even though the Spanish word for pear does not share any sound-similarity with “perro”). The results of this study will determine if early-learner bilinguals demonstrate similar parallel activation of lexical items in between languages as previously found with late-learner bilinguals by Spivey and Marian (1999). This research will bear on theories of how words are recognized, and how to more effectively educate and communicate with bilingual speakers.

One of the driving forces behind my desire to do research in cognitive neuroscience comes from the memory of my grandfather; he had suffered from Alzheimer’s disease. His memory ignited a desire to better understand the functioning of the brain, especially in reference to memory, language, and learning.

In an effort to increase my knowledge in the field of cognitive science, I worked in Professor Michael Spivey’s cognitive science lab as a research assistant. My participation in Spivey’s lab opened my eyes to different areas of study within cognitive science, but more importantly I discovered a passion for research.

## **Optimizing Matlab Coding to Analyzing HVAC System**

Nhan Dao, Dr. J.Q. Sun, Siyu Wu Ph.D

School of Engineering, University of California, Merced

Buildings are the largest energy consumers. Since we are continue growing every year. A faulty HVAC system in the building can lead to significant waste of energy; moreover, the HVAC system should be improve to create more environmental buildings. The objective of this research is to develop methods to identify faults in HVAC.

The monitored data of various sensors of the HVAC system contain information that can help us to identify faults. Computer programs will be developed and optimized to analyze the data of the HVAC system. An other objective is to optimizing the code will help people to understand the method that were use to analyze the data, and thus enable more an in-depth analyze of the HVAC system. Ultimately, we hope to create efficient HVAC systems with minimal faults.

My name is Nhan Dao. I was born in Vietnam and came to America when I was 8 years old. I am a first generation college student who is attending University of California, Merced. I am a junior who is major is computer science and doing research with Dr. J.Q. Sun. My interest is applying computer science with biology. I am the web master of Society of Women Engineering. During my spare time, I enjoy learning how to create websites and games.

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## **Understanding the Inhibition of Inflammation through Chemokine Binding**

Paula Fon, Nai Wei Kuo PhD, Patricia LiWang PhD

School of Natural Sciences, University of California, Merced

Inflammation occurs to protect the body from injury or infection. Pro-inflammatory chemokines help aid leukocyte movement towards the site of injury or infection, which is helpful when necessary but harmful when it is not needed, causing unwanted inflammation. Inhibition of the chemokines is one method to prevent inflammation from happening. Chemokine inhibition can occur in two ways: 1) binding a chemokine analog to the chemokine receptor and 2) binding a chemokine binding protein to the chemokine. vMIP-II, a chemokine analog, and vCCI, a chemokine binding protein are two anti-inflammatory proteins our lab mainly focuses on. To better understand the anti-inflammatory functions of vMIP-II and vCCI, we will study their binding interactions with their corresponding parts: CCR5, a chemokine receptor, and eotaxin, a human chemokine, respectively. Our overall hypothesis is that by mutating the various binding partners and inhibitors, we will learn more about the inhibition of inflammation. For example, 5P12-RANTES, an engineered chemokine, has shown to bind tightly to the chemokine receptor, CCR5. Here, we replace the N-terminus of vMIP-II with the N-terminus of 5P12-RANTES and expect to see a stronger binding between 5P12-vMIP-II and CCR5. This should make 5P12-vMIP-II a potent anti-inflammatory compound. As for vCCI, previous research has indicated the negative residues on it binds to the positive residues on the chemokine. Making mutant variants of eotaxin by changing the charged residues and adding a fluorophore (fluorescein) to the C-terminus end will allow us to study their binding affinity to vCCI by an anisotropy assay. These studies will provide greater insights to treating inflammation through understanding chemokine inhibition on a molecular level.

My name is Paula Fon and I am a first generation Chinese-American. Currently, I am a junior studying human biology at the University of California, Merced. This summer, I am working in Patricia LiWang's biochemistry laboratory, researching the inhibition of inflammation. After I graduate, I plan to enter a Medical Scientist Training Program and achieve both Doctor of Medicine and Doctor of Philosophy degrees. My goal is to practice medicine while conducting research because it would be rewarding to actually apply the information researched in my laboratory to help my patients and potentially other patients around the world.



## **Development of Three Component Mannich-type Reaction Using Unnatural Amino Acid**

Tasnima Islam, Dr. Meng-Lin Tsao

Site specific modification of protein is very beneficial in biological system as it provides an effective way to study protein's behavior and properties. Some chemoselective fashion modifications of proteins have been reported focusing on lysine and cysteine side chains. Recently, many of the site specific modification reactions focused on amino acids with aromatic rings like tyrosine are developed. Dr. Francis and coworkers show that a three-component Mannich-type of reaction can be used to modify tyrosine site-specifically.

Hence, we hypothesize once an unnatural amino acid bearing a 2-naphthol side chain is incorporated in protein, it can provide us a potential tag for further protein modification. The 2-naphthol tyrosine analogue is structurally similar to tyrosine, so the Mannich-type reaction may apply to this unnatural amino acid. P-cresol and 2-naphthol were used as the model molecule for tyrosine and the unnatural amino acid. Preliminary data shows high selectivity by optimization of the original reaction condition. Here, we propose that the three component Mannich-type reaction with the unnatural amino acid bearing a 2-naphthol side chain provides us a new site-specific protein modification strategy.

Tasnima Islam is a fourth year undergraduate student, studying Chemical Sciences at University of California, Merced. Tasnima is originally from Bangladesh, and she moved to the United States in 2005 as an immigrant. Her research experience includes working under Dr. Meng-Lin Tsao's lab where they focus on organic synthesis, bioorganic chemistry, and protein chemistry. In future, after her undergraduate studies, she desires to attend graduate school to study synthetic organic chemistry and pursue Doctor of Philosophy degree in this discipline.

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## **Bounded Gradient Projection Methods for Sparse Video Recovery**

David R Jones, Roummel F. Marcia

The recovery of sparse images from noisy, blurry, and potentially low-dimensional observations can be accomplished by solving an optimization problem that minimizes the least-squares error in data fidelity with a sparsity-promoting regularization term (the so-called  $l_2-l_1$  minimization problem). This paper focuses on the reconstruction of a video sequence of images where known pixel-intensity bounds exist at each video frame.

It has been established that the  $l_2-l_1$  minimization problem can be solved efficiently using gradient projection, which was recently extended to solve general bound-constrained  $l_2-l_1$  minimization problems. Furthermore, the reconstruction of the video sequence can be made more efficient by exploiting the similarities between consecutive frames. In this paper, we propose a method for reconstructing a video sequence that takes advantage of the inter-frame correlations while constraining the solution to satisfy known a priori bounds, offering a higher potential for increasingly accurate reconstructions. To demonstrate the effectiveness of this approach, we have included the results of our numerical experiments.

