



THE UNIVERSITY OF ARIZONA  
GRADUATE COLLEGE

# Undergraduate Research Opportunities Consortium



# UROC

## Abstract Review

August 2015

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UROC: Undergraduate Research Opportunities Consortium 2015





## UROC - PREP

Executive Director: Andrew Carnie, PhD

Program Director: Donna Treloar, MA

Faculty: Andrew Huerta, PhD

UROC-PREP, funded by the University of Arizona, is a highly structured academic, mentoring, and research program for undergraduate students at the University of Arizona. All students in the year-round program come from backgrounds that are underrepresented in graduate education and are interested in pursuing research oriented graduate degrees (Master's or PhD).

# KENIA JORDANA CARRERA

UROC PREP



**UNIVERSITY OF ARIZONA**

TUCSON, ARIZONA

PI: DR. JOHN JB ALLEN

## **ASSOCIATIONS BETWEEN MILD TRAUMATIC BRAIN INJURIES, EVENT-RELATED POTENTIALS, AND MAJOR DEPRESSION DISORDER**

**ABSTRACT:** Over the years, the relationship between mild traumatic brain injuries (mTBIs) and depression has been thoroughly examined, and a strong positive correlation between the two variables has been found (Chrisman & Richardson, 2014; Guskiewicz et al., 2007; Holsinger et al., 2002). However, not many researchers have investigated what happens structurally and functionally to the brain that allows this relationship to exist. In the past, concussions and severe depression have both been linked to a smaller error-related negativity (ERN) amplitude (Broglia et al., 2011; Duncan et al., 2011; Olvet, Klein, & Hajcak, 2010; Pontifex et al., 2009). Here, we proposed that a smaller amplitude in ERN is the mediating factor between mTBIs and depression. The present study evaluated a population of high-impact sports athletes with a history of mTBIs for levels of depression and ERN amplitude. All the participants, N=17, completed the Beck Depression Inventory-II (BDI-II) to assess for severity of depression, and a modified flankers task to evaluate for ERN amplitude. Although not statistically significant, the results show a mediator model trend where the correlation between concussions and depression decreased once the ERN was controlled for. Even though these findings suggest that the ERN is not a mediating factor, if further studies with larger sample sizes and controls were conducted a statistical significance could appear.



# JANETTE ESPERANZA CARRILLO

UROC PREP

**UNIVERSITY OF ARIZONA**

TUCSON, ARIZONA

PI: DR. ANNE CRESS

## THE INFLUENCE OF INTEGRIN $\beta_4$ EXPRESSION IN THE COLLECTIVE MIGRATION OF PROSTATE TUMOR CELLS

**ABSTRACT:** In order for cancer to metastasize, it must first gain the ability to become invasive. The American Cancer Society reports that prostate cancer is the second leading cause of cancer death in males, and 90% of cancer deaths are attributed to metastasis (American Cancer Society, 2015). During metastasis many cellular signals are deregulated and a main target axis for signal deregulation are integrins- tissue specific heterodimeric transmembrane proteins. One of the integrins,  $\alpha_6\beta_4$ , is only observed normal epithelia, but now variants of integrin  $\beta_4$  are observed in prostate tumor cells and postulated to be a defining factor in metastasis. One model of metastasis stipulates that prostate cancer migrates collectively in networks as opposed to migrating as single cells. The aim of the current research is to determine the influence of  $\alpha_6\beta_4$  on the progression of collective cell migration in prostate tumor cells. Experiments were designed to knockdown the  $\beta_4$  integrin in an immortalized cell line and determine by immunofluorescence and confocal microscopy the distribution and influence of  $\beta_4$  on collective migration. The results showed that collective migration was  $\alpha_6\beta_4$  integrin dependent. Under two different conditions of 3-D cell growth the loss of  $\alpha_6\beta_4$  integrin prevented network formation. Future work will be to determine the minimal components necessary to form the networks seen in  $\alpha_6\beta_4$  containing adhesion complexes.



