



BORDER LATINO & AMERICAN INDIAN SUMMER EXPOSURE TO RESEARCH

2018 BLAISER



Closing Program

August 7th, 2018 | 7:30 AM-10:30 AM | Drachman Hall A114



THE UNIVERSITY OF ARIZONA HEALTH SCIENCES
Diversity & Inclusion



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Border Latino and American Indian Summer Exposure to Research (BLAISER) was created to address health disparities in Arizona's ethnically diverse and fast-growing communities. This cutting edge 10-week, undergraduate research experience provides an extraordinary laboratory training opportunity, pairing the junior and senior level student-scholars with preeminent UA health sciences researchers.

NAME	INSTITUTION	MENTOR
Tomas Aramburu	Haverford College	Diego R Martin, MD, PhD, FRCPC
Javier Bastidas	Pima Community College	Michael Hammer, PhD
Eric Bayman	University of Arizona	Fernando Martinez, MD
Jonathan Blohm	University of Arizona	Nathan A Ellis, PhD
Mattsue Cahue-Lopez	Arizona State University	Jane Mohler, RN, MSN, MPH, PhD
Sabrina Castillo	University of Arizona	Heidi Hamann, PhD
Virnel Demby	Arizona State University	Julie Armin, PhD
Stefano DiCenso	University of Arizona	Julie Miller, Ph.D.
Edgardo Guzman	University of Arizona	Todd Vanderah, PhD
Luis Machado Niebla	Arizona State University	Diego R Martin, MD, PhD, FRCPC
Taylor Martinez	University of Arizona	Martha Monroy, MA
Natalie Munguia	University of Arizona	Jil C. Tardiff, MD, PhD
Tun Pyai So Nef	University of Arizona	Marc Verhougstraete, PhD
Brooke Quinton	University of Arizona	Jason X.-J. Yuan, MD, PhD
Anette Real Arrayga	University of Arizona	Nicole Marrone, PHD, CCC-A
Ferris Saad	Arizona State University	Stephen Black, PhD
Juan Sanchez	University of Arizona	Frank Porreca, PhD
Ruby Sierra	University of Arizona	Rajesh Khanna, PhD
Marisol Verdugo	University of Arizona	Rajesh Khanna, PhD
Gloria Villa Barbosa	University of Arizona	Gerardo U Lopez, Ph.D

AGENDA			
	Time	Activity/Poster Presentation	Speaker Name
Session 1	7:30	Breakfast	
	7:55	Welcome remarks	Jorge Gomez, MD, PhD
	8:00	Demographics of Fatty Liver Disease using Quantitative Magnetic Resonance Biometrics	Tomas Aramburu
	8:05	Discovering the Effects of a Selenium-free diet on Seizure Severity in a Mouse Model of Childhood Epilepsy	Javier Bastidas
	8:10	Association Between Low Lung Function in Children and a Polymorphism in the ADAM19 Gene	Eric Bayman
	8:15	Genotyping of Small Interstitial copy-neutral loss of Heterozygosity (si-cnLOH) events in Colorectal Cancer Patients	Jonathan Blohm
	8:20	Association Between Depressive Symptoms, with Physical and Cognitive Function in Healthy Young Adults	Mattsue Cahue-Lopez
	Break 5 minutes		
Session 2	8:30	Factors Associated with Appointment Adherence Among Cancer Patients	Sabrina Castillo
	8:35	Health-Related Research among Racial and Ethnic Minorities with Intellectual and Developmental Disabilities	Virnel Demby
	8:40	Zebra Finch Model of Parkinson's Disease Voice Deficits	Stefano DiCenso
	8:45	Analgesic efficiency of PNA6, an Angiotensin-(1-7) analog, in a rodent model of traumatic nerve injury	Edgardo Guzman
	8:50	Demographics of Fatty Liver Disease using Quantitative Magnetic Resonance Biometrics	Luis Machado Niebla
Break 5 minutes			
Session 3	9:00	Transportation Distance and Travel Burden Correlation with Diabetes in Rural Arizona Cities	Taylor Martinez
	9:05	Effects of Tropomyosin Mutations on Binding Affinity with F-Actin	Natalie Munguia
	9:10	A Water Quality Assessment in a Farm Worker Community	Tun Pyai So Nef
	9:15	Pathogenic Role of STIM2 in Pulmonary Arterial Hypertension	Brooke Quinton
	9:20	Hearing Healthcare Treatment: What influences adherence?	Anette Real Arrayga
Break 5 minutes			
Session 4	9:30	Pro-inflammatory effect of calcium channel TRPV4 activation in human pulmonary artery endothelial cells	Ferris Saad
	9:35	Repurposing Clinically Available TRPV1 Antagonists to Prevent Anesthesia-induced Hypothermia and to Reduce Opioid Dose Requirements	Juan Sanchez
	9:40	Using a Light-Gated Potassium Channel for Pain Relief	Ruby Sierra
	9:45	Opioid Epidemic: A Crisis on the Horizon and a Lab's Journey to Developing Non-Opioid Drugs for Pain	Marisol Verdugo
	9:50	Cyclospora: Potential Reservoirs and Occurrence in Irrigation Waters	Gloria Villa Barbosa
	9:55	Closing Remarks	Jorge Gomez, MD, PhD