My name is David Jones. I am a non-traditional, first generation student. I am currently an undergraduate studying applied mathematics with an emphasis on physics at University of California, Merced. I am a Scholar for many organizations, including Jack Kent Cooke Undergraduate Transfer Scholar, NASA Aerospace Scholar, UC Regent Scholar, UC Leadership Excellence through Advanced Degrees (LEADS) Scholar, and most recently the NASA Motivating Undergraduates in Science and Technology (MUST) Scholar. I plan on getting my Ph.D. in applied mathematics, with an emphasis on the physical sciences, and then using my education to help further mankind's knowledge, either by moving onto a professorship or by working for NASA.

## **Wetting and Drying Cycle effects in Soil Aggregation**

Jose Moreno, Prof. Teamrat A. Ghezzehei

Soil Aggregates are clumps of soil particles that are naturally bonded together by organic matter (decaying plant roots and/or microbes), fungal hyphae, and organic compounds such as Glucose. One reason why this is important is because aggregates can help insulate nutrients and other necessary compounds and retain water for a plant. Increased formation of soil aggregates is the result of naturally occurring wetting and drying cycles.

The hypothesis is that wetting and drying cycles work as a driving agent in depositing and transporting particle organic agents as the soil dries and this leads to soil aggregate formation. To test this hypothesis artificial soil aggregates were created by adding extracted organic matter (extracted from a sample of forest soil and organic farm soil) to a sand soil with a size range of 250 $\mu$ m-425 $\mu$ m. The extracted organic matter represents the organic compounds (ex. Glucose, xanthan, and polygalacturonic acid) that were originally contained dead plant roots or original produced by microbes. In this study we investigated the effect of varying number of wetting and drying cycles (1, 3, and 5 cycles) and two types of extracted soil organic matter (forest soil and organic farm soil) with two levels of concentration from these extracts on aggregate formation and their stability. Wet and dry sieving was used in determining aggregate formation and stability. We expect from the results that aggregation should increase as the number of wetting-drying cycles increases for only a short period of these cycles.

My name is Jose Moreno and I attend the University of California, Merced (UCM). My major is Material Chemistry and the main reason I chose Material Chemistry was that I was very interested in working with materials in improving their properties or designing new materials, but also being able to apply green chemistry ideals as well. My future plans are to attend a graduate school after graduating from UCM, however as for which I want to attend is uncertain. During my time at UCM, I received awards such as the Renewable Energy Scholarship, Dean's Honor List, and participating in the Leadership Excellence Through Advanced Degrees (UC Leads).

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## **The Educational Transition from the STEM Pipeline Education Program to Science**

Maria Torres, Dr. Angel Sanchez

Education Program to Science Disciplines at California State University, Stanislaus for Latino Population

This review is an annotated bibliography of STEM programs, policy, and research. Of particular interest is to understand the meaning of the STEM "Pipeline" (Science, Technology, Engineering and Mathematics) and why this is of such political importance to the United States. The review also focuses on the case of minority student persistence in STEM education in California and examines trends in the enrollment of minority or disadvantage students in STEM programs in the California State University system.

Is the STEM Pipeline a real and viable pipeline of transition from pre-collegiate to collegiate levels for unrepresented minority students? The STEM education programs were created to improve teacher quality and student achievement in the United States in order to remain globally competitive. Universities and academic departments promote ethnic diversity to increase the participation of underrepresented students for masters and doctoral education in science fields at a national level. However, cultural capital and economics are factors that may explain barriers to and patterns of attrition among unrepresented minority students that impede the achievement of academic goals.

Maria Torres came from Mexico to the United States in 1995. She enrolled in Modesto Junior College in order to learn English. When she began her academic life, she realized that she would be serving as a role model for her son's academic life. She overcame the language barrier, attended Merced College and graduated with Associates of the Arts Degree with the Superintendent's Honors; she was also honored with the Psychology Department Award. Furthermore, she has been on president's list a Modesto Junior College and the Dean's List at Merced Junior College, and at the California State University, Stanislaus. She has been involved in many extracurricular activities through her membership in the Sociology Club, Hungry Network, Phi Theta Kappa, Puente and Students 4 Social Justice. For her, it is very important to excel in her classes and to serve the community in order to be a positive influence for her son.

## **The Efficiency of PbSe Nanowire Based Solar Cells**

Ibrahim Yusuf, Prof. Erik Menke PhD

We are making solar cells using lead selenide (PbSe) nanowires. The solar cells are prepared through a process known as electrodeposition. This allows the PbSe to form on a glass surface. We aim to show the efficiency of the PbSe solar cells by testing the cells with different widths of PbSe nanowires.

The nanowire's width being tested includes 50nm, 60nm, 70nm, 80nm, 90nm, 100nm, 110nm, 120nm, and 150nm. Once the solar cell has been prepared; the current produced by each cell is measured using the Gamry Framework program. The data collected from the measurements should show a trend that proves these solar cells efficiency.

Ibrihim was born in Hayward, California. He is currently a third year undergraduate student of human biology and psychology at the University of California of Merced. He is currently an undergraduate researcher under the mentorship of Professor Erik Menke Ph.D. He aspires to pursue his graduate education at the University of California of San Francisco in their MD/PhD program where he would be studying to become a biomedical researcher.

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## THE CENTER OF EXCELLENCE FOR THE STUDY OF HEALTH DISPARITIES IN RURAL AND ETHNIC UNDERSERVED POPULATIONS' UNDERGRADUATE RESEARCH TRAINING PROGRAM

In September 2009, UC Merced was awarded a program grant by the National Institutes of Health's National Center on Minority Health and Health Disparities to develop a Center of Excellence for the study of Health Disparities (COEHD) in California's San Joaquin Valley.

The COEHD's Undergraduate Research Training Program begins with an eight-week intensive summer program and continues throughout the following academic year with the goals of:

- Increasing the number of students who are knowledgeable about health disparities;
- Increasing the numbers of undergraduate students from under-represented and disadvantaged groups performing basic, clinical and/or bio-behavioral research; and
- Expanding the capacity and competence of UC Merced in conducting health sciences research that address health disparities in the region.

Ultimately, the COEHD will develop a sustainable infrastructure and culture on our nascent campus that recognizes and supports health sciences education and research with an emphasis on training and research that impacts health disparities, especially in the geographic region in which UC Merced is located, but that also has national and global implications.

Along these lines, the ultimate goal of the Undergraduate Research Training Program is to produce highly qualified and well-trained students that are well-positioned to seek advanced degrees in basic, clinical and bio-behavioral biomedical sciences to support the main goals of the National Institute for Minority Health & Health Disparities of reducing health disparities.



2011-12 COEHD Undergraduate Research Trainees.

