# Online Proceedings

## Poster Session 1

**Commons East, Easel 71**

*11:00 AM to 1:00 PM*

**Spectroscopic Studies of Purified Rat TRPV1**

*Marium Raza, Senior, Biochemistry, Comparative History of Ideas*

*UW Honors Program*

*Mentor: Sharona Gordon, Physiology and Biophysics*

*Mentor: Gilbert Martinez, Physiology and Biophysics*

Transient receptor potential vanilloid-1 (TRPV1) ion channels are polymodal signal integrators of noxious stimuli including heat, vanilloids such as capsaicin, peptide toxins, acid, and inflammatory mediators. It is unknown whether activation of TRPV1 by different stimuli is achieved through the same structural mechanism or if different stimuli activate the channel through different structural mechanisms. Clinical trials using TRPV1 antagonists resulted in patients exhibiting hyperthermia, suggesting that TRPV1 plays a role in maintaining body temperature, and highlighting the need to ensure that therapeutics targeting the channel do not disrupt thermal homeostasis. Hence, knowledge of different structural mechanisms for channel activation would aid in the design of therapeutic agents targeting TRPV1. To address this, we have expressed a series of functional single-cysteine rat TRPV1 channels for spectroscopic analysis, with techniques such as electron paramagnetic resonance, double electron-electron resonance, and Förster resonance energy transfer spectroscopy. By probing several structural regions within TRPV1 we can determine which regions of the channels move during activation and whether those are the same for different noxious stimuli.

## Poster Session 3

**Commons West, Easel 36**

*2:30 PM to 4:00 PM*

**Digital Healthcare Technologies Can Improve Access to Care for Ethnically Diverse and Underserved Communities**

*Peter Lewis Wangigi, Junior, Healthcare Leadership (Tacoma Campus)*

*Mentor: Sharon Laing, School of Nursing and Healthcare Leadership, University of Washington Tacoma*

Studies show that disparities in healthcare access in ethnically diverse underserved communities are linked to healthcare barriers including cost of care and language differences. The purpose of the study was to evaluate the role of technology in improving healthcare access for ethnically diverse and underserved communities and thus helping to reduce healthcare disparities. We hypothesized that ethnically diverse patients' ready access to mobile health technologies like smartphones and healthcare apps can improve patient care by promoting self-care management and improve doctor-patient communication. To test our hypothesis, we recruited N=20 healthcare providers from Washington, state. Healthcare providers comprising physicians, medical assistants, nurses and social workers participated in a 60-minute focus group session and were asked about the role of technology in increasing access to healthcare services for diverse ethnic communities. Respondents received a $75 gift certificate at the end of the study and responses were transcribed for later assessment. We evaluated transcripts by deriving codewords, codewords used more than two times were identified and recorded on three separate occasions, codewords with similar information were grouped into codeword clusters and finally, themes were derived based on a single idea from codeword clusters. From our analysis, we learned that healthcare providers see the importance of using mobile devices to increase healthcare access for ethnically diverse and underserved communities. They noted that mobile healthcare technologies can improve patient-provider relationships via enhanced communication. The implication of our finding is that mobile health technologies can improve patient-provider communication and help to eliminate barriers to healthcare access for ethnically diverse and underserved communities.

## Poster Session 3

**Commons West, Easel 37**

*2:30 PM to 4:00 PM*

**Healthcare Providers' Perceptions of Value of Mobile Health Technology to Improve Patient Care**

*Jason Michael Muncy, Senior, Healthcare Leadership (Tacoma Campus)*

*Mentor: Sharon Laing, School of Nursing and Healthcare Leadership, University of Washington Tacoma*

Technology has evolved in ways that allow healthcare professionals to improve patient outcomes through personal elec-

tronic devices such as smartphones or healthcare applications. These advances have allowed patients to manually or automatically record personal health information which can then be sent to their provider for real time assessments. The purpose of this study was to evaluate healthcare providers' perceptions about the value of digital healthcare technology in improving healthcare outcomes for low-resourced communities. We hypothesized that healthcare providers will report that mobile health technologies can be a valuable innovation to support patient wellness and improve health outcomes. To test our hypothesis, we recruited N=20 healthcare providers from Washington, state. Healthcare providers comprising physicians, medical assistants, nurses, and social workers participated in a 60-minute focus group and asked about the role of technology in improving healthcare services for their patients. Participants received a $75 gift certificate at the end of the session and responses were transcribed for later assessment. We evaluated transcripts by deriving codewords, codewords used more than two times were identified and recorded on three separate trials, codewords with similar information were grouped into codeword clusters, and finally, themes were derived based on a single idea from codeword clusters. Results of our study revealed that providers perceived value of smartphones/mobile health technologies to improve patient health outcome through data tracking and increased accuracy of reported health information. The implication of our finding is that mobile healthcare technologies can support the work of healthcare providers by accurately tracking patient health status and thus support treatment delivery.