ABSTRACTS



Tomas Aramburu

Title: Demographics of Fatty Liver Disease using Quantitative Magnetic Resonance Biometrics

Mentor: Dr. Diego R Martin, Department Chair, Medical Imaging Professor, Medical Imaging, Professor, Biomedical Engineering

Luis Machado Niebla



ABSTRACT: Non-alcoholic fatty liver disorder (NAFLD) is a disorder of abnormal fat accumulation in the liver. Non-alcoholic steatohepatitis (NASH) represent a spectrum of fatty liver disease, including progressive liver fibrosis, which is a risk factor for hepatocellular carcinoma (HCC). NAFLD presents a growing healthcare burden, affecting over twenty-five percent of the US populations. The common method for NAFLD detection and diagnosis is liver biopsy, an invasive procedure prone to sampling error. New medical imaging techniques provide noninvasive NAFLD diagnostic tools. Magnetic resonance (MR) can be used for accurate quantification of liver lipid. MR also can be used for liver iron quantification; iron may be a contributor to liver disease progression in certain conditions. Though some risk factors, like obesity and insulin resistance, have been established, the cause and progression of NAFLD remain poorly understood. The imaging archives at the Banner-UA Hospital contain thousands of MR scans using quantification technique developed by the MR research team. This data provides a unique resource to study NAFLD demographics and etiology in an ethnically diverse population. This study aimed to collect and analyze data to determine if variables (including BMI, subcutaneous fat, age and ethnicity) predict liver fat levels.



Javier Sanchez Bastidas

Title: Discovering the Effects of a Selenium-free diet on Seizure Severity in a Mouse Model of Childhood Epilepsy

Mentor Michael Hammer, PhD – Research Scientist, Arizona Research Labs; Research Scientist, BIO5 Institute; Research Scientist, Ecology and Evolutionary Biology; Research Scientist, Neurology

BACKGROUND: Epilepsy is a neurological disease characterized by reoccurring seizures that affects about 50 million people around the world. At this time the current medical interventions for epilepsy consist of treatment with anti-epileptic drugs (AEDs) that only suppress the seizures. However, AEDs have been shown to be ineffective in 30% of patients with drug-resistant epilepsy (DRE). Recent research has shown that the effects of selenium deficiency are associated with an enhanced propensity for seizures in humans and rodents. Therefore, the present study was designed to investigate the anti-convulsant effect of sodium selenate. At this time we are also attempting to identify if there is a connection between epileptic seizures and

the occurrence of neuronal loss due to hippocampal sclerosis (HS). In sum this research will help to assess the potential for treatment of neurological diseases through the use of selenium as a therapeutic agent.

METHODS: In this study we used female and male mice 8-9 weeks of age, which were bred in cages together at the University of Arizona Core Facility. Once pregnant dams had a litter, that litter was then fostered over to a healthy wildtype mother. The foster mother would then begin on the selenium deficient diet and will continue until the pups are weaned (~21 days). The mice are expected to receive the sodium selenite through the mothers' milk until they are weaned, once weaned the mice will continue on the reduced diet until natural death to calculate the effect on survival. Once the effect of reduced selenium has been established, experiments to add back selenium via sodium selenate will be started. When the sodium selenite is started again the foster mothers will continue to be on the selenium deficient diet and will also receive the sodium selenate dose through a peanut butter pellet while nursing pups. Once pups are weaned they will receive their own pellet until natural death to determine the effect on survival.

RESULTS/CONCLUSIONS: In conclusion, although the full extent of the increased and decreased Selenium levels are not yet clear, we have gathered information that has a positive correlation between Selenium and Epileptic seizures. In the mouse models of epilepsy that we were testing, the Selenium deficiency promoted seizures, where as a supplementation of the Selenium helped to decrease seizure activity. There was also reduced neuronal loss in the mice that were treated with the sodium selenate after being given the Selenium deficient diet.



Eric Bayman

Title: Association Between Low Lung Function in Children and a Polymorphism in the ADAM19 Gene

Mentor: Dr. Fernando Martinez, Asthma/Airway Disease Research Center, Director, Asthma / Airway Disease Research Center, Professor, Pediatrics, Regents Professor, Endowed Chair, Swift – McNear, Professor, BIO5 Institute, Professor, Genetics – GIDP

ABSTRACT: Multiple genome-wide association studies (GWAS) found an association between lung function and SNP rs1422795 in the ADAM19 gene, with G being the risk allele. Lung function is assessed by the volume of air a person can forcefully exhale in one second (FEV1). This project was an attempt to replicate that finding in three Tucson populations; the Children's Respiratory Study (CRS), the Infant Immune Study (IIS), and Pathways to Immunologically Mediate Asthma (PIMA). Subjects were genotyped for the polymorphism and their FEV1 was compared between genotypes. GG subjects had lower FEV1 in CRS, but the association was not shown in IIS or PIMA. Our results confirm that genetic determination of complex phenotypes is influenced by the multiple factors that affect phenotype expression.