## **Differentiation of Insulin-Producing Cell Clusters from Mouse Embryonic Stem Cells**

Christa D. Caneda and Jennifer O. Manilay

In Type 1 diabetes, insulin-producing pancreatic cells, or beta cells, are destroyed by an autoimmune response. Current clinical treatments are limited to indefinite insulin replacement therapy, pancreas transplantation, and beta islet transplantation. To restore glucose regulation in a less invasive way, the replacement of beta cells by inducing embryonic stem cell (ES cell) differentiation to insulin-producing cell clusters (IPCCs) has been proposed.

We hypothesize that cell culture and differentiation of embryonic stem cells to IPCCs will reproduce the insulin-producing capacity of healthy beta cells in an adult mouse. Over the course of 6 weeks, three mouse-derived cell cultures were grown and maintained: the insulinoma cell lines, 832/3 and 832/13; the embryonic fibroblast cell line, STO; and the clonal ES cell line, ES-D3. These cell lines were cultured through the practice of routine subculture, thawing, and freezing protocols. Insulinoma cell stocks were successfully expanded, and will be utilized as a positive control for comparison with IPCCs. ES cells and STO cells (which are feeder cells for ES cells) continue to be cultured. To direct differentiation to IPCC, ES cells will be resuspended by trypsinization and then transferred to differentiation media. Analysis of differentiation will be conducted through enzyme-linked immunosorbent assay (ELISA) to detect levels of c-peptide, a byproduct of insulin production, to distinguish between de novo insulin synthesis and adsorption of insulin-rich culture media. These protocols will contribute to the overall goals of achieving islet cell development by embryonic stem cell differentiation.

Christa is a third-year Regents Scholar from Sacramento, California. She is a Biological Sciences major, with her studies emphasizing on Microbiology and Immunology. She is actively engaging in career exploration for a suitable lifelong environment for her passion towards biology, with current considerations in pharmacy and research. When she is not sporting her lab coat to perform cell culture, she enjoys the creative pastimes of drawing, painting, and theater. She also currently participates in the UC Merced Intervarsity Christian Fellowship and the UC Merced Pre-Pharmacy Club.

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## **Omega-3 fatty acids and their role in biological membranes: Possible reasons for beneficial health outcomes**

Stephanie Chen and Linda S. Hirst

Docosahexaenoic acid (DHA), an  $\omega$ -3 fatty acid, is known for being an essential dietary nutrient for nerve tissue growth and function. Numerous clinical studies have also shown that DHA deficiencies are associated with disorders such as attention deficit hyperactivity disorder, cystic fibrosis, unipolar depression and aggressive hostility. Consequently it is important to understand how  $\omega$ -3 fatty acids contribute to the development of the central nervous system, but not much is known about how polyunsaturated fatty acids are transported to the cells of the nervous system and incorporate into the membrane. We are particularly interested in studying the link between ingestion of  $\omega$ -3 lipids and their observed dietary benefits.

This study uses fluorescence microscopy and atomic force microscopy to observe phase separation phenomena (such as lipid rafts/domains) in membranes containing DHA and other lipids. Membranes are prepared by the electro-formation method to generate giant unilamellar vesicles, synthetic models for the cell membrane. Previous work has shown that saturated lipids in the membrane pack preferentially with cholesterol to form nano-scale domains with a variety of proposed important roles in trans-membrane protein function. We expect that an increase in polyunsaturated lipids in the membrane, such as DHA, will modify the structure and/or distribution of the membrane domains. This molecular level study may provide key information about how ingestion of  $\omega$ -3 lipids can produce health benefits.

Stephanie Chen is currently a third year undergraduate student at the University of California, Merced. She is pursuing a bachelor's degree in psychology with a minor in art. She plans on pursuing graduate school upon completing her degree. Some career interests, that Stephanie is exploring, are: academic advising, research, teaching, and forensic testimony. She is now a part of the Center of Excellence on Health Disparities' Undergraduate Research Training Program. She works in a biophysics lab in order to explore her interests in biology and physics.

## **Studying Patterns of Mitochondrial DNA and Major Histocompatibility Complex Variation in the Red Hills Roach (*Cyprinidae: Lavinia symmetricus ssp*) Populations**

Morrell Chhay and Andy Aguilar

The recently discovered small population of the Red Hills roach (*Cyprinidae: Lavinia symmetricus ssp*) has had previous morphological and phylogenetic studies done to determine the degree of isolation for this subspecies. However, studies to determine genetic diversity in the major histocompatibility complex (MHC) in these small populations has yet to be done and can provide insight into the future persistence of these populations.

We hypothesized that the small populations of the Red Hills roach will have a low amount mitochondrial DNA and MHC diversity due to their small population sizes and their isolations. DNA was extracted with fin clips and the Qiagen DN-easy kit. Portions of the cytochrome B and the three MHC genes: DAB1, UAA, and OL93-139/OL93-23 were targeted with polymerase chain reaction (PCR) using established primers.

Data for MHCs were inconclusive for because all three MHC primers had failed to produce consistent results. The OL93-139/OL93-23 primers produced multiple bands when amplified and the UAA primer fail to produce any bands. The DAB1 primer only worked in some individual samples and the trends that correlate to the success of the primer in certain samples is unclear. The cytochrome B primer produced useable results showing variation in the mitochondrial DNA in the Red Hill roach populations. Our data suggests that the Red Hills Roach is a distinct subspecies in the California roach species complex.

Morrell Chhay is a continuing third year student at UC Merced and is majoring in Biology with an emphasis in development. For his career goals he is keeping an open mind and for now is pursuing a career involving general health and medicine. Aside from academics he takes part in the UC Merced Sports Shooting Club and volunteers in emergency room at Catholic Healthcare West's Mercy Medical Center. On the recreational side, Morrell enjoys staying active with running, hiking and biking.

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## **Underrepresented Students' Success in STEM Majors**

Irenee Beattie, Rubinpreet Kaur

Science, Technology, Engineering, and Mathematic (STEM) fields are amongst the most popular choices of major for underrepresented students (e.g. women, first generation, and minorities). A common characteristic for successful students in STEM fields is communication. In this study, we are looking for a relation between communications during high school with parents and college with faculty amongst underrepresented STEM students. Increased times of communication per semester between faculty and students can be a result from communicating openly with parents during high school about career planning and higher education. We conducted an online survey to a stratified random sample at a university.

Currently, the results show that women minorities communicated more with their parents during high school than first generation men and non-first generation men and women did. Further analysis could possibly show higher Grade Point Averages amongst these women when looking at a factor of academic success. Some underrepresented students, such as first-generation, that had working parents during high school probably communicate less to faculty than others do. A mentoring program at universities can help students that did not openly converse with parents during high school learn to communicate with professors.

Rubinpreet Kaur is a fifth year student at the University of California, Merced. She has obtained a Bachelor of Arts in Sociology and will be completing final courses for her minor this upcoming academic year. Rubinpreet plans to attend law school and study criminal law. Her interests include cooking, dancing, and mentoring students into higher education.

