Online Proceedings

Poster Session 1

Commons West, Easel 10

11:00 AM to 1:00 PM

Impact of the Harborview Chronic Pain Self-Management Program on Participants' Quality of Life, Confidence, and Pain Experience

Jennifer Michelle Noar, Senior, Nursing
UW Honors Program
Mentor: Debra Gordon, Anesthesiology & Pain Medicine
Mentor: JoAnne Whitney, Biobehavioral Nursing & Health Systems

Chronic pain is a widespread health concern affecting over 100 million Americans nationwide and interfering with all aspects of a person's quality of life. The Chronic Pain Self-Management Program (CPSMP) is a self-management training model involving a six-week long workshop designed for adults with chronic pain conditions to gain the knowledge and skills to manage chronic pain. The CPSMP has been adapted from Stanford's well-researched *Chronic Disease Self-Management Program* (CDSMP) which was found to improve many areas of participants' health status, health care utilization, self-efficacy and self-management behaviors for chronic diseases. However, little to no evidence exists on the program effects for people with chronic pain conditions, leaving the question as to whether CPSMP workshops effectively enable participants to better manage their own health and improve their overall quality of life. The purpose of this study is to assess how effective CPSMP workshops are at improving participants' self-efficacy in managing their pain and overall health status. This study reports on the results of six CPSMP workshops held between October 2015- March 2017 that were offered through Harborview Medical Center (HMC) in partnership with African American Reach and Teach Health (AARTH). Participants in these courses completed pre and post surveys including questions from the PROMIS Scale v1.2 – Global Health, UW Pain Tracker, PHQ-4, and the Perceived Confidence Scale (PCS) to evaluate the experience of pain of each participant, the extent to which their pain limits their daily activities, usage of pharmaceutical pain management methods, and overall usage of medical care before and after their participation in the HMC CPSMP workshops. If the results of this study reveal positive improvements in participants' confidence in their ability to manage their chronic pain conditions, further research may be done to identify the sustainability and long term outcomes of CPSMP programs.

Poster Session 1

Commons West, Easel 14

11:00 AM to 1:00 PM

The Relationship between Maternal Psychological Well-Being and Perception of Fetal Movement

Nikki (Nicole) Reynolds, Fifth Year, Nursing
UW Honors Program
Emma J. (Emma) Cunningham, Senior, Nursing
UW Honors Program
Mentor: Ira Kantrowitz-Gordon, Child, Family, and Population Health Nursing

Decreased fetal movement, especially in the third trimester, has been associated with an increase in fetal mortality. Very little is known about what factors influence a woman's perception of her baby's movement. A cross-sectional national Internet survey of stress and pregnancy was conducted in April 2015 using participants from a BabyCenter.com research panel. Inclusion criteria were current pregnancy and age > 18. The survey included validated measures of depression, mindfulness, pregnancy anxiety, stress, and maternal-fetal attachment, as well as nine exploratory questions about maternal perception of fetal movement. Relationships among the variables were explored using correlations coefficients (Spearman's rho). Of the 853 participants, 553 perceived regular fetal movement and were included in the analysis. Maternal anxiety, depression, and stress had a small to moderate correlation with three questions about a decrease in perceived fetal movement. Maternal-fetal attachment had a small to moderate correlation with six questions about maternal awareness of fetal movement. Maternal mindfulness had small to moderate correlation with four questions about both maternal awareness of fetal movement and a decrease in perceived fetal movement. Intercorrelations of the nine fetal movement questions supported organizing the questions into two groups: awareness of fetal movement and decrease in fetal movement. These findings provide support for the relationship between perception of fetal movement and maternal-fetal attachment, anxiety, depression, stress, and mindfulness. Future research can use these results in the development of instruments to measure perception of fetal movement and to explore whether improvement in maternal psychological well-being increases perception of fetal movement.

SESSION 2B

CHEMISTRY, BIOCHEMISTRY, AND MATERIALS SCIENCE

Session Moderator: Sharona Gordon, Physiology and Biophysics

MGH 228

3:30 PM to 5:15 PM

* Note: Titles in order of presentation.

