SEARCHING FOR THE FOUNTAIN OF YOUTH: REVERSING AGING EFFECTS ON MITOCHONDRIA WITH EXERCISE TRAINING
Amir Safi (Amir) Ali, Senior, Biochemistry
Initiative for Maximizing Student Development Scholar, McNair Scholar
Mentor: Kevin Conley, Radiology
Mentor: Erick Shankland, Radiology

For the first time we are able to non-invasively measure levels of a molecule that indicates the ageing and disease state of an individual. This molecule called nicotinamide adenine dinucleotide (NAD) and its other forms (NAD, NAD+, NADH) are related to aging and muscle function. High levels of the form NADH is found in individuals with disease and old age while high levels of NAD+ is found in active and younger individuals. Through exercise on elderly subjects we show that ageing effects on muscle can be reversed and levels of NAD+ and NADH can be restored to those found in adults. The form NAD+ is an index of mitochondrial capacity for making energy. With aging the oxidative capacity of the mitochondria declines, the amount of mitochondria declines and the levels of NAD+ declines. Through exercise training this effect can be reversed to yield higher muscle capacity in elderly. Our measurements were made on a 1.5 Tesla Magnet. We acquired Phosphorus spectra on the FDI (First Dorsal Interosseous) muscle and analyzed the data using software called jMRUI. From the Phosphorous spectra we are able to extract and analyze the NAD+ and NADH peaks.

SESSION 1D

BIOメディカル ENGINEERING
Session Moderator: Eric Seibel, Mechanical Engineering
231 MGH
12:30 PM to 2:15 PM

* Note: Titles in order of presentation.

PULMONARY HYPERTENSION RESEARCH STUDY
Hon Ching (Edmond) Lai, Sophomore, Pre-Sciences
Tammy Tarhini, Sophomore, Pre-Health Sciences
Mentor: Gail Van Norman
Mentor: Kevin Ma, Surgery/Anesthesiology and Pain Medicine

Although patients diagnosed with pulmonary hypertension (PHTN) are at a higher risk for postoperative complications, studies to date have not distinguished whether this applies equally to all PHTN patients, nor have they determined the severity of postoperative complications should they occur. Pre-operative screenings take place in the form of echocardiograms (ECHO), which are accurate but rather expensive. This study, one of the largest pulmonary hypertension studies to date, is headed by Dr. Gail Van Norman, director of the Pre-Anesthesia Clinic at the University of Washington Medical Center (UWMC). We look to explore the correlation between the severity of pre-existing pulmonary hypertension and post-operative complications. This study additionally explores the correlation between metabolic equivalences (METS) and PHTN, which could yield a new, more cost-effective method of screening for the disease. As research interns on this project, we abstract data from the medical records of eligible patients at UWMC. We focus on patients who have undergone surgery with moderate to severe PHTN, and collect pre-op and post-op data using hospital affiliated databases. Patients with these specific conditions are believed to have <4 METS and are at an elevated risk for post-operative complications. Should these hypotheses be proven correct, the results of this study will benefit both patients and providers, reducing the cost of screening, as well as improving patient care by allowing doctors to better manage the disease in the peri- and postoperative settings, reducing both complication and mortality rates.
Distribution and Hybridization of Northwestern Crow (Corvus caurinus) with American Crow (Corvus brachyrhynchos) in Pacific Northwest using Mitochondrial DNA
UW Honors Program
Mentor: John Klicka, Biology
Mentor: Kevin Epperly

The Northwestern Crow (Corvus caurinus) and American Crow (Corvus brachyrhynchos) are difficult to distinguish using morphological or vocal characters. The Northwestern Crow is considered ecologically distinct, occupying only coastal and shoreline habitats from Central Washington, north through much of coastal Alaska. The more widely distributed American Crow occurs throughout greater North America, including Pacific coastal habitats north to Central Washington, potentially overlapping and hybridizing with Northwestern Crow in this region. Until now, no comprehensive genetic analysis has been performed to examine crows in this potential zone of overlap. This study examines Pacific Northwest Corvus species distributions with minimal spanning networks and phylogenetic analyses via the mitochondrial DNA ND2 gene. Mitochondrial DNA is inherited maternally and does not recombine giving a minimally distorted view of an individual’s ancestry. Our data show that the Northwestern Crow occurs from Alaska to Southern British Columbia, and not in central Puget Sound or along the southern coast of Washington. The American Crow occurs throughout the continental U.S. and comes into contact with the Northwestern Crow in southern B.C. Further analysis is required to reveal the possible extent of this contact zone north of Vancouver and/or into northern Washington. A better understanding of this overlap zone will allow science to update natural history species distributions and further explore the effects of human impact on biogeography.

**POSTER SESSION 3**
Commons East, Easel 67
2:30 PM to 4:00 PM

Population Characteristics of Balanophyllia elegans in the San Juan Archipelago
Roxana Rautu, Senior, Biology (Ecology, Evolution & Conservation)
Mary Gates Scholar, UW Honors Program
Hana Louise Dubail, Senior, Biology (Ecology, Evolution & Conservation), Environmental Studies
Mary Gates Scholar, UW Honors Program
Mentor: Kenneth Sebens, Biology, SAFS
Mentor: Kevin Turner, Biology