Rubinpreet is currently working with Dr. Irenee Beattie, through the Center of Excellence on Health Disparities, as a research intern. She is looking at trends in underrepresented students in fields of Sciences, Technology, Engineering, and Mathematics.

## **Akt/Protein Kinase B Expression Increases with High Glucose Supplementation in Insulin Resistant OLETF Rats**

Lia Lee<sup>1</sup>, Irina Popovich<sup>1</sup>, Ruben Rodriguez<sup>1</sup>, Jose Viscarra<sup>1</sup>, Daisuke Nakano<sup>2</sup>, Akira Nishiyama<sup>2</sup>, Rudy M. Ortiz<sup>1</sup>

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Akt/protein kinase B plays a significant role in the insulin signaling pathway of peripheral tissues. Disruption of Akt/protein kinase B in skeletal muscle is associated with a decrease in glucose uptake. Inefficient glucose uptake can lead to insulin resistance, contributing to the development and progression of cardiovascular disease. Angiotensin receptor blocker (ARB) treatments can improve insulin sensitivity and decrease the augmentation of cardiovascular conditions. However, the contribution of angiotensin receptor activation to insulin sensitivity in the heart remains unclear.

In addition, cardiac insulin signaling with respect to Akt phosphorylation is yet to be investigated. Using an insulin resistant model, we hypothesized that the action of Akt is increased with high glucose. After six weeks, hearts were collected from 5 groups of rats (14 wks old): 1) LETO control, 2) OLETF, 3) OLETF+ARB (10 mg olmesartan/kg/d), 4) OLETF+high glucose (HG; 5% in water) and 5) OLETF+ARB+HG. Protein content of cardiac Akt was analyzed by Western blotting. Blood and plasma insulin levels were measured to calculate IR index. Ratio of phosphorylated Akt to total Akt content increased with high glucose suggesting glucose increases the activation of Akt. However, treatment with ARB did not change the activation in rats on either normal or high glucose-supplemented diets. This suggests that the activation of angiotensin receptor does not contribute to the activation of Akt in the heart during an insulin resistance.

Lia Lee is a fourth year student from Fresno, Ca. She is majoring in molecular and cell biology and hopes to pursue nursing after she leaves UC Merced. She enjoys reading books and seeing new places!

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## **Hmong cultural practices, traditions, and beliefs to prevent morbidity and mortality: A critical review**

Bouapanh Lor and Stergios Roussos<sup>1</sup> MPH, PhD

1. Alliance for Community Research & Development, Merced

After the Hmong migrated from Southeast Asia to the United States in the early 1970s, adaptation and assimilation into the Western culture has been a continuous struggle, especially towards Western medicine. This study aims to determine Hmong cultural practices or traditions that are used to prevent diseases and maintain overall good health. If these practices could be identified, they could be applied towards building trust in Western medicine.

Interviews were conducted with 12 key informants about cultural practices used to prevent diseases and maintain good health. Each interview was assessed individually to examine key concepts about health practices in the Hmong culture. Eighty three percent of the interviews identified herbs, herbal teas, and nutrition such as growing their own foods, as ways that the Hmong stay healthy and try to prevent diseases. Seventy-five percent of the interviews said that if someone were dying from an illness, most Hmong people would take that person to a shaman or try home herbal remedies; Western medicine would be the last resort. Ninety-two percent of those interviewed agreed that individuals who are considered trustworthy (preferably Hmong) and educated about vaccines or drugs, or visual proof would be the only way to convince or change behaviors of the Hmong public.

This study suggests there is a need for cultural liaisons that are trusted and educated about vaccines and drugs to reach out to the Hmong public about health issues that specifically target them. More research is needed on the effectiveness of Hmong cultural health practices.

Bouapanh Lor first moved to Merced at the beginning of her sophomore year in high school from Fresno. She attended Golden Valley High School and graduated in 2007. That following fall semester, she attended Merced College as an undeclared major. After a year, she discovered her enthusiasm for the sciences and declared biology as her major. In the spring of 2011, she transferred to UC Merced as a biology major with an emphasis in human biology where she still currently attends. Her future plans include continuing her education in an institution where she can pursue becoming a physician's assistant.

## **Impacts of Foreclosure on Efficacy and Perceptions of Barriers to Community Success in South Merced and Planada.**

Alex Leigh Parnell, Simón E. Weffer

Neighborhood collective efficacy, which is defined as a common intent to reduce the existing problems within a neighborhood, is dependent on social cohesion and social control. It can be disrupted by instability within the neighborhood. Previous studies by Sampson et al (1997) have found a relationship between increased collective efficacy and a decrease in violence as well as the negative effects of residential instability. One of the most impactful factors on neighborhood stability in the last 5 years has been the increase in foreclosures.

Foreclosures clearly cause a shift in neighborhood stability. The literature has not examined in depth the link between foreclosures and neighborhood efficacy. If people have negative ideas of foreclosure, these views should be reflected in decreased efficacy. Using surveys of 127 participants from South Merced and Planada from 2007 to 2010, we examine foreclosures, neighborhood efficacy, and perceptions of barriers to community success.

We examine what the average efficacy score is for individuals based on their responses on the impacts of foreclosure in their community. The most common response in relation to the questions: 1) what are the barriers to improving the community; 2) what empty houses (as a result of foreclosure) do to the neighborhood were crime and safety. However, only 2 of the 127 people surveyed mentioned foreclosure as a barrier to community success. Therefore, people are concerned with crime and safety within their neighborhoods, but may not be directly aware of foreclosure as a factor.

Alex Parnell is currently a senior at the University of California, Merced. Alex entered the university as a psychology major, but during her junior year decided to broaden her education by adding cognitive science as a second major, with a minor in sociology. Her future goals include attending graduate school in the fall of 2012 and then to pursue a career as a clinical psychologist.

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## **2H and 13C NMR Analysis of Ethanol: Isotopic Markers of Biological and Process Origins of Single-Malt Scotches**

D Ventura, M P Meyer and A LiWang

Isotopic analysis via NMR is rapidly becoming a powerful tool in the analysis of the biological and process origins of foods. The principal hypothesis behind this analysis is that food and drink production processes fractionate isotopes in a distinct manner which can be traced to physical origins. Here, we propose to utilize the analysis of four isotopic quantities to gain insight into the differences among single-malt scotch whiskeys. The geographical origins of the raw barley used to manufacture malt will partially determine the ratio of  $^{13}\text{C}$  in the methylene and methyl groups of the product of fermentation, ethanol. Processes, such as distillation, are likely to have some additional effect upon total heavy isotope inclusion. The regional geographical source of water used during the milling process in the production of scotch whiskey is likely to determine the intramolecular  $^2\text{H}$  ratios at the methylene and methyl groups in ethanol. Total deuterium content is likely to reflect the geographical origin and distillation process of raw barley.