Studies of the Gating Mechanism of the Pain-Sensing Ion Channel TRPA1

Amanda Qu, Senior, Biochemistry
Levinson Emerging Scholar, Mary Gates Scholar, NASA Space Grant Scholar, UW Honors Program
Mentor: Sharona Gordon, Physiology and Biophysics
Mentor: Gilbert Martinez, Physiology and Biophysics

The protein Transient Receptor Potential Ankyrin type 1 (TRPA1) is an ion channel found in nociceptive (pain-sensing) sensory neurons. TRPA1 is activated by several noxious compounds, including those found in mustard plants, garlic, smoke, and tear gas, among others. It is responsible for the sensation of irritation and pain that these compounds cause, as well as some related chronic pain disorders. A better understanding of TRPA1 could lead to novel therapeutics against chronic pain. For this reason, the mechanism by which TRPA1 activates is an active area of research. TRPA1 contains a coiled-coil domain at its C-terminal end and several ankyrin repeat domains (ARDs) at its N-terminal end. These are both very common repeating protein motifs; ARDs in particular often modulate protein-protein interactions. Many channels in the Transient Receptor Potential (TRP) family, which includes TRPA1, contain these domains, but their role in channel activation is not fully understood. However, a recently solved atomic structure of TRPA1 provided some key insights. The structure showed that TRPA1's coiled-coil domain is tightly enveloped by its ARDs, and they appear to interact with each other. No other TRP channel with a known structure exhibits this unique structural arrangement. My project aims to better characterize the interaction between the ARDs and coiled-coil. I am studying a mutation in the ARDs of the human TRPA1 channel, which is at its interface with the coiled-coil. The mutation, K591E, changes a key lysine amino acid residue, which is positively charged, to a negatively charged glutamate. It is found in rattlesnake TRPA1, which unlike the human protein is activated by temperatures above 27 C. Current results show that the K591E mutant is active at room temperature, even without any other compounds. A stronger understanding of TRPA1's activation mechanism will be vital to the development of effective next-generation pain therapies.

POSTER SESSION 4

Balcony, Easel 117

4:00 PM to 6:00 PM

Investigating the Incorporation of the Non-Canonical Amino Acid *L*-ANAP into the Ion Channel TRPV1 in *Xenopus* Oocytes using Fluorescence Microscopy

Nicolas Dean Basil, Senior, Biochemistry, Chemistry (ACS Certified)
Mentor: Sharona Gordon, Physiology and Biophysics
Mentor: Mario Rosasco, Physiology and Biophysics

The family of Transient Receptor Potential (TRP) proteins contains ion channels with a wide array of functions, including invertebrate phototransduction, responding to painful stimuli, responding to temperature changes, and many others. Of particular interest is the polymodal receptor TRPV1, which responds to many stimuli, including capsaicin, heat, pH, etc. TRPV1 is known to play a role in the sensation of both pain and heat; however, the structural dynamics that underlie TRPV1's ability to transduce these signals are still incompletely understood. Therefore, an understanding of the activation, regulation, and structure of TRPV1 are of clear importance. To address these questions, I have sought to use *Xenopus laevis* oocytes as an expression platform to perform studies on the structure and function of TRPV1. Since TRPV1 is not naturally expressed in *Xenopus* oocytes, the genetic information needed for the cell to build the protein was provided for the oocyte via microinjection of RNA. After an incubation period of several days, Western blot techniques were applied to analyze the presence and strength of expression of TRPV1. To better understand specific structural changes made when in the activated conformation, the fluorescent, non-canonical amino acid *L*-ANAP was integrated into TRPV1 using amber stop codon suppression and an engineered tRNA synthetase. Integrating the non-canonical amino acid ANAP enables structural and functional analysis of the membrane protein via fluorescence microscopy. The results of applying such methods to understand the function of TRPV1 will provide insight into the use of TRPV1 for therapeutic purposes, most prominently the reduction of the sensation of pain.