# KAREN GUADALUPE CRUZ

UROC PREP



**UNIVERSITY OF ARIZONA**

TUCSON, ARIZONA

PI: DR. JEAN-MARC FELLOUS

## THE ROLE OF OXYTOCIN IN EMPATHY IN THE RAT

**ABSTRACT:** Oxytocin is a neuropeptide with widespread effects on the socio-emotional behavior of various mammalian species. In humans, intranasal administration of oxytocin has been shown to improve emotional empathy, the ability to share affective states with others and act pro-socially as a result, and other related processes, such as emotional contagion and accurate identification of affective states in others. Studies suggest that oxytocin administration increases the saliency of emotional cues in social settings, though it is yet unclear whether oxytocin only facilitates empathy or whether it is in fact required. We hypothesize that the endogenous oxytocin system is necessary for the promotion of empathic behavior. Evidence that rats are capable of displaying both emotional contagion and pro-social action provides an interesting animal model for the investigation of the role of the oxytocin system in the behavioral expression of empathy. In order to test this idea, we used a model for measuring empathic behavior in rats, in which one rat can prevent the delivery of a footshock to a conspecific by altering lever-pressing behavior in an operant task. Our preliminary results show that intracerebralventricular administration of a selective oxytocin receptor antagonist ( $0.75\mu\text{g}/5.0\mu\text{l}$ ) 20 minutes prior to the test disrupts empathic behavior in a male rat by increasing the number of shocks delivered to their conspecific compared to control conditions. These results suggest a critical role for the endogenous oxytocin system in empathic behavior, indicating a potential target for disorders in which empathy is deficient, such as anti-social personality disorder.

# ROBERTO JUAN DE LA ROSA

UROC PREP



**UNIVERSITY OF ARIZONA**

TUCSON, ARIZONA

PI: DR. ALFRED W. KASZNIAK

## SELF-COMPASSION: A CORRELATIONAL EXPLORATION

**ABSTRACT:** The present study examined self-compassion in a sample of undergraduate students ( $N = 73$ ). Self-compassion is defined as a positive self-attitude that emphasizes being understanding of one's own flaws and keeping feelings and thoughts in balance. Although there have been studies of the relationships that self-compassion shares with self-esteem, anxiety, and depression, there is currently no literature that has investigated the relationships self-compassion has with implicit self-esteem and existential-anxiety. Implicit self-esteem is defined as an unconscious evaluation of the self that is most commonly found in the appraisals of self-associated objects (e.g. name letters). Existential anxiety refers to anxiety of death, meaningless, and guilt. We hypothesized that self-compassion would be negatively correlated with existential-anxiety and that implicit self-esteem would be positively correlated with self-compassion and that this correlation would be higher than the correlation with explicit self-esteem. The Self-Compassion Scale-Short Form, Existential Anxiety Questionnaire, Rumination Response Scale, and Rosenberg Self-Esteem Scale were utilized in this study. Implicit self-esteem, using the Name Letter Test, was not correlated with either self-compassion or self-esteem ( $r_s < |0.1|$ ,  $p_s > .05$ ). There were significant negative relationships found between self-compassion and existential anxiety ( $r = -.41$ ,  $p < .01$ ) and self-compassion and rumination ( $r = -0.57$ ,  $p < .01$ ). This potentially implies that anxiety about death and rumination can be attenuated through the use of self-compassion which makes it a viable option to treat related mental illnesses, such as Post-Traumatic Stress Disorder.



# ERIKA ELIZALDE

UROC PREP

**UNIVERSITY OF ARIZONA**

TUCSON, ARIZONA

PI: DR. MICHELLE M. PERFECT

## **THE EFFECTS OF ATTENDING A SCHOOL WIDE POSITIVE BEHAVIORAL INTERVENTIONS AND SUPPORTS (SWPBIS) STATUS SCHOOLS ON AGGRESSIVE-DISRUPTIVE BEHAVIORS OF YOUTH WITH TYPE 1 DIABETES MELLITUS (T1DM)**

**ABSTRACT:** The purpose of this study was to explore the effects of attending School Wide Positive Behavioral Interventions and Supports (SWPBIS) status schools on the aggressive-disruptive behaviors of students with Type 1 diabetes mellitus (T1DM). The hypothesis was that students with T1DM will have lower teacher-rated aggressive-disruptive behaviors if they were in SWPBIS status schools compared to non-SWPBIS status schools. Also, we examined the relations between teacher-reported aggressivity and self-reported self-esteem, relations with teachers, and attitude to schools. The study was conducted with a sample of 71 participants with T1DM. The measures of the study were the administration of the Behavior Assessment System for Children, Second Edition (BASC-2) and the identification of the schools' SWPBIS status based on school district information. Preliminary findings indicated that none of the hypotheses were supported. However, there was a trend that students in SWPBIS status schools had more positive perceptions of their teachers than teachers in non-SWPBIS status schools. Indeed, further research with a larger sample and more accurate information about SWPBIS implementation and the schools' status validity and reliability would provide better results. Overall, the study contributes to the better understanding of behavioral problems in at-risk youth such as youth with T1DM.