## POSTER SESSION 3

**Commons East, Easel 47**

*2:30 PM to 4:00 PM*

**The Power of Art : A Mental Health Therapy**

*Monica Shoemaker, Junior, Behavioral Health, Lake Wash Tech Coll*
*Mentor: Rex Rempel*
*Mentor: Sharon Raz*

Art can be a healthy way to express emotions and bring healing to the hurting mind. Tapping into the creative mind and using art to express oneself can provide a calm that other methods may not. Mental health disorders and substance use disorders are giants that cannot be defeated by one method alone. The safest place to be for an individual suffering in silence is outside the mind in an inclusive, creative, empathetic, and healing environment. The LWTech Lion's Pride Healing Art club is intended to help individuals safely experience and express emotions while bonding and sharing a safe space with like-minded people. To understand the effect that the healing art club has on its participants, I am conducting in-depth interviews with key students and staff. I hypothesize that participation in the healing art club helps express themselves in a therapeutic way, foster feelings of belonging to the community, and contributes to their overall health. The data collected is a helpful start in encouraging college communities to adopt similar programs and to promote positive mental health on campus.

## POSTER SESSION 4

**Balcony, Easel 87**

*4:00 PM to 6:00 PM*

**Using Calcium Imaging to Create a Database of Functional TRPV1 Single-Cysteine Mutants for Future Structural Studies in Protein Targeting for Pain Relief**

*Margot T Maraghe, Senior, Biochemistry, Biology (Molecular, Cellular & Developmental)*
*Mentor: Sharona Gordon, Physiology and Biophysics*
*Mentor: Gilbert Martinez, Physiology and Biophysics*

The transient receptor potential vanilloid 1 (TRPV1) ion channel is well known for its role in sensing numerous "noxious" stimuli. It responds to noxious heat, acid, capsaicin (the active compound that makes chili peppers "spicy"), and inflammatory signals, which can be perceived by the brain to be painful. When the TRPV1 channel senses a signal such as capsaicin, it goes from a closed, non-conducting state, to an open state that allows the passage of ions into the cell, generating an electrical signal. Since TRPV1 is activated by a variety of different stimuli one of our aims is to determine if the structural mechanisms that open the channel is the same or different for each stimulus, which could have important clinical implications. For example, failed clinical trials of some TRPV1 antagonists resulted in elevated body temperatures in patients, indicating that the body's ability to regulate body temperature is impaired when TRPV1 is completely inhibited. Hence, if TRPV1 can be inhibited in most cases, but still respond to temperature, it will be a better target. We aim to combine cysteine-scanning mutagenesis with spectroscopic techniques to map the structural changes of TRPV1 activation in response to different stimuli. Since introduction of mutations can result in impaired channel function, each mutant needs to be functionally verified. My research will be to generate a broad library of single-cysteine TRPV1 mutants and verify their function using calcium imaging. Mutants that preserve TRPV1 function can then be used for further spectroscopic studies.

## POSTER SESSION 4

**Commons East, Easel 51**

*4:00 PM to 6:00 PM*

**Anti-Fungal Endophytes: A Bioinformatics Approach**
*Carina Kill, Junior, Biology (Molecular, Cellular & Developmental)*
*Mary Gates Scholar*
*Mentor: Sharon Doty, Environmental&Forest Sciences*

As our climate continues to change, science is becoming increasingly focused on replacing environmentally-harmful agricultural methods with a more natural approach. One approach steadily gaining traction is the use of bacteria found in plants that confer benefits to their plant hosts. The benefits range from drought tolerance to increased growth and more. In this study, I focused on two species that confer significant anti-fungal activity to the plants they inhabit. The goal was to obtain a high-quality whole-genome sequence and analyze the sequence with a variety of bioinformatics software. This would provide both clues about the genes possibly confering the anti-fungal benefits, and useful characterization needed for the strain's eventual commercialization.

## POSTER SESSION 4

**Commons East, Easel 52**

*4:00 PM to 6:00 PM*

**Mechanisms of Increased Stress Tolerance in Plants Provided by Plant Microbiota**
*Linnea A. Stavney, Junior, Biology (Ecology, Evolution & Conservation)*
*Mentor: Sharon Doty, Environmental&Forest Sciences*

As the Earth's population rises, it is increasingly important to find new ways to manage food demands and pollution. One strategy is to use endophytes, which are organisms—usually fungi or bacteria—that naturally live within a plant. These microbes can help the plant in various ways, from nutrient acquisition to increased resilience in stressful environments. There are multitudes of applications for these organisms, as they can be transferred from one plant to another, thereby transferring these helpful qualities. My first project aims to explore the possibility of using bacteria to protect plants from fungal diseases. This would reduce the need for manmade pesticides, which can have, a high cost, many detrimental environmental effects, and susceptibility to fungal resistance. The effectiveness of an array of bacterial strains on different fungal plant pathogens has already been determined. Now, the anti-fungal chemicals secreted by the bacteria must be identified. To do so, each fungus and bacterium will be plated together, and the area of inhibition will be collected. The chemicals secreted will be extracted with methylene chloride, and characterized via mass spectrometry. My second project involves studying phytoremediation, which is the use of plants to remove or modify pollutants in the environment. Arsenic is a fairly common and toxic pollutant. It has been observed that the effective endophytes used for this remediation produce a biofilm when in contact with arsenic. This biofilm production has not been quantified, and it is unclear if or how it affects the phytoremediation process. One possibility is that the bacteria sequester arsenic in the biofilm, potentially reducing the phytotoxic effects on the host plant. This second project will determine the production rate of biofilm and how that changes when exposed to arsenic.