Jonathan Blohm

Title: Genotyping of small interstitial copy-neutral loss of heterozygosity (si-cnLOH) events in colorectal cancer patients

Mentor: Nathan Ellis, PhD, Associate Professor, Cellular and Molecular Medicine, Scientific Director, Cancer Biology Research Program, Associate Professor, Cancer Biology, Associate Professor, Genetics, Chair, ABBS Program, Chair, Genetics

ABSTRACT: Copy-neutral loss of heterozygosity (cnLOH) is a phenomenon in cancer where regions of the genome retain two copies but change from heterozygous in normal tissue and homozygous in the tumor. Previously, cnLOH events have been characterized as large, and terminal changes to the genome. This genomic instability is associated with mutations in tumor suppressor genes because the loss of the functional gene improves tumor fitness. Recently, the Ellis Lab identified small interstitial (si) cnLOH events using bioinformatics. However, there was skepticism of whether or not this phenomenon is actually present in colorectal cancer tumor samples. In this project we validated 2 si-cnLOHs in 2 patients from the Chicago Colorectal Cancer Consortium (CCCC) by genotyping single-nucleotide polymorphism (SNP) regions inside and outside of si-cnLOH regions of the genome. Genotyping was performed using PCR to amplify SNP regions inside and outside of the si-cnLOHs. Then, restriction enzyme digests specific to alleles inside the SNP region were used to validate the genotype of tumor and normal paired samples. Results indicate that of the 2 si-cnLOHs identified, SNPs inside the si-cnLOH are homozygous in the tumor and heterozygous in the normal. These data validate the bioinformatics analysis and illustrate that these previously uncharacterized, small interstitial events are actually novel phenomenon in colorectal cancer samples.



Mattsue Cahue-Lopez

Title: Association Between Depressive Symptoms, with Physical and Cognitive Function in Healthy Young Adults

Mentor: Nima Toosizadeh, Assistant Professor, Medicine - (Research Scholar Track), Assistant Professor, Biomedical Engineering, Staff, University of Arizona Center on Aging PhD; Jane Mohler, PhD, Professor, Medicine; Associate Professor, Nursing and Public Health; Clinical Professor, Pharmacy Practice-Science; Associate Director, University of Arizona Center on Aging

BACKGROUND: Physical function (i.e., the ability to perform basic actions as measured by mobility, strength, and endurance), and cognitive function (i.e., the ability to clearly learn, think, and remember) are essential for maintaining older adult independence and wellbeing. Decline in physical and cognitive function is common as we age and is related to decreased activities of daily living and Instrumental Activities of Daily Living. Recently body worn sensor objective measures of function have been implemented in older adults. However, equivalent

sensor-based measurement of the physical function and cognitive of younger healthy adults has not been well established. Using equivalent measures would allow measurement across the life-course trajectory and would enhance meaningful comparisons of function across age-groups. Further, these measures could be employed for young adult-related impairments, diseases, and conditions.

METHODS: We administered a battery of physical function assessments and self-reported questionnaires from a cohort of healthy young adults aged 18 – 27 years, which had been previously employed in the NIH-funded older-adult cohort within the Arizona Falls and Frailty Cohort. We determined indicators of depressive symptoms via the modified Patient Health Questionnaire (PHQ-9) scale, assessed cognitive health using the Montreal Cognitive Assessment (MoCA), and measured physical and cognitive function using previously validated Upper Extremity-Function (UEF) method. Participants performed six UEF tests including combination of two motor task levels (consistent self-paced, (N), and fast, (F)), and three cognitive levels (no counting (ST), counting backward by ones (DT1), and counting backward by threes (DT2). Single-task trials were used to assess physical function and dual-task trials were used to assess cognitive function. Linear correlations and linear regressions were performed in Excel using the total scores from each UEF task, the MoCA, and the PHQ-9 to examine the relationship between variables.

RESULTS: Thirty community-dwelling young adult participants were recruited (mean age: 21.5 +, range: 18-27 years), 53% (n=16) of whom were female. Two of sixteen (12.5%) females scored as mild cognitive impaired (MoCA cut-off <20), while males showed no impairment. None of the participants were depressed (PHQ-9 score cut-off >10). Our regression models confirmed that in this cohort there was no relationship between depressive symptom scores and UEF physical and cognitive performance ($p>0.05$). However, UEF fast dual-tasks (FDT1, FDT2) scores and cognition (MoCA) scores were significantly associated ($p<0.05$).

CONCLUSION: Our findings confirm that the UEF method is a viable tool to measure physical and cognitive function in healthy young adults, providing an equivalent sensor-based approach to the measurement of physical and cognitive function across the life course, and providing meaningful comparisons of function across age-groups. The UEF method has potential for application in young adult-related impairments, diseases, and conditions.



Sabrina Castillo

Title: Factors associated with appointment adherence among cancer patients

Mentor: Dr. Heidi Hamann, Ph.D , Associate Professor, Psychology; Associate Professor, Family and Community Medicine

OBJECTIVE: In cancer care, optimal appointment adherence is a critical determinant of patient survival. Enhanced understanding of appointment adherence and its demographic correlates are needed. In this study, we aimed to characterize ‘No-Show’ rates among cancer patients at University of Arizona Cancer Center (UACC) and determine specific demographic variables predictive of appointment adherence.