# ERICKA ENCINAS

UROC PREP



**UNIVERSITY OF ARIZONA**

TUCSON, ARIZONA

PI: DR. MELISSA BARNETT

## **PERCEIVED SOCIAL SUPPORT IN MEXICAN ORIGIN MOTHERS WITH TODDLERS ABSTRACT**

**ABSTRACT:** Although Latino mothers typically report considerable social support from the whole family, research has mainly focused on reporting the role romantic partners and grandparents have in supporting Mexican origin mothers rather than describing what the support networks of Mexican origin mothers look like by investigating the role of other supportive individuals inside and outside the family. This study is based on a community sample of mothers' reports on what individuals are providing them support, the size of these support networks (by quantifying the amount of identified individuals), and whether maternal satisfaction is associated with the size or amount of contact between these mothers and their support networks. Whether there were any differences between Mexican and Mexican American mothers concerning these variables was also examined. Findings indicate maternal satisfaction with support network isn't associated with size or amount of contact, while the amount of contact in the support network is associated with size. Also there are statistically significant differences between Mexican and Mexican American mothers in the amount of contact and the size of their support networks. Specifically, Mexican-born mothers report less contact and smaller support networks. Suggestions for future directions are focused towards professionals who work in family support and intervention programs. Since these programs focus on educating parents on positive parenting characteristics, the primary recommendation is to open up these services focused on different individuals involved in supporting parents and children. Moreover, recommendation include educating family members on the negative and positive impacts they can have in support networks.



# ALEXAN GOMEZ

UROC PREP



**UNIVERSITY OF ARIZONA**

TUCSON, ARIZONA

PI: DR. HEIDI MANSOUR

## **ADVANCED SPRAY DRIED PRO-LIPOSOMES AS DRY POWDER INHALER: AN ADVANCED DRUG DELIVERY SYSTEM FOR PULMONARY DRUG ADMINISTRATION**

**ABSTRACT:** The pulmonary route has shown to offer many advantages to deliver drugs and treat local diseases and systemic diseases. Furthermore, dry powder inhalers (DPIs) have become a common way to deliver drugs through the pulmonary system. However, there are limitations that make it difficult for the drug delivery. To surpass these limitations, inhalable pro-liposomes can be an approach to enhance drug delivery through the pulmonary route. In the current study, pro-liposomes were designed and optimized as DPIs employing the technique of co-spray drying, a novel particle engineering technique for the formulation of solid state pharmaceutical powders. They were composed of synthetic phospholipids, dipalmitoylphosphatidylcholine (DPPC) and dipalmitoylphatidylglycerol (DPPG). Amphotericin B (AmB) was utilized as a model drug for this study, a drug commonly used to treat severe fungal infections. Physicochemical properties of these formulated pro-liposomes were comprehensively characterized in order to analyze geometric size, solid-state phase transitions, morphology, and residual water content. In vitro cellular studies were performed to test the enhancement that these pro-liposomes offer to pulmonary drug administration. Toxicological effects comparing the drug alone and the formulated pro-liposomes were tested using two different methods, pulmonary cell viability assay, and transepithelial electrical resistance (TEER) at air-interface conditions. In addition, in vitro aerosol dispersion performance was done using the Next Generation Impactor™ (NGI™) with a human DPI device (HandiHaler®) for the analysis of powder deposition and particle aerodynamic properties.

# LINDSIE JEFFRIES

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PI: DR. PAK KIN WONG

## APPLICATION OF ELECTROCHEMICAL BIOSENSORS TO THE IDENTIFICATION OF BACTERIAL BLOOD INFECTIONS AT THE POINT-OF-CARE

**ABSTRACT:** Accurate and timely identification of bacterial infections is critical to the effective implementation of treatments in health care. Herein, the ability of electrochemical biosensors to distinguish specific species of bacteria within a single blood sample is examined. Four bacteria representative of typical blood pathogens were inoculated into blood samples, including the bacterium *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Proteus mirabilis*. Capture and detector probes used included pairs for each bacteria as well as a universal probe pair which is capable of detecting the presence of all bacteria. The bacterial 16s rRNA was obtained through lysis and then hybridized with the thiol-modified capture probe and fluorescein-modified detector probe. Amperic detection of the 16s rRNA was achieved through the interaction of Tetramethylbenzidine (TMB) and H<sub>2</sub>O<sub>2</sub> with a horseradish peroxidase-conjugated anti-fluorescein bound to the detector probe. Samples were placed on five biosensor chips, with each chip containing a pair of probes, either species-specific or universal. Samples containing a mix of bacteria, each individual bacterium and plain blood were distributed amongst each chip's 16 electrodes. Beginning with lysis, signals for each sample were able to be read under an hour. Differentiation of bacteria using the specific probes was achieved for each probe pair, with the detection signal from the sample containing mixed bacteria averaging 95% of the signal obtained from the samples containing one bacterium. Electrochemical biosensors possess the potential to rapidly identify infecting bacterial pathogens in blood samples, and with further development can become an effective tool to aid in point-of-care diagnosis.



