39th Annual Western PA Undergraduate Biology Research Symposium

SATURDAY
April 14th, 2018
08:00 a.m. to 01:00 p.m.

HAER FAMILY SCIENCE AND ARTS CONNECTOR/Atria
PEDAS COMMUNICATION CENTER/Stamm Hall

THIEL COLLEGE CAMPUS

SYMPOSIUM SCHEDULE

08:00 a.m. – 08:25 a.m.	Registration Coffee/pastries provided Poster set-up Location: Haer Family Science and Arts Connector Atrium space
08:25 a.m. – 08:30 a.m.	Welcome and Opening Remarks Location: Haer Family Science and Arts Connector Atrium Space

Poster Presentations
BLDG.: Haer Family Arts and Science Connector
ROOM: First and Second Floor Atria

08:30 p.m. – 10:30 a.m.	Posters Location: Haer Family Science and Arts Connector Atrium space

Oral Presentations
ROOM: Stamm Hall

10:30 a.m. – 10:55 a.m.	Undergraduate Student Talk: Amy Ritchie
11:00 a.m. – 11:50 a.m.	Keynote Address: Rachel Wills – University of Pittsburgh School of Medicine, Pittsburgh, PA Title: "My Ph.D. Journey and the Fun Science I Do Now"

LUNCH
ROOM: Thiel College Cafeteria