METHODS: We completed a retrospective chart review of 60 solid tumor, currently living, stage I-III breast, colorectal, lung, prostate, and head and neck cancer patients diagnosed at UACC between July 2015 and June 2016. Composite patient ‘No-Show’ rates and demographic variables were collected via electronic medical record review in EPIC.

RESULTS: Patients who listed primary language as Spanish (N=10) had higher ‘No-Show’ rates compared to English (6.2% v. 1.80%). Stage III cancer patients had higher ‘No-Show’ rates than Stages I and II patients (4.38% v. 2.02%). Using regression analysis, primary predictors of ‘No-Show’ rate were language and cancer stage. Overall, patients had low ‘No-Show’ rates.

CONCLUSION: Although this is a preliminary analysis and conclusions are limited by sample size, careful consideration of demographic factors such as language may reduce health disparities associated with appointment non-adherence in cancer care.



Virnel Demby

Title: Health-Related Research among Racial and Ethnic Minorities with Intellectual and Developmental Disabilities

Mentor: Julie Armin, PhD – Assistant Professor, Family and Community Medicine

BACKGROUND: People with intellectual and developmental disabilities (IDD) experience health disparities, but there is a double-burden of disparities among racial and ethnic minorities with IDD. As a first step toward a better understanding the evidence-base regarding cancer control efforts among Native American women with IDD, we conducted a systematic review of the literature to “map” the research that has been conducted among racial and ethnic minorities with IDD.

METHODS: “intellectual and developmental disabilities” and “African Americans/Latinos/Native Americans/Asian-Americans” were used to search four major reference databases (PubMed, EBSCO-Academic Search Ultimate, SCOPUS, & OvidSP. Using the EndNote Citation Manager, each article retrieved was organized into subcategories, including health, social services, employment, and other, within the major racial/ethnic groups. We report the counts for each category and subcategory and summarize the health focused literature.

RESULTS/CONCLUSIONS: As expected, not much research has been conducted for racial and ethnic minorities with intellectual and developmental disabilities. The results were as follows: 15 total articles from PubMed, 64 total articles from EBSCO, 3 total articles from OvidSP, and no articles from SCOPUS; 5 relevant articles from PubMed, 6 relevant articles from EBSCO, and 2 relevant articles from OvidSP.



Stefano Martin DiCenso

Title: Zebra Finch Model of Parkinson's Disease Voice Deficits

Mentors: Julie E. Miller, PhD, Neuroscience, Assistant Professor, Assistant Professor, Speech and Hearing Science, Assistant Professor, Neuroscience

BACKGROUND: Parkinson's disease (PD) is characterized by a depletion of the neurotransmitter dopamine (DA). This depletion leads to limb and vocal motor deficits including decreased pitch variability (monotonous speech). Zebra finch songbirds have dedicated song nuclei with strong homology to vocally-dedicated nuclei in humans. This homology makes zebra finch a convincing model to study PD vocal deficits. The neurotoxin 6-hydroxydopamine (6-OHDA) is used to deplete DA in the song nucleus Area X mimicking the reduced DA in the brains of individuals with PD. In PD, the variability of the fundamental frequency (FF), a measurement of pitch, is reduced. We hypothesize that birds treated with 6-OHDA will show a reduction in FF variability due to the loss of DA; mimicking monotonous pitch in the human PD condition.

METHODS: Twelve male zebra finches were split into two groups - the treatment group injected with 6-OHDA (n=6) and the vehicle control group injected with saline solution into Area X (n=6). Undirected (UD) song, a singing condition in which the male zebra finch sings alone, was recorded from two time points - prior to injection (pre) and four days after injection (post). Zebra finch song is made of sound units called syllables of which there are two types: noisy syllables and flat harmonic syllables. The flat harmonic syllables were analyzed and the coefficient of variation (CV) of the FF for each syllable was calculated to quantify pitch changes due to treatment. The FF variability from pre- to post-injection for the vehicle control group was compared to the 6-OHDA injected group. Within group comparisons were evaluated via Wilcoxon signed rank and between groups comparison were evaluated via Mann-Whitney U test.

RESULTS/CONCLUSIONS: There was a significant reduction in the variability of FF in finches treated with 6-OHDA compared to vehicle, suggesting a treatment effect that parallels the monotonous speech of PD patients. Interestingly, within a treatment group, natural song variability made the detection of treatment effects pre vs. post-injection challenging.

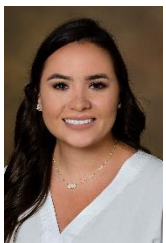


Edgardo Guzman

Title: Analgesic efficiency of PNA6, an Angiotensin-(1-7) analog, in a rodent model of traumatic nerve injury

Mentor: Todd W. Vanderah, Professor and Head, Department of Pharmacology, University of Arizona, COM; Tally M. Largent-Milnes, Ph.D., Assistant Professor, Department of Pharmacology, University of Arizona