# DAVID HUMBERTO LOPEZ

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## UNIVERSITY OF ARIZONA

TUCSON, ARIZONA

PI: DR. ARMIN SOROOSHIAN

### FREQUENCY AND CHARACTERIZATION OF EXTREME AEROSOL EVENTS IN THE SOUTHWESTERN UNITED STATES: A CASE STUDY ANALYSIS IN ARIZONA

**ABSTRACT:** In recent decades, the southwestern United States (Southwest) has been moving towards a dryer climate. Such changes in the Southwest generally promote more dust emissions and wildfires. To examine characteristics of such aerosol pollution events, Arizona is chosen as the study region because it is within the Southwest and has experienced rapid population growth and land use changes in recent years. The study uses surface data from eight EPA monitoring sites to quantify the frequency of extreme events as a function of month and year (2001-2014) and classifying the events according to their source.

Extreme events are first identified independently for mass concentrations of PM<sub>2.5</sub> (i.e., particulate matter with aerodynamic diameters less than 2.5 micrometers), PM<sub>10</sub>, and fine soil, which are defined by establishing specific criteria associated with their respective concentrations in each month. Next, these events are further classified as wildfires or dust events by using the following criteria: dust = PM<sub>10</sub> and fine soil levels reached extreme levels; smoke = PM<sub>2.5</sub> reached extreme levels (and not fine soil). The dust events were then analyzed using satellite data to distinguish between Asian dust and local dust. Between 5-21% of the extreme events at the either sites were due to wildfires, 5-15% due to Asian dust, and 22-36% due to local dust. The frequency of total events exhibits no significant inter-annual change between 2001 and 2014. Depending on the site, the most extreme events occurred in either January, February, April, July, August, or December.

# DAVID MAESTAS

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**UNIVERSITY OF ARIZONA**

TUCSON, ARIZONA

PI: DR. JONATHAN VANDE GEEST

## **TISSUE ENGINEERED VASCULAR GRAFTS SEEDED WITH HUMAN UMBILICAL CORD BLOOD DERIVED ENDOTHELIAL CELLS**

**ABSTRACT:** Heart disease is the leading cause of death in the United States, resulting in a drastic increase in the demand for the development of therapeutic biocompatible vascular grafts. In this study, experiments were targeted to test the feasibility of cellularizing electrospun biopolymer scaffolds with human umbilical cord blood derived endothelial cells (hCB-ECs) to investigate whether these cell lines can mitigate problems with graft thrombogenesis and recipient immunocompatibility. Endothelial progenitor cells were isolated from umbilical cord blood and differentiated into endothelial-marker producing cell lines which were then characterized by flow cytometry and immunocytochemistry. Previously designed compliance-matched flat sheet constructs were fabricated by electrospinning a gelatin and fibrinogen solution and seeded with hCB-ECs to compare cell growth and viability against isolated human umbilical vein endothelial cells (HUVECs). To examine the relative levels of thrombogenesis, platelet adhesion to each cell type was quantified by scanning electron microscopy and a platelet activity state assay was performed to contrast platelet activation caused by hCB-ECs against HUVECs. The results indicated that hCB-ECs possess classical endothelial cell markers, reduced platelet adherence, and reduced platelet activation compared to HUVEC lines. Furthermore, the hCB-EC seeded flat sheet scaffolds displayed sufficient cell viability ranges for all chosen time points. These findings suggest that utilizing hCB-ECs to endothelialize compliance-matched vascular grafts is feasible and can reduce the levels of thrombogenesis in vitro. Future studies shall focus on placing the endothelialized constructs under biomechanical loading to further assess functionality.



# CALDONIA MASK

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**UNIVERSITY OF ARIZONA**

TUCSON, ARIZONA

PI: DR. ALLISON EWING-COOPER

## COMMUNICATION BETWEEN MILLENNIAL GENERATION COLLEGE STUDENTS AND THEIR HELICOPTER PARENTS

**ABSTRACT:** Parents who consistently are involved in each aspect of their child's life, even when their children go to attend college are characterized as practicing helicopter parenting. This particular parenting style is common amongst parents who have children of the Millennial Generation i.e., those born during and after the year 1982. The relationship between helicopter parents and children of the millennial generation has been explored through previous research to consider different outcomes of the parental and child as individuals and as a set. This paper examines the relationship of 259 college students' that voluntarily responded to a questionnaire regarding their perceptions of their relationship with their parents and their college education. Four research questions were proposed to better understand the relationship between communication and parent involvement patterns amongst the participants. The findings support the hypothesis that there is a significant nonzero relationship between who pays for a student education and communication with their parents about their education. The majority of respondents were millennials and characterized their parents as practicing the helicopter parenting style. This was seen in the results of frequent communication patterns and the relationship of parental involvement. It was interesting to discover that 90% of the participants are content with the level of involvement their parents have with their academic life.