We propose to leverage NMR analysis of the  $^{13}\text{C}$  and  $^2\text{H}$  content at the methyl and methylene groups in ethanol for scotch whiskeys originating from each of the geographically distinct whisky production regions in Scotland. Principle component analysis will be used to generate isotopic markers capable of distinguishing the geographical origin of single-malt scotch whiskeys. This research has the prospect of increasing our knowledge of how geochemical signatures are transferred into food systems, as well as increasing the effectiveness and accuracy of food provenance determination techniques.

Dusty Ventura began her academic career by studying biotechnology at Merced Community College, which was completed in 2009. She is now a senior at the University of California, Merced, currently doing research in enology and NMR analysis in the lab of Dr. Matthew P. Meyer and Dr. Andy LiWang. Dusty is particularly interested in nanobiotechnology, and plans on pursuing a Ph.D. in that field while at UC Merced.





## THE RONALD E. MCNAIR POST-BACCALAUREATE ACHIEVEMENT PROGRAM

The Ronald E. McNair Post-Baccalaureate Achievement Program is a comprehensive program structured to prepare undergraduates for successful careers as graduate students, professors, and professional researchers.

The program is one of various educational opportunity programs funded under the Higher Education Act of 1965 collectively known as TRIO Programs.

At UC Merced and CSU Stanislaus, a partnership was created to provide an enriching educational experience for low-income/first-generation and underrepresented college students to: excel as undergraduates, succeed in graduate school, and ultimately enter faculty and research positions in our nations' colleges and universities.

The McNair Scholars Program supports a cohort of 25 student scholars each year. All students participate in academic year and summer activities until they graduate.

McNair Scholars are motivated students who have both the desire and the potential to earn a doctoral degree. By participating in the program, scholars increase and refine their academic skills and learn the tools necessary to be successful in graduate school.



2011 McNair Scholars.

## **Photovoltaic and Spectroscopic Activity of Inorganic Nanospheres Versus Commercial Organic Dyes**

Randall Babayo, David F. Kelley, PhD, Xichen Cai, PhD, Cory Sobotta, Robert Zeller, Kevin Zhong

School of Natural Sciences, University of California, Merced

Luminescent Solar Concentrator (LSC) Technology has been in use for decades, but with limited commercial viability. This technology is hampered by spectroscopic challenges that severely limit energy conversion efficiency. Conventional dye solutions such as the Rhodamine series used in conventional LSCs absorb light at frequencies very close to the luminescence spectra. This absorption-luminescence overlap works against the effects of total internal reflection and greatly decreases energy conversion efficiency within the device. However, the properties of quantum confinement in customized nanomaterials have the potential to overcome such energy barriers. Inorganic semiconductors such as CdSe and CdTe can be fine tuned in such a way; they can be designed into monolayers, spheres, rods, or composites with other material. The nanostructured semiconductors can be modified to passivate the materials with a coating of a large band gap semiconducting material; this increases efficiency further by controlling light absorption.

Improved solar concentrators have potential applications in the aerospace industry to power satellites, space stations, and weather balloons while minimizing overall mass load.

Randall Babayo is a junior undergraduate chemistry major with a passion for science. He is so passionate, in fact, that he is adding a second major in Natural Science before graduating in 2013. Randall has been working hard over the past few years: working part-time jobs, going to school, and riding a mountain bike as a sole means of transportation. During this time he worked as a summer researcher with the COINS program to study nanotechnology. Randall believes that through love and hard work he can accomplish anything despite any disadvantages in life.

Growing up in Santa Barbara, his mother taught him living in a low-income household raised by a single parent was no excuse not to excel. He wants to share this message and be a good role model in his community. In his free time he enjoys playing music and rigorous exercise.

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## **The effectiveness of monomeric Griffithsin in HIV prevention and its relationship with dimeric Griffithsin**

Gustavo A. Chata, Patricia J. LiWang PhD Biochemistry

University of California, Merced

Griffithsin is a dimeric protein from red algae, which potently prevents HIV-1 infection by binding onto gp 120. The structure of Griffithsin is a dimer and whether its monomer binds to gp 120 and inhibits HIV is important to understanding how the dimeric Griffithsin interacts with the HIV.

If the monomeric Griffithsin does not inhibit HIV as well as dimeric Griffithsin, then a characteristic of dimeric Griffithsin should prevent HIV from entering the cell. Some possible characteristics which may make dimeric Griffithsin a more potent inhibitor than monomeric Griffithsin could be the size of the dimeric Griffithsin, the orientation of the active sites, or the number of active sites on the dimeric Griffithsin. Therefore our goal is to make a monomer of Griffithsin and compare it to the dimer. We are using molecular techniques to produce and test a monomeric form of Griffithsin.

Gustavo Chata is a third year undergraduate student in Bioengineering whose research interest focuses on understanding the biochemistry of proteins, viruses, or bacteria that lead to genetic, viral or bacterial diseases. He expects to graduate Spring 2014. Gustavo has spent two years as an officer in engineering clubs, which have allowed him to develop leadership, administrative, time management and organizational skills.

Gustavo thinks it's important to find a way to treat diseases in a way that can decrease side effects and increase efficiency for patients. He hopes to continue his research in graduate school in order to successfully synthesize a drug of protein to properly inhibit genetic disparities. Gustavo enjoys playing tennis competitively and working out. He also likes to attend concerts and watch movies with his friends.

## **Creating A Latina Standardized Patient to Assess effectiveness of Health Educator: Pilot study Measure**

Marisol Chavez, Monica Bernardo, MIA and Steve Roussos, PhD, MPH,

Alliance for Community Research & Development, University of California, Merced

Adolescent Latinas continue having higher pregnancy rates compared to other ethnicities in the United States. Health educators are one method to help inform and support teens in making safer choices that prevent pregnancy and STIs. As part of a larger project in community health centers, a standardized patient visit was selected as a way to assess how health educators interact with Latina teens.

Community resources and literature reviews were used to understand the Latino community to create a biography script and barriers Latinas experience. The standardized patient was video recorded during a health educator visit. Twelve volunteers were asked to view the video and rate the teen actors on their performance. Measurement is still underway. The final results from the video observation questionnaire, the standardized patient will be used to provide feedback to health educators in order to improve their performance.

Marisol Chavez is a third year undergraduate student studying Psychology with minors in Art and Public Health. She is highly involved in the Health Education Representatives for Opportunities to Empower Students (H.E.R.O.E.S.) where she educates peers on various health topics. She enjoys educating students regarding alcohol, tobacco and other drug use. Marisol loves being part of the Delta Delta Delta Sorority where she can fundraise for St. Jude Children Research Hospital. She believes it is important to share knowledge to others and motivate friends and family members to strive for success. During her spare time she enjoys running outside or playing volleyball.