Over the last four decades, marine community composition has changed in the San Juan Archipelago, showing a density decline in the scleractinian (hard skeleton) solitary cup coral Balanophyllia elegans. Determining predictors of B. elegans abundance, distribution, and size is important for ecological research in the eastern Pacific Ocean because changes observed over time could be an indication of realized impact from climate change and ocean acidification on calcifying organisms. Though reef corals are heavily studied, little is known about temperate, solitary corals. We studied B. elegans in the San Juan Islands in transect photos from 2008-2011 at 11 sites. At two of the sites, we analyzed photos to determine the distributions of size and abundance at 3-27 m depth. At all of the sites, we evaluated the effect of flow rate on coral size and population density by grouping the data from depths between 15-21m at the 11 sites into 4 categories of flow: low flow, medium flow, high flow, and very high flow. We used multiple statistical tests, including the Gaussian General Linear Model and the Poisson General Linear Model, with ANOVA to analyze the data. We found that the distributions of B. elegans vary by site, depth, and year. The results tell us that each site is unique. Even though some of these sites are separated by mere meters, characterized by the same flow rates, and evaluated on equivalent slopes, they appear to differ enough to create measurable variance. The patterns we found will need to be explained by researching these sites longer and adding additional site variables, such as pH. Fluctuations in pH, potentially caused by changes in rates of upwelling in the northern Pacific Ocean, could cause short term trends of increasing population size of calcifying organisms when pH is higher, but significantly reduced populations when pH is lowered by increased upwelling.

**POSTER SESSION 4**
MGH 241, Easel 136
4:00 PM to 6:00 PM

An Investigation of the Impact of Focused-Breathing Meditation on Impulsivity in Emerging Adults
Rachel Chan Yi Lee, Senior, Psychology, Sociology
UW Honors Program
Mentor: Kevin King, Psychology
Mentor: Connor McCabe, Psychology

Adolescence through emerging adulthood is a peak period for risk taking and impulsivity matched with a significant increase in emotional reactivity. This increase in stress response makes those in this age group vulnerable to psychopathology and act more impulsively. One way to diminish this is using an effective mean of coping. Mindfulness meditation has been found to increase attentional control, cognitive control, and executive function, and these increases may reduce the tendency toward impulsive action when distressed. This current study will be comparing focused breathing—a component
of mindfulness meditation—to rumination and unfocused attention to investigate whether focused breathing is an effective strategy for reducing impulsive tendencies. Using an expected \( n = 40 \) undergraduate students, we will test whether focused breathing produces reductions in impulsiveness and reward sensitivity following a stress induction, compared to a neutral or a rumination condition.

**POSTER SESSION 4**

Commons East, Easel 65  
4:00 PM to 6:00 PM

**Pulmonary Hypertension Study**  
Asha Meloottu, Senior, Biology (Molecular, Cellular & Developmental)  
Shilpa Susan (Shilpa) Santhosh, Junior, Pre-Health Sciences  
Olivia Mei jia Wong, Senior, Biochemistry  
UW Honors Program  
Daniel Shashy Masin, Senior, Business Administration (Finance)  
Se Won An, Sophomore, Pre-Sciences  
Jacob Zachary (Jacob) De Berry, Senior, Biology (Bothell Campus)  
Mentor: Gail Van Norman  
Mentor: Kevin Ma, Surgery/Anesthesiology and Pain Medicine

Although patients diagnosed with pulmonary hypertension (PHTN) are at a higher risk for postoperative complications, studies to date have not distinguished whether this applies equally to all PHTN patients, nor have they determined the severity of postoperative complications should they occur. Pre-operative screenings take place in the form of echocardiograms (ECHO), which are accurate but rather expensive. This study, one of the largest pulmonary hypertension studies to date, is headed by Dr. Gail van Norman, director of the Pre-Anesthesia Clinic at the University of Washington Medical Center (UWMC). We look to explore the correlation between the severity of pre-existing pulmonary hypertension and post-operative complications. This study additionally explores the correlation between metabolic equivalents (METS) and PHTN, which could yield a new, more cost-effective method of screening for the disease. As research interns on this project, we abstract data from the medical records of eligible patients at UWMC. We focus on patients who have undergone surgery with moderate to severe PHTN, and collect pre-op and post-op data using hospital affiliated databases. Patients with these specific conditions are believed to have \(<4\) METS and are at an elevated risk for post-operative complications. Should these hypotheses be proven correct, the results of this study will benefit both patients and providers, reducing the cost of screening, as well as improving patient care by allowing doctors to better manage the disease in the peri- and postoperative settings, reducing both complication and mortality rates.

**POSTER SESSION 4**  
MGH 241, Easel 137  
4:00 PM to 6:00 PM

**Mindfulness Training: Effects on BIS/BAS Systems of Self-Regulation**  
Naser H A H (Naser) Abdulraheem, Senior, Psychology  
UW Honors Program  
Mentor: Kevin King, Psychology

Self-regulation plays a significant role in an individual’s behavior and has been linked to various psychopathologies. The Behavioral Inhibition System (BIS) and the Behavioral Activation System (BAS) are two biopsychological systems that are hypothesized to affect approach and avoidance-motivated behaviors. The BIS/BAS systems provide one framework that can explain the self-regulatory mechanism. In addition, studies have found that mindfulness-based therapies can improve one’s self-regulation by increasing consciousness and awareness; however, there has been relatively little research on the effects of mindfulness training on the BIS/BAS systems. We recruited 17 youths aged 15-19 from a juvenile correction facility who are expected to possess extreme BIS/BAS levels, and placed them in a 6-week mindfulness-based intervention. We collected self-reported data on mindfulness and BIS/BAS level before and after the intervention. Using paired t-tests, we will test whether BIS/BAS and Mindfulness changed from baseline to a 1 month followup assessment.