# KATARENA MATOS

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**UNIVERSITY OF ARIZONA**

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PI: DR. PAUL FERRÉ

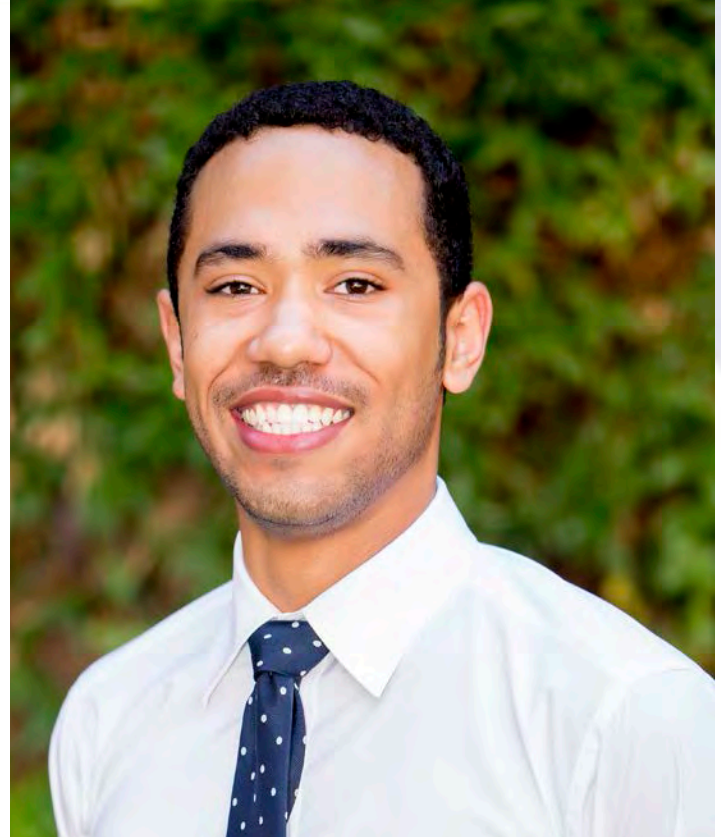
## **ELECTRICAL RESISTANCE AS A METHOD OF QUANTIFYING WATER CONTENT IN SOILS**

**ABSTRACT:** The objective of the current study is to explore if electrical properties of soils, such as electrical resistance, can be used to infer properties about the soil, such as water content. The methods employed to answer this question consisted of a hanging column experiment to develop a soil water characteristic curves of soils. A soil column was also built in order to take a sample from the field and measure the electrical resistance of the soil, undisturbed. In order to accomplish this task, several cells were built and tested using solutions with known electrical resistivity as well as clean sands. Our hypothesis is that if the hanging column and soil electrical resistance methods are able to run simultaneously, then a relationship can be determined between electrical resistance, water content, and matric potential. The testing phase of this project is not yet over and research will continue over the next year. However, it is believed that finding a relationship between electrical resistance and water content would allow for technology to be developed that could aid fields from agriculture to floodplain management.



# ZACHARIAH SEAN MILLS

UROC PREP



**UNIVERSITY OF ARIZONA**

TUCSON, ARIZONA

PI: DR. JOHN P. WILLERTON

## **POLITICAL BREAKDOWN IN UKRAINE: WHY IT HAPPENED**

**ABSTRACT:** The current armed conflict in east Ukraine and the Russian annexation of Crimea are the direct results of the political breakdown that occurred in Ukraine in February 2014. These events are significant because they have sparked a geopolitical struggle that could continue to grow and move Europe into a new Cold War. Developing a more nuanced understanding of how internal factors led to the breakdown is necessary if realistic steps are to be taken in addressing the conflict. This research loosely utilizes a process tracing approach to explore the interactions of three independent variables which were identified through a preliminary literature review. Two data-sets aid the approach. The first is a compilation of all Ukrainian presidential elections since 1991, organized by oblast and region. The second contains biographical and career information on select Ukrainian elites including presidents, prime ministers, opposition leaders, and oligarchs. Preliminary results suggest that the domestic variables of institutional and political arrangements as well as Ukrainian identity, worldview, and policy perspectives were determinative for the breakdown. These internal domestic variables were exacerbated by the external variable of outside influence by third parties. Implications of this research suggest that further EU expansion should take into account societal nuances that exist in potential member states. Taking into account such nuances can help in avoiding exacerbating chasms within those societies because, as seen in Ukraine, such chasms can cause civil conflict which can then evolve into international conflict. Creating consensus and compromise in Ukraine is vital to resolving the conflict.