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## **Love According to a Four-Year-Old**

Jennifer T. Dang, Rose Scott Ph.D. School of Social Sciences, Humanities and Arts, University of California, Merced

Based on Jean Piaget's theory of child development, we examine children during the preoperational stage (roughly ages 4-7). The preoperational stage is theorized to be the stage in which children are able to form stable concepts through mental reasoning. This assumption allows us to determine how children have begun to understand the concept of love by asking them to illustrate three pictures: 1) a mother who loves her baby 2) two children who love each other 3) two adults who love each other. We then interview the children with a set list of questions and analyze their responses.

We anticipate that there will be a variety of results in the children's drawings and definition of love. We theorize that these differences may be attributed to cultural factors, gender, and social economic status. However, it will be interesting to view just how early these diversity differences influence a child's cognitive processes. Is it already by the age of four that a child has developed their own social identity and understanding of cultural differences or is this formed later? If results prove to be consistent across a specific demographic (i.e. a majority of four year olds depict a similar drawing and explanation to the attitude of love), this may hint that love is not socially defined, but there is already an innate, universal understanding of love.

Jennifer Dang is a second year student in the school of Psychology and is avid about pursuing studies in Health Disparities. Through McNair, she hopes to research homelessness epidemic throughout the Central Valley. Jennifer believes in the University's motto of "let there be light" and the importance of utilizing education to illuminate disparities within her community. While at UC Merced, Jennifer also serves as a Resident Assistant for Housing, small group leader for Intervarsity Christian Fellowship and secretary of Film Association. Her off the clock interest includes photography, volleyball and expanding her eating horizons.

## **Largest Realistic Environment Simulation for Robotic Control Software**

Jessica C. De Silva, Stefano Carpin, Ph.D., Nicola Basilico, Ph.D.

School of Engineering, University of California, Merced

Realistic environment simulation is instrumental for the development of robotic control software. The task requires testing the software in the simulation prior to its exposure in the real world to ensure proper operating. Therefore, the objective of this project was to create the largest and most realistic environment model to be used in experiments done by scientists. 3D models, known as static meshes, were designed using the 3DS Max program which, along with Maya, is the primary program used for blockbuster animations. These models are then imported into the newest and most efficient game engine, Unreal Development Kit, also known as UDK.

This engine contains accurate rigid body simulation and can withstand the input of tens of robots within one environment. The environments simulated within UDK entails maximizing retention to detail to guarantee accuracy in the training of the robotic control software. With UDK's monthly updated software, the purpose is to create simulations that are indecipherable among the real world.

Jessica DeSilva is a first year undergraduate student majoring in Mathematics. She graduated as valedictorian of her high school and has served many leadership roles such as class president, currently math club secretary at Stanislaus and others. Jessica enjoys spending the holidays with her Portuguese family and going to church with them every Sunday. In her spare time Jessica coaches a novice cheer team in her hometown and loves being a role model for them. Jessica plans to graduate from Stanislaus in Spring 2013 having friendships and memories that will last a lifetime.

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## **Analysis of Conformational Influences within 2R,3R-Butanediol**

Zoila M. Estrada, Michael D. Drake<sup>1</sup>

<sup>1</sup>. California State University, Stanislaus

2R,3R-Butanediol is a simple polyol with two different isomers: the meso isomer and the racemic isomer. By examining racemic 2,3-Butanediol in different solvents, we investigate its conformational preferences to determine the conformational influences present in racemic-2,3-Butanediol. 2R,3R-Butanediol serves as a model molecule to understand the conformational influence in more complex compounds such as proteins. Some conformational influences we investigate are steric bulk, intramolecular hydrogen bonding, Coulombic attraction/repulsion, solvent effects, the polarity of conformer versus polarity of the solvent, and hyperconjugation.

This project aims to understand the occurrence and effect of hyperconjugation between vicinal hydroxyl (OH) groups which are present in 2R, 3R-Butanediol. Hyperconjugation is an interaction between electrons in a sigma bond with a vicinal, coplanar anti-bonding sigma orbital which increases the stability of the system. The methodology employed is <sup>1</sup>H NMR and <sup>13</sup>C NMR on 2R,3R-Butanediol in different solvents. Then, we simulate the experimental spectrum on gNMR to extract the J coupling values. We used the Altona equation in order to correlate the J-coupling constants dihedral angles there by determining the conformation of the compound.

Zoila (Zoe) Estrada is a Junior at California State University Stanislaus. She is a Chemistry and Biological Science concentration in Clinical Laboratory with a minor in Psychology. She is researching the effect of Hyperconjugation in 2R, 3R-Butanediol to determine conformational preference of the compound. She expects to graduate in the Spring 2014. Zoe is involved in a multiple of organizations, which include Pre-Health Society, Biology Club, Hunger Network, and ASI Warrior Squad. Zoe enjoys a wide array of recreational activities such as bicycle riding, quad riding, camping, baking, gaming, listening to jazz and classic rock, and ice skating.

## **From Static Mental Representation to Kinetic: Understanding the Development of Mental Representation to Critical Thought Processes in School-Age Children.**

Jose-Michael Gonzalez, G.A., Michelle Zambrano G.S., and Rita Asher, PhD

School of Human & Health Sciences, California State University—Stanislaus

Mental Representation is the underpinning construct that leads to the development of the critical thought process throughout the human lifespan and precedes the use of information. One key component of children's thought processes is imagery. With an increase in cognition and working memory, children are found to create more realistic, detailed, and accurate portraits through recall. Human Figure Drawing (HFD) Test and Picture Figure Test (PFT) are used to measure development by the spontaneous use of patterns, number of descriptive objects, orientation of the human figure, posture and cues, and presence or lack of movement in each drawing.

The goal of the study is to examine the relationship between children's understanding of representation of movement and developmental patterns in the spontaneous use of symbolic expressions of movement in children's drawings. This study examines Piaget's theory of development of mental representation which reported that children gain images with movement after the age of seven in order to actively recreate a perception. However, this study found that kinetic imagery develops far earlier than once believed. This study demonstrates a relationship between the understanding of movement and presentation of motion expression in drawings of the human figure. Also, adds to understandings of knowledge and its use, the shift from static to kinetic representation, symbolic expression of movement, mental representation theories, and the critical thought processes in children. The results obtained in this study are being further calculated and will be extrapolated for a higher-level comparison to previous research findings on the subject matter.

Jose Gonzales is a third year California State University, Stanislaus student in Child Development looking specifically into the development of cognitive and mental representation abilities in children. He expects to graduate in the Spring of 2013. Jose has also spent a combined ten years in the administration of Child Development and School Age Programs. Jose shares his expertise as the Director of After School Programs and Family Literacy Services of Waterford Unified School District and a Commissioner for the City of Waterford Parks and Recreation Commission. He also is the state-wide Co-chair of the California After-School Network.