ABSTRACT: Neuropathic pain is a complex chronic pain that currently has no effective pharmacological treatment. Opioids are commonly prescribed to treat the underlying symptoms, which can potentially compromise patient's quality of life due to harmful side effects such as addiction. Angiotensin-(1-7) activates the Mas receptor which reduces pain by modulating anti-inflammatory cytokines. Unfortunately, Ang-(1-7) is easily degraded in vivo and cannot readily cross the blood-brain barrier, making Ang-(1-7) unsuitable for conventional administration. We hypothesized that an Angiotensin-(1-7) analog, PNA6, will activate the Mas receptor and modulate the anti-inflammatory cytokines in a Spared Nerve Injury (SNI) mouse model. Mechanical allodynia was assessed before and after the administration of PNA6 using the von Frey behavior method. Data was quantified with the University of Arizona FlashCalc Dixon software and analyzed with two-way Repeated Measures-ANOVA with Bonferroni post-hoc multiple-comparison. Testing showed that some animals with SNI did not significantly express mechanical allodynia. In animals expressing mechanical allodynia after SNI, post-PNA6 administration showed a decrease in mechanical allodynia until 60 minutes, then an increase in mechanical allodynia until 180 minutes. Data here suggest that PNA6 appears to reduce mechanical allodynia; however, it was not statistically significant due to behavioral variability limiting conclusions on drug actions. Thus, we plan to replicate this experiment using a larger subject sample in order to obtain stronger statistical power and determine if PNA6 may be an alternative neuropathic strategy for patients suffering from neuropathic pain.



Taylor Martinez

Title: Transportation Distance and Travel Burden Correlation with Diabetes in Rural Arizona Cities

Mentor: Martha Monroy, MA, Rural Programs Manager at the Arizona State Office of Rural Health, REACH Program Director, Lecturer at the University of Arizona Mel and Enid Zuckerman College of Public Health, Southwest Regional Director for the National REACH Coalition Board of Directors

BACKGROUND: Diabetes affects about 9.4% of the U.S. population yet 16% of Arizona's rural population has diabetes. Both Ajo, Arizona and Casa Grande, Arizona are rural, medically underserved areas that see diabetes as their second most treated medical service behind hypertension. However, while Casa Grande has a hospital within its city limits around 20 miles

away from the furthest resident, Ajo is about 100 miles away from the nearest hospital. The availability to reach medical services is one of the largest health disparities within rural communities that may correlate with the prevalence and treatment of chronic diseases such as diabetes.

METHODS: A Community Health Needs Assessment was conducted on both Ajo, Arizona and Casa Grande, Arizona to determine what medical needs were being addressed, what conditions were most prevalent, and what healthcare areas were in need of improvement. Community statistical profiles from the Arizona Department of Health Services were analyzed and compared to identify differences between the two communities. Healthcare facility patient demographics and statistics were also obtained from both Ajo and Casa Grande to determine the prevalence of diabetes-related treatment as well as the quality of those services. A literature review of chronic disease predominance and health disparities in rural areas was also completed.

RESULTS/CONCLUSIONS: While it was found that Ajo has a much larger travel distance and transportation burden to receive diabetes-related medical care within that community, it may not be reflective of the diabetes prevalence in that area. Casa Grande is able to treat a larger number of patients, dedicate a higher percentage of their services to diabetes, and is able to provide higher quality care based on the UDS Adjusted Quartile Rankings for Clinical Performance. However, the associative county diabetes prevalence is higher for Casa Grande than for Ajo. This also may be due in part to the Ajo community implementing more prevention programs such as Bike Ajo and the Edible Ajo Schoolyard school garden program. With Ajo having a smaller population, these projects may be able to be more effective and reach more community members to implement health lifestyle behaviors.



Natalie Munguia

Title: Effects of Tropomyosin Mutations on Binding Affinity with F-Actin

Mentor: Dr. Jil C. Tardiff, MD, PhD- Professor of Medicine, Professor of Cellular and Molecular Medicine, Associate Chair for Research Department of Medicine, Steven M. Gootter Endowed Chair for the Prevention of Sudden Cardiac Death, Member UA Saver Heart Center and BIO5 Institute

BACKGROUND: Cardiomyopathy is the disease of the cardiac muscle, affecting the hearts ability to pump effectively and deliver blood through the body. Hypertrophic cardiomyopathy (HCM) affects 1 in 500 people and is the leading cause of cardiac death in young adults. Dilated cardiomyopathy (DCM) affects 1 in 2500 people and is the most common referral for heart transplantation. In HCM, the wall thickness of the left ventricle increases and chamber size decreases, while in DCM the wall thickness decreases and chamber size increases. Cardiac muscle proteins are composed partially of thin and thick filaments. The thin filament is

composed of: actin, tropomyosin (Tm), and the troponin complex; and the thick filament is composed of primarily myosin. Interaction between the thin and thick filaments allows cardiac muscle to contract by cross-bridge formation. Mutations in Tm may alter Tm's binding affinity to actin affecting Tm's ability to move along the surface of actin, leading to disruption of cross bridge formation and cardiac muscle contraction. The purpose of this study is to better understand the possible effects of Tm mutations: D219N (HCM), D230N (DCM), and D84N (DCM); on Tm's binding affinity with actin which may contribute to the development of cardiomyopathies. We hypothesize that the binding affinity between D219N Tm and actin would decrease, while D84N Tm would increase.

METHODS: A Cosedimentation assay was run to measure the various Tm mutations binding affinity to F-actin. Three samples at various concentrations were utilized in this assay: standard (Tm), sedimented (Tm without F-actin), and cosedimented (Tm with F-actin). Samples were run on SDS-PAGE gels and stained with Coomassie dye. Intensities of the sample bands (actin and Tm) were measured using LiCOR Image Studio and analyzed in Microsoft Excel and GraphPad Prism 7.

Results/Conclusions: Binding affinity of D219N Tm increased, while D230N Tm decreased compared to WT Tm. D84N Tm experiments are still in process. Although our results currently do not agree with our hypotheses and published data, this could be due to the fact that the experimental conditions are still being optimized. Once experimental conditions are optimized, additional runs must be completed for WT Tm and all Tm mutations.



Tun Pyai So Nef

Title: A Water Quality Assessment in a Farm Worker Community

Mentor: Marc Verhougstraete, Community Environment & Policy, Assistant Professor, Public Health

ABSTRACT: The farm worker community in this project is a small and unincorporated community located near Willcox in Cochise County, Arizona with a population of approximately 600 community residents who have migrated from Mexico to work in the agricultural fields here in Arizona. This community has been listed by various organizations at the county and federal level as the only *colonia* in Arizona which lacks water, wastewater, and sanitation infrastructure. Since the community uses water from groundwater wells, trace and heavy metal contaminants in the household drinking water is one of the main health concerns for this vulnerable and underserved farm worker community. Thus, this project's objective was to understand the concentration of arsenic and lead in household drinking waters by using community-based participatory approach. The sampling team worked with community health workers, *promotores*, to collect and interpret trace metals from 31 homes in the community. The concentration of arsenic and lead contaminants found in the

community water was below Maximum Contamination Level (MCLs) set by the U.S. Environmental Protection Agency for lead and arsenic in drinking water. This project aims to empower communities to organize and prepare for future environmental health issues of concern, advocate for change, and influence collective decision-making.



Brooke Quinton

Title: Pathogenic Role of STIM2 in Pulmonary Arterial Hypertension

Mentor: Jason Yuan M.D., Ph.D., Professor, Medicine; Professor, Physiology; Chief, Division of Translational and Regenerative Medicine; Associate Vice President for Translational Health Sciences, UA Health Sciences

ABSTRACT: STIM2 is a calcium sensor protein that is embedded in the endoplasmic reticulum that controls calcium influx in the cell. In a condition known as idiopathic pulmonary arterial hypertension (IPAH), this increase in calcium in pulmonary artery smooth muscle cells plays a key role in the progression of vascular remodeling, and vasoconstriction associated with the condition; which can eventually lead to right heart failure. Given that STIM2 plays this significant role in progressing IPAH, the lung tissue in a normal rat was expected to exhibit higher concentrations of this protein than other rat tissues. To test this, western blotting was performed to examine the relative cellular concentrations of STIM2 in the lung, heart, brain, liver, and kidney of a wildtype rat. The western blot analyses showed that STIM2 is expressed in higher concentrations in the lung tissue, confirming the hypothesis. Therefore, further studies should be conducted that compare the concentrations of STIM2 in lung tissue of healthy rats, and rats with induced pulmonary arterial hypertension. Continuing to study this protein and its function could be useful to possibly identify a drug target for treatment of IPAH in the future, or to gain further knowledge about the pathogenesis of IPAH.



Anette Real-Arrayga

Title: Hearing Healthcare Treatment: What influences adherence?

Mentor: Nicole Marrone, Ph.D., CCC-A, Associate Professor in the Department of Speech, Language, and Hearing Sciences and the James S. and Dyan Pignatelli/Unisource Clinical Chair in Audiologic Rehabilitation for Adults

BACKGROUND: More than 2/3 of adults 75+ years have a clinically significant hearing impairment that may impact the social, cognitive, and physical functioning of older adults (Nieman et al 2016). In addition to device treatments, group education classes are utilized as an additional intervention option for hearing loss. Hearing loss is also highly prevalent in the Hispanic population (Lee et al, 1991). Oyendo Bien (OB), a 5-week, Spanish-language hearing healthcare education program, consists of weekly 2-hour audiologic rehabilitation classes that

include peer support, hearing health information, and communication strategies. Community Health Workers facilitate OB in collaboration with audiologists. More information regarding the impact of barriers and facilitators on treatment adherence, such as self-perceived hearing loss and social supports, is needed.

METHODS: As part of a larger clinical trial, participants (N=134) were recruited from community hearing screenings in southeast Arizona as dyads or triads. Subjects were 55+ years with hearing loss, and/or attended with someone 55+ years with hearing loss. Pre-assessment results, including: a self-report question and the Client Oriented Scale of Improvement (COSI) were compared to attendance. Subject and partner attendance were also compared.

RESULTS/CONCLUSION: Though previous studies have shown that self-perceived hearing difficulties were associated with higher use and satisfaction of hearing aids, our data show that this may not apply to our Oyendo Bien intervention. Results showed no difference in attendance for subject's who self-reported hearing loss compared with those who did not. Also, the participant's ability to identify a communication situation needing improvement did not equate to increased class attendance. Additionally, while results showed that participants and partners were more likely to have similar attendance patterns, this did not increase overall attendance.



Ferris R. Saad

Title: Pro-inflammatory effect of calcium channel TRPV4 activation in human pulmonary artery endothelial cells

Mentor: Dr. Stephen M. Black, PhD - Professor, Medicine; Professor, Physiology; Director, Lung Vascular Pathobiology Program

BACKGROUND: The encoded protein of TRPV4 (Transient Receptor Potential Cation Channel Subfamily V Member 4) is a Ca²⁺-permeable cation channel that is involved in disease, as well as in many physiologic functions and dysfunctions. Mitochondrial dysfunction in endothelial cells may occur as the result of Ca²⁺ overloading and oxidants, leading to mitochondrial swelling and stress. Oxidative stress derived from mitochondria has been implicated in conditions such as chronic inflammation, cancer progression, diabetes mellitus, and atherosclerosis. Mitochondrial-derived Reactive Oxygen Species (MtROS) contribute to the production of pro-inflammatory cytokines (TNF α , IL-6, and IL-8). We hypothesized that MtROS have a direct relationship to the inflammatory response in cells as a result of the degradation of the protein I κ B α and NF- κ B activation.

METHODS: We activated TRPV4 by using a selective agonist, 4 α -phorbol-12,13-didecanoate (4 α PDD), and analyzed any possible induction of the transcription factor NF κ B pathway, followed by activation of pro-inflammatory cytokine gene expression. We demonstrated the activation of the cell signaling pathway IKK/I κ B α /NF- κ B in 4 α PDD-treated human pulmonary

artery endothelial cells (HPAEC) using Western blot analysis. Total RNA fractions isolated from control, and 4 α PDD-treated cells were used for cDNA preparation and real-time PCR with primers designed for TNF α , IL-1 β , IL-6 and IL-8. Further, we utilized fluorescent imaging to measure changes in intracellular calcium, MitoSox fluorescent imaging to evaluate changes in mitochondrial ROS, and the Seahorse XF analyzer to measure effects on mitochondrial function.

RESULTS/CONCLUSIONS: The data that we obtained demonstrated a robust dose- and time-dependent induction of the pro-inflammatory cytokines TNF α , IL-6, and IL-8 in HPAEC treated with 4 α PDD. This inflammatory response correlated with increases in intracellular calcium, MtROS, and attenuated mitochondrial function. Further studies will be necessary to confirm that these events are causally related. Our results clearly indicate that TRPV4 activation can lead to a pro-inflammatory response in the pulmonary endothelium; and this correlates with pathologic increases in intracellular calcium, mitochondrial dysfunction, and oxidative stress.



Juan Sanchez

Title: Repurposing Clinically Available TRPV1 Antagonists to Prevent Anesthesia-induced Hypothermia and to Reduce Opioid Dose Requirements

Mentor: Frank Porreca, PhD—Associate Department Head, Pharmacology; Professor, Anesthesiology; Professor, Cancer Biology Professor, Neuroscience Professor, Pharmacology

ABSTRACT: The experience of pain will signal to the organism the presence of aversive stimuli, influencing its decision to find relief. In many cases, this acute pain becomes chronic, even if the organism is not in any immediate danger. In many cases, surgery is necessary to treat conditions resulting in pain. Surgeries are conducted in the presence of anesthesia and patients commonly experience a drop in body temperature (hypothermia) that can result in post-operative complications. Opioids have often been used to treat pain but these drugs can produce serious toxicity. Many non-opioid treatments, including antagonists for the TRPV1 channel, are under investigation to provide pain relief and reduce the use of opioids. The use of TRPV1 antagonists for treatment of pain has not been feasible because this class of drugs increases body temperature (i.e., produces hyperthermia). This discovery has led to the proposition of utilizing this side effect counteract anesthesia-induced hypothermia. Under blind testing conditions, studies have shown using TRPV1 antagonists after anesthetic induction prevents anesthesia-induced hypothermia and can decrease reduce opioid dose requirements.



Ruby Sierra

Title: Using a Light-Gated Potassium Channel for Pain Relief

Mentor: Rajesh Khanna, PhD – Professor, Anesthesiology; Professor, Neuroscience Professor, Pharmacology

ABSTRACT: BLINK1 is an engineered blue-light induced potassium channel designed by attaching the photosensory module of plant LOV2 -Ja to Kcv, a small viral potassium channel. BLINK1 channels induce hyperpolarization to the potassium equilibrium which potentially results in a control mechanism for neuronal firing and hormone release associated with the pain pathway. Previous studies have observed a significant reduction in the escape response of zebrafish embryos with the BLINK1 plasmid and exposure to blue-light. In this study we are investigating further in vivo applicability of BLINK1 through assessing its potential as a pain reliever in rat models. Paclitaxel, a chemotherapy drug, was administered four times over the course of two weeks to induce paclitaxel-associated acute pain syndrome (P-APS). The Von Frey filament test was used to assess the rodent's sensitivity to mechanical stimuli and Hargreaves was used to assess sensitivity to thermal stimuli. After paclitaxel injections a significant decrease in paw withdrawal threshold was observed. BLINK1 RNA was then administered to the test group and on the alternate day both control and test groups were exposed to blue-light for two minutes. Only those with the BLINK1 plasmid saw an increase in paw withdrawal threshold. This indicates BLINK1 has further in vivo applicability as a non-opioid pain reliever.



Marisol Verdugo

Title: Opioid Epidemic: A Crisis on the Horizon and a Lab's Journey to Developing Non-Opioid Drugs for Pain

Mentor: Rajesh Khanna, PhD, Associate Professor, Anesthesiology, Associate Professor, Neuroscience, Associate Professor, Pharmacology

ABSTRACT: Opioid related deaths are a rising issue at both state and national levels. During 2015, there were a total of 33,091 deaths in the United States. Approximately half of the total deaths, 15,281, were associated to prescription opioids. These are individuals who typically suffer from chronic pain as a result of diseases such as cancer, fibromyalgia, and neurodegenerative disorders.

In an attempt to address this issue, Dr. Rajesh Khanna's Laboratory focuses on the study of how to regulate the trafficking and function of Voltage-Gated Calcium and Sodium Ion Channels to find pain pathway targets. To test the activity of these Voltage-Gated Ion Channels, the laboratory uses ratio-metric fluorescent-based Calcium Imaging on rat sensory neurons cultivated from dorsal root ganglions (DRGs). Calcium Imaging detects the influx of calcium into

a cell by fluorescing when Fura-2 Am dye, a calcium indicator, binds to the free intracellular calcium in target cells. The cells are imaged using 340 nm and 380 nm wavelengths and are responsible for activating the Fura-2 dye in the presence and/or absence of calcium. The ratio emission of both wavelengths is directly associated with intracellular calcium concentration in target cells. This work is a novel tool that can prove useful for regulating the trafficking and function of Voltage-Gated Calcium and Sodium Ion Channels to find pain pathway targets. Doing so, can help discover novel non-opioid drug alternatives to alleviate the opioid epidemic we currently face.



Gloria Villa Barbosa

Title: Cyclospora: Potential Reservoirs and Occurrence in Irrigation Waters

Mentor: Gerardo U. Lopez M.A.T., M.Ed., Ph.D., Animal & Biomedical Sciences-Ext, Assistant Extension Specialist, 4-H Youth Development-STEM, Assistant Professor, School of Animal and Comparative Biomedical Sciences

ABSTRACT: Cyclospora Cayetanensis is an intestinal coccidian protozoan parasite that has emerged as one of the main causes of diarrheal illness in humans worldwide. Cyclospora has been implicated in multiple outbreaks in the United States associated with fresh produce imported from Latin America. The purpose of this study is to determine the occurrence of Cyclospora in irrigation waters in Arizona and Texas. To determine if produce in the United States is at risk of contamination from irrigation waters contaminated with Cyclospora. For a period of two years, samples from different canals and wastewater treatment plants are being collected monthly in Arizona and Texas regions. A novel Taqman assay for quantitative PCR (qPCR) is being used to determine the presence of Cyclospora in collected samples. Cyclospora presence has been determined in 6 samples of wastewater treatment plants and 1 canal in Arizona and Texas. For further identification, the 7 qPCR positives and 7 negatives samples were sequenced. One wastewater treatment plant sample was confirmed through NCBI blast. Pairwise sequence alignment was performed for all sequenced samples using the known amplicon. It was determined that sequencing results may be affected by amplicon concentration, amplicon size, inhibitors, among others.

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Minority Health Disparities Lecture Series

Jorge Gomez, MD, PhD – Assistant Vice President, Translational Research in Special Population; Assistant Director, Cancer Research; Assistant Professor, Public Health; Director, BLAISER | *Minority Health Disparities Lecture Series*

Jill G. De Zapien – Associate Dean, Community Programs | *Building Healthy Communities in the Arizona-Sonora Border Region: Today's Strengths and Challenges*

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Rajesh Khanna, PhD - *Exploring New Opportunities for Relief of Chronic Pain*

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Arizona Area Health Education Centers – A Special thank you to the Arizona AHEC for sponsoring this program

BLAISER ACTIVITY PHOTOS

UAHS Summer Programs Opening Ceremony



First day at Arbol de la Vida Dorms!



Meeting their mentors!



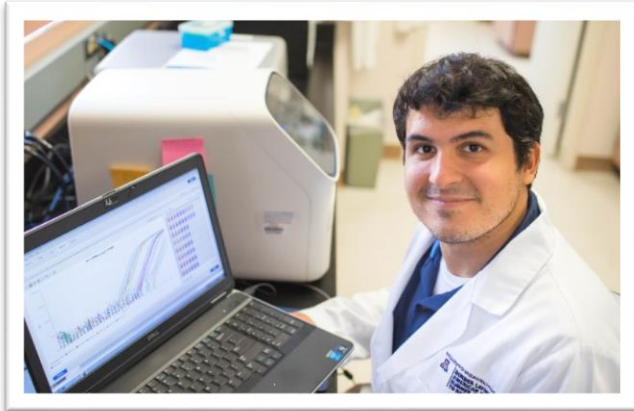
With their lab coats!



Minority Health Disparities Lecture Series



Working in their labs!



Touring Nogales and Sells AZ!