# WILLIAM NED PALMER

UROC PREP



**UNIVERSITY OF ARIZONA**

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PI: DR. PATRICIA HAYNES

## ACCESSING PARENTAL ACCEPTABILITY OF MINDFULNESS PRACTICE

**ABSTRACT:** Currently in the US, one in five individuals suffers from an adult lifetime of clinical anxiety and/or depression. The implementation of a social-emotional development program will reveal that the practical use of mindfulness practice, in the school setting, will translate to the reduction of adults diagnosed with clinical anxiety and depression. However, consistency and reinforcement are two critical elements for long-term integration and adaption. The mediating factors for consistency and reinforcement must be present outside of the school setting, thus parents must be willing to have an active role in the development of this practice. This descriptive study is intended to gather and assess general attitudes of primary caregivers, in regards to their acceptance of their child participating in mindfulness exercises. Participants were drawn from six preschools. Following site authorization from school directors, the author was granted permission to distribute recruitment flyers into students' assigned cubbies. We anticipate that 40-80 participants will complete a non-identifying, 20-question online survey. Parental acceptability of mindfulness practice for their child will be measured using a ten-item, seven-point Likert-type scale, in which participants respond to how much they agree or disagree with statements about: suitability, acceptance, reasonableness, effectiveness, credibility, appropriateness, expected benefits, tolerance, comfort level and justification. We anticipate that both the caregiver's gender and/or age will play a significant factor in determining the level of acceptability. Final data collection and analysis is to take place in fall 2015.



# DANIEL ENRIQUE PALOMARES

UROC PREP



**UNIVERSITY OF ARIZONA**

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PI: DR. MARVIN J. SLEPIAN

## **MICROFLUIDIC DEVICES USED TO REPLICATE THE SHEAR STRESS CALCULATED BY THE DEVICE THROMBOGENICITY EMULATION FOR THE OPTIMIZATION OF VENTRICULAR ASSIST DEVICES**

**ABSTRACT:** Cardiovascular disease is the leading cause of death in the United States and worldwide. The end stage of all cardiovascular disease is congestive heart failure which requires a heart transplantation. However with donor shortage, a ventricular assist device (VAD) has been widely used as bridge-to-transplantation or as destination therapy. Despite all the clinical success of VAD systems, they are still plague with thrombosis. In our lab we have been using the Device Thrombogenicity Emulation (DTE) methodology to optimize the VAD in silico simulation and Hemodynamic Shear Device (HSD) as an in vitro analysis of platelet activity state assay. This process has been proven successful with HeartAssist5 VAD. However, DTE and HSD are lab bench equipment and require technical specialty to operate. Therefore, our goal in this study is to miniaturize the system into Lab on a chip platform i.e. microfluidic base assay. This microfluidic device is composed of the inexpensive polydimethylsiloxane (PDMS), is of relatively small size, and does not require a technical background for its operation. The microfluidic devices is operated by syringe pumps, where gel filtered platelets are passing through series of loops; generating a shear stress equivalent to that of HSD. Our working hypothesis is that the microfluidic devices will be able to successfully replace the HSD. We have fabricated the microfluidic device in three different configuration; generating shear stress of 30, 50, 70 dyne/cm<sup>2</sup>. In the future, we will validate the platelet activation from the microfluidic devices by comparison with the platelet activation of the HSD.

# ALLISON L. RAMIREZ

UROC PREP



## **U**NIVERSITY OF ARIZONA

TUCSON, ARIZONA

PI: DRS. JOSEPH GALASKIEWICS, STEPHEN CORNELL

### **SAN XAVIER'S FORMAL AND INFORMAL ECONOMY**

**ABSTRACT:** The San Xavier Indian Reservation is located in Southern Arizona, just southwest of Tucson. Though geographically disconnected, the San Xavier Indian Reservation is one of the Tohono O'odham Nation's eleven districts. Within the past century, San Xavier Indian reservation, as part of the Tohono O'odham Nation, has participated in various economic endeavors such as casino gaming, the distribution of copper, and agriculture. The focus of this project is to examine political, economic, and geographic influences on both informal and formal citizen entrepreneurialism in this community. Qualitative data was collected using semi-structured interviews, and a sample of nine informal business owners (non-taxed entities), four private formal business owners (taxed entities), and two public officials. A total of fifty-five establishments' locational information, as well as the number of individuals each establishment employs, was also recoded and geocoded using Geographic Information System (GIS) ArcMap. The combination of this information asserts that while economic activity takes place on the northern and eastern border of the reservation, establishments located in the northwestern region of the reservation are more likely to hire within their social circles, and economic activity in this region is often the result of citizen entrepreneurship. This study adds to the conversation of citizen entrepreneurialism in American-Indian communities, and the significance of space when discussing a given community's economic goals.