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## **Conversion of Waste into Energy using Plasma Gasification**

Israr Hussain, Gerardo Diaz

School of Engineering, University of California, Merced

The need for developing a mechanism to convert waste into energy is essential in today's environment. As population continues to increase, energy resources are decreasing and landfill waste continues to grow. An alternative method to process waste into energy can be accomplished by using plasma to gasify waste and converting it into synthesis gas. Synthesis gas is a mixture of gases that contains mainly hydrogen and carbon monoxide that can be used as fuel. Preliminary tests have been run for different types of biomass, including wood shavings, waste from ground coffee, grape pomace, etc.. in order to obtain energy and mass balances. It is essential to determine if the biomass samples will provide substantial energy and to analyze the flowing characteristics of each sample as it runs through the auger system. Flow-rate results for different types of biomass are provided and discussed.

Israr Hussain was born in a rural village in Pakistan and immigrated with his family to California in 1996 to pursue a better life. For more than half of his life he has live in the Bay Area with his mother, father, younger brother, older sister and cousin. Israr Hussain is a third year under graduate student majoring in Mechanical Engineering who is expected to graduate in spring of 2013. He is the first generation of his family to attend college. Over the past years, Israr has shown great leadership and involvement in campus life. He is currently involved in SAE (Society of Automotive Engineers at UC Merced) and is working along with his fellow members in designing a formula race car to compete against other universities from all over the world. Along with this, he is also a member of a professional engineering fraternity, Theta Tau. Israr has also been an office in the Muslim Student Association since 2008, and is the current president of the club. After he graduates, Israr hopes to pursue higher education, eventually obtaining his PhD.

## **The Preferred Source of Sexual Education: Variability of General and Sex-Related Rapport Between Parents and Children.**

Rafael Ayala Lopez, Lin Myers, Ph.D.

California State University, Stanislaus

Parent and child communication about sexuality has evolved over the last few decades due to new findings of sexually transmitted infections and trends of teen pregnancies. Sex-related rapport between parents and children has become more common; however, the level of satisfaction and information from parents may not be up to standard of what the children should know. Theories such as Social Learning and Cognitive-Development would emphasize that children's primary source of education is through mimicking and learning behavior from their parents.

Given that parents is typically the first primary source of education, it is important to analyze the characteristics that impair parent and child communication about sexuality and sex related topics. This study used the Sex Education Inventory, which measures the sources of sex of education. Overwhelmingly the study showed that the preferred source of sex education was primarily parents, however the main source of sex education was from teachers and professionals. This study adds to the field and further implementation of the parent child communication would make a difference in sex-related behavior, disease prevention and education.

Rafael was born in Degollado Jalisco, Mexico. He was raised in Modesto, CA in a traditional Mexican home. He is currently a third year Psychology major at CSU, Stanislaus. Rafael is an active member of M.E.C.H.A. In addition to his studies, he is full-time worker and enjoys volunteering his time for the community. He expects to graduate in Spring 2012 with a BA in Psychology and begin graduate school in the fall. Rafael enjoys art, dance and performing arts.

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## **The Role of Vocabulary in High-Inhibition False-Belief Tasks**

William Morning, Rose M. Scott, PhD

School of Social Science, Humanities and Arts, University of California, Merced

This study used a high-inhibition false-belief task to test the processing-load account of false-belief reasoning; developmental psychologists are interested in false-beliefs because false-beliefs are one of the mental states that drive human behavior. This study predicted that children's performance on the false-belief tasks would vary as a function of their processing skills.

Children saw a picture book accompanied by a story of character who comes to hold a false-belief about the location of an object. Researchers then measured where children looked spontaneously when shown two pictures representing the end of the story, one matched the correct end of the story if the children took the false belief into account the other did not. Results from the spontaneous-response looking-times showed a vocabulary effect, suggesting that vocabulary influences performance in false-belief tasks and supports the processing-load account of false-belief reasoning.

William Christopher Morning was born in Merced, California. William graduated from Merced High-School and then went on to attend several Community Colleges: Pasadena City College, Santa Monica College and Merced College before transferring in to UC Merced in the spring of 2011. William is a declared double major in psychology and economics, with plans to earn a Ph.D. industrial organizational psychology.

William is a first year cohort in the 2011-2012 McNair program. As a McNair scholar, William is working with developmental psychologist Dr. Rose Scott; developmental psychologists study human cognitive, social, intellectual, personality, emotional and perceptual, growth. Under the mentorship of Dr. Scott William is currently studying the processing-load account of false-belief reasoning; false-beliefs are one of the mental states that drive human behavior. William is using a high-inhibition false-belief task to test whether children's performance on the false-belief tasks varies as a function of processing skills.

## **Multi-Nucleation of P2X4 and P2X7 HEK Cells**

Ikechukwu Ollawa, Maria Avila, Marisa Brooks, David Ojcius, Ph.D.

University of California, Merced

Purinergic receptors, P2X4 and P2X7, function as ligand-gated channels stimulated by extracellular ATP. P2X4 and P2X7 receptors form high calcium permeabilization and membrane pore expansion. Previously, the purinergic P2X7 receptor has been shown to induce giant multinucleation morphology in Human Embryonic Kidney 293 (HEK) cells, while P2X4 is still under study.

The exact mechanism behind the signaling cascades of these receptors is unclear, and must be elaborated upon. Here in this study we are modifying the same HEK293 cells by over expressing both the purinergic P2X4 and P2X7 receptors to demonstrate multi-nucleation. By utilizing cell tracker green (5-chloromethylfluorescein diacetate) and cell tracker red (5-(and-6)-(((4-chloromethyl)benzoyl)amino)tetra-methylrhodamine) at various time points with and without inhibition of multi-nucleation with the purinergic antagonist, pyridoxal phosphate-6-azo (benzene-2,4-disulfonic acid) tetrasodium salt hydrate (PPADS) solution; multi-nucleation is examined using flow cytometry and fluorescence microscopy. Our results show that the over expression of these receptors in HEK293 cells induces these cells to aggregate and fuse, causing multiple nuclei to bind and share a cytoplasm. Purinergic receptors have been identified as stimulating the opening of large 900da pores that release a variety of cytokines by characterizing the receptors involvement in multi-nucleation we learn more about the importance of these purinergic receptors in general cell function.

Ike Ollawa is a 4th year human biology major with a psychology minor at UC Merced. He was born and raised in Los Angeles, CA and he is of Nigerian descent. Currently, he is a second year McNair Scholar, and his last year's research project took place at Alfred I. Dupont Biomedical Cancer Research Center and at the University of Delaware, where he focused on treatment of the rare childhood cancer, neuroblastoma. Ike's hobbies include, research and traveling throughout the state of California.

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## **Relationship Maintenance and Social Skills**

Rosa Ramirez, Kurt Baker, Ph.D.

California State University, Stanislaus

The present project investigated the relationship between social skills and marital satisfaction in a sample of 65 married couples. Wives' level of social skills was positively correlated with their level of marital satisfaction. Contrary to predictions, husbands' level of social skills was not significantly associated with their level of marital satisfaction. Several findings emerged when we examined the correlations of social skills scores for one person with their spouses' scores.