# MARIANA S. RODRIGUEZ MCGOFFIN

UROC PREP



**UNIVERSITY OF ARIZONA**

TUCSON, ARIZONA

PI: DR. LAURA LOPEZ HOFFMAN

## POTENTIAL IMPACTS OF ‘SIGNIFICANT PORTION OF ITS RANGE’ ON MIGRATORY SPECIES

**ABSTRACT:** The protection policies put into place by government agencies should meet the needs of endangered species. Data on whether the needs of endangered migratory species are being met is extremely limited. We study three migratory species listed as endangered that may be impacted by a recent change in policy. The policy is referred to as “Significant Portion of its Range” (SPOIR) and defines ‘significant’ as the area so vital to a species’ health that without it the species would become extinct everywhere. This new rule may be particularly problematic for migratory species because the range a species occupies at the time of determination for listing is considered to be its general geographic range, while historic range is overlooked. We evaluate the hypothesis that the language of the SPOIR policy will have negative impacts on the protection practices for migratory endangered species. Because we want to predict the potential impacts of SPOIR on migratory species, we investigate how migratory species were listed as endangered before SPOIR was enacted. Our evaluation of Fish and Wildlife Service standards suggest the agency currently makes two assumptions: (1) the area a species currently inhabits, even if it excludes historical habitat, is the only part of its range that may be considered significant to its existence. (2) If a species is present in abundance elsewhere in the world, the species need not be considered endangered if there are risks of it being extirpated from a portion of its range.

# ALVA SAINZ

UROC PREP



**UNIVERSITY OF ARIZONA**

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PI: DR. NOEL WARFEL

## **PIM KINASE REGULATES HIF-1 ACTIVITY AND SURVIVAL IN HYPOXIA**

**ABSTRACT:** Cancer arises from an accumulation of mutations that result in uncontrolled cell growth. As a tumor forms, cells outgrow the existing vasculature, which results in the emergence of hypoxic regions in solid tumors. Hypoxia is defined as insufficient oxygen diffusion to tissues, and it has been implicated in tumor growth, malignant progression, and the development of drug resistance. Two proteins that contribute to cancer cell survival and tumor growth in hypoxia are HIF-1 and PIM kinases. Although PIM kinases have been shown to play a significant role in tumorigenesis and are upregulated in hypoxia, inhibition of PIM kinases has not been evaluated in this context. This study shows that inhibition of PIM kinases by AZD1208, a pan-PIM kinase inhibitor that is currently being used in humans, reduces HIF-1 protein levels. Hydroxylation of HIF-1 by Prolyl Hydroxylase Domain proteins, and the presence of the von Hippel-Lindau tumor suppressor are necessary for AZD1208 mediated degradation of HIF-1. In addition to reducing HIF-1 activity, inhibition of PIM kinases reduced cell viability preferentially in hypoxia. Overexpression of a constitutively active HIF-1 failed to rescue cell viability, indicating that AZD1208 induces cell death in a HIF-1 independent manner. Interestingly, AZD1208 increased reactive oxygen species (ROS) to a greater extent in hypoxia than in normoxia. Introduction of ROS scavengers partially rescued cell viability in hypoxia, implicating ROS as a contributing factor to the AZD1208 induced cell death. Together, the studies indicate that inhibition of PIM kinases decrease HIF-1 levels, and is selectively toxic to hypoxic cells.



# CARLENE ANN SWIFT

UROC PREP



**UNIVERSITY OF ARIZONA**

TUCSON, ARIZONA

PI: DR. RUDY MOLINA

## THE LIVED EXPERIENCE OF COLLEGE STUDENTS WITH LEARNING DISABILITIES

**ABSTRACT:** Students who have learning disabilities face a wide array of difficulties that encompass more than school assignments, such as low self-esteem and bullying. What are the lived experiences of college students who have been diagnosed with a learning disability? More specifically, do these students experience prejudice or discrimination from sources other than peers? In depth interviews with open-ended questions were conducted with three undergraduate students at a large research-intensive university in the southwestern United States who were registered participants in their Strategic Alternative Learning Techniques Center. Reoccurring themes of identity, intervention, social interactions, and family were found to be significant with all participants. The stories and perspectives shared by these students contributes to the general knowledge of learning disabilities and can be utilized to impact future policies and implement new programs and treatments.

# MEIGHAN N. TAYLOR

UROC PREP



**UNIVERSITY OF ARIZONA**

TUCSON, ARIZONA

PI: DR. LEILA BARRAZA

## **ASSESSING THE QUALITY OF INFORMED CONSENT IN THE AMERICAN MATERNITY CARE SYSTEM**

**ABSTRACT:** Recent survey data and alarming news stories indicate that there are growing ethical and legal concerns regarding the treatment of maternity patients by health care professionals. A topic central to these concerns is the quality of informed consent obtained from patients, particularly during labor and delivery. In order to develop a broad perspective of the issues influencing the quality of informed consent in maternity care for this project, a variety of peer-reviewed journal articles from various disciplines were reviewed and analyzed for recurrent themes. Three primary issues emerged as underlying determinants for low quality informed consent: 1) Inadequate patient education regarding common medical interventions or procedures, 2) Barriers to effective communication between the patient and physician including time constraints and power imbalances, and 3) A tendency by some maternal health care providers to practice defensive medicine. This is defined as behaviors that lead a physician to make health care choices for the patient based on what makes the care provider(s) legally comfortable and less on what the expectant mother may want or need. To minimize future occurrences of these issues, a number of steps may be taken by health care professionals. A model of prenatal education is proposed that utilizes time the patient spends in the waiting room as an opportunity to learn important information about pregnancy, labor, delivery, and medical interventions she may encounter at the hospital. Additionally, health care providers who work with expectant patients are advised to use a collaborative approach to care which honors the patient's preferences whenever possible.