First, husbands' marital satisfaction was significantly correlated with wives' social skills. Second, wives marital satisfaction was not significantly related to husbands' level of social skills. These results are discussed with respect to wives' primary role in dealing with interpersonal issues with marriage.

I was born in Durango, Mexico but raised in the U.S. Professionally, I have worked for over 17 years in the Social Services Area in various positions from clerical, to case manager, to analyst; all involved discipline and leadership in order to provide guidance to both the public and private sectors of the services available.

I enjoy meditating and learning more of the metaphysics. I believe spirituality should not be minimized and everyone would benefit from connecting with oneself and with a higher purpose. Currently, I am focused on my studies and would like to achieve what would seem an impossible dream, a degree in Psychology and Sociology. I enjoy social work and also like to evacuate what causes psychological issues.



## **Analysis of Synthetic Gas Obtained From Plasma Gasification**

Azucena Robles, Gerardo Diaz, PhD

School of Engineering, University of California, Merced

Studies in renewable energy concern the potential future scarcity of fossil fuels, and the damages made in the environment with current energy sources and growing waste. In order to address these problems, a process called plasma gasification is used to decompose waste material to its basic molecular form at temperatures of 5000°C or more. The decomposed waste material is converted to synthetic gas (syngas), and is composed of mainly carbon dioxide, carbon monoxide and hydrogen. The main goal is to reach sustainability, and to produce a large amount of renewable energy from waste without having to input any external energy that will continue to damage the environment. That is why it is essential to analyze the syngas obtained from different types of biomass tested in order to find its precise composition using a gas chromatograph and to verify that the expected results are obtained. Therefore, the energy and mass balances for each syngas are determined to further confirm the amount of fuel that can be produced with that specific syngas. In the first stage of this project the plasma gasification process will be conducted using a variety of waste generated on campus and locally. This will help combat the concern of the increasing waste production in the local areas, as well as the alternative form of renewable energy that is needed; overall, trying to reach sustainability will also give Eco-friendly results.

Originally from Bakersfield, California, Azucena Robles is a first generation Mexican-American young woman pursuing her Bachelors of Science in Mechanical Engineering. She is a second year student at the University of California, Merced, and she expects to graduate in the spring of 2013. Azucena is a great team player and a team leader; she loves taking up a challenge and pushing others to so the best they can. Throughout her previous experience in volunteering at a hospital and at an elementary school, Azucena learned that she enjoyed working with people and being a positive influence in their lives. She approaches any situation with a positive mindset and enjoys helping others in tough situations. She feels that one of her biggest accomplishments was graduating from high school and pursuing a higher education, because she knows that she is being a positive role model to her tow younger siblings and family members.

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## **Minimum Ages and Conditions Under Which Children Language Broker for Their Limited-English-Proficient Parents**

Sarah E. Sanders, and Stergios Roussos, PhD, Psychology

University of California, Merced. 2. Alliance for Community Research and Development

Children in families with limited English proficiency typically learn the language and become accustomed to American culture sooner than their parents. Therefore, parents with language barriers often rely on their children to help them communicate in a variety of locations and under many conditions. This activity, identified as “language brokering,” differs from “translating” and “interpreting” because it is more complex than the paraphrasing of linguistic content. Language brokers identify often subtle distinctions between cultures, intermediating to convey each party’s overall tone and sentiment in the context of cultural norms. Some practitioners are raising concerns over the implications of children language brokering in sensitive or stressful situations. This research project reviews literature published between 2000 and 2010 to identify the minimum ages and conditions under which children engaged in language brokering. Preliminary findings indicate children language broker as young as 7 years old, mainly for their parents, in situations of varying degrees of complexity.

Past research has identified relationships between language brokering and variables such as academic performance, parent-child bonding and psychological adjustment,. Therefore, results from this project will have broader implications for child language brokers’ overall healthy development. Additionally, findings may aid in establishing guidelines for children to assist their limited-English-proficient parents in what could serve as developmentally appropriate and mutually beneficial activity.

Sarah Sanders is a junior at UC Merced majoring in Psychology. She grew up in the bay area before her family settled in Merced County where she graduated from Los Banos High School. Sarah enjoyed careers in journalism and with the Atwater Chamber of Commerce before deciding to return to school. Sarah has served on boards including the Los Banos Arts Council, Soroptimist Int’l of Atwater and United Way of Merced County. She is a Merced College transfer with the ultimate goal of earning a B.A. and eventually a Ph.D. in Clinical Psychology. She feels treating families affected by mental illness and also by raising awareness about mental health to erase the stigma that prevents many from seeking treatment would serve her life’s purpose. Sarah loves hiking and running, thrift store shopping, trying new recipes and reading anything she can get her hands on.

## Enhanced Cholesterol Diet effects Epithelial Na<sup>+</sup> Channel levels

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The epithelial Na<sup>+</sup> channel (ENaC) is a trimeric transmembrane channel expressed in multiple secretory organs. ENaC is responsible for regulation of Na<sup>+</sup> transport and balance in the kidney with the alpha subunit ( $\alpha$ ENaC) primarily responsible for function. However, the impact of enriched cholesterol diet on the regulation of ENaC during insulin resistance is not well described. To examine the effects of enriched cholesterol diet and activation of the angiotensin receptor on renal ENaC protein during insulin resistance, Otsuka Long Evans Tokushima Fatty (OLETF) rats and their lean, non-insulin resistant controls, Long Evans Tokushima Otsuka (LETO) rats were supplemented with an enriched cholesterol diet (ECD; 2% + 0.5% cholic acid) and/ or treated with an angiotensin receptor blocker (ARB; 10 mg olmesartan/kg/d) for 16 weeks. The renal ENaC alpha and gamma subunits were measured by Western blot.

After 7 weeks of the treatment, ECD increased mean  $\alpha$ ENaC expression by 34% in LETO, while ARB decreased the expression by 79% suggesting that increased cholesterol contributes to increased  $\alpha$ ENaC expression via an angiotensin receptor-mediated process. These results suggest that an enriched cholesterol diet may contribute to the manifestation of the hypertension associated with cardiovascular and renal disease by increasing  $\alpha$ ENaC expression and thus renal uptake of Na<sup>+</sup> resulting in volume-dependent hypertension. The over-activation of the renin-angiotensin system commonly associated with metabolic syndrome may exacerbate the hypertension via overexpression of  $\alpha$ ENaC.

Jessica Sood is a third year undergraduate student majoring in Biological Science with an emphasis on Human Biology and double majoring in Chemistry and Psychology. She expects to graduate in the spring of 2013. She is an Emergency Department volunteer at Mercy Hospital and has been there over a year now. From volunteering, she has obtained great insight on the different medical professions and has experienced and participated in collaboration with a hospital setting. Along with volunteering, Jessica is an Advancement Via Individual Determination (AVID) tutor at Mitchell Senior Elementary School, where she finds herself making a difference by preparing students for college readiness.

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