# JASMINE TUYNÆ WILSON

UROC PREP



**UNIVERSITY OF ARIZONA**

TUCSON, ARIZONA

PI: DR. MARY A. IRWIN

## **AN INVESTIGATION INTO THE NEW START SUMMER PROGRAM: A PEER MENTORSHIP-BASED BRIDGE PROGRAM**

**ABSTRACT:** Summer bridge programs exist at many universities around the United States and are designed to prepare students for college and assist in their transition from high school to college (Hoops & Kutryala, 2015). This study examines academic preparedness and skill development comparing students who live on campus to students who commute to campus during a six-week summer bridge program at a four-year university in the southwest region of the United States. This study includes a combination of qualitative and quantitative analysis. Students completed two surveys that included demographic background; Likert scaled responses focused on academic habits, social interactions; and student/faculty interaction, and open-ended questions regarding student's experience in the program. The sample consisted of 192 females, 106 males, and 2 students who did not identify as female or male. 204 students reside in the resident hall and 96 students live off campus. Out of the 300 students, 60% of the population identify as Hispanic or Latino(a). Findings will be revealed in Fall 2015.



# Undergraduate Research Opportunities Consortium

## PROGRAM STAFF AND SPONSORS • 2015

### **SUMMER RESEARCH INSTITUTE (SRI)**

Coordinator: Donna Treloar, MA  
Instructors: Andrew Huerta, PhD, Renee Reynolds, ABD,  
Joanna Sanchez-Avila

Sponsors: University of Arizona; Graduate College; The Partnership for Native American Cancer Prevention (NACP) training program, a collaboration between Northern Arizona University and the University of Arizona Cancer Center, funded by the National Cancer Institute; College of Medicine – Office of Diversity and Inclusion, Health Resources and Services Administration (HRSA) Centers of Excellence; Western Alliance to Expand Student Opportunities (WAESO); Department of Physics.

### **MINORITY HEALTH DISPARITIES SUMMER RESEARCH PROGRAM (MHD)**

Coordinator: Stephanie Adamson, Holly Lopez  
Sponsors: University of Arizona; Graduate College; Western Alliance to Expand Student Opportunities (WAESO).

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Coordinator: Cindy Neal, MEd  
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### **HOOKED ON PHOTONICS RESEARCH EXPERIENCE FOR UNDERGRADUATES (HOP)**

PIs: Nasser Peyghambarian, PhD  
Sponsors: University of Washington/National Science Foundation (NSF). Funding for this research was provided by NSF Grant No. CHE-1156598.

### **CIAN INTEGRATED OPTICS FOR UNDERGRADUATE NATIVE AMERICANS (IOU-NA) RESEARCH EXPERIENCE FOR UNDERGRADUATES**

PI: Allison Huff Mac Pherson, DHEd, Robert Norwood, PhD  
Coordinator: Ameé J. Hennig, Daniel Lamoreaux  
Sponsors: National Science Foundation (NSF) Engineering Research Center for Integrated Access Networks (ERC CIAN).

Funding for this research was provided by the NSF Engineering Research Center No. EEC-0812072.

### **BIOSPHERE 2**

PI: Katerina Dontsova, PhD  
Sponsors: National Science Foundation Research Experiences for Undergraduates Program.

### **STUDENT AFFAIRS RESEARCH PROGRAM (STAR)**

Coordinator: Nura Dualeh, MA  
Instructors: Andrew Huerta, PhD, Renee Reynolds, MA, Joanna Sanchez-Avila  
Sponsors: University of Arizona; Graduate College; Division of Student Affairs; Western Alliance to Expand Student Opportunities (WAESO).

### **UROC-PREP**

Coordinator: Donna Treloar, MA  
Instructor: Andrew Huerta, PhD  
Sponsors: University of Arizona; Graduate College, Western Alliance to Expand Student Opportunities (WAESO).

### **CAT VEHICLE PROGRAM/ ECE REU**

PI: Jonathan Sprinkle, PhD  
Coordinator: Nancy Emptage  
Sponsor: National Science Foundation Research Experiences for Undergraduates Program

### **RESEARCH IN OPTICS (RIO)**

PI: R. John Koshel, PhD  
Coordinator: Melissa Sarmiento Ayala, MEd  
Sponsor: National Science Foundation (NSF)  
Award No. 1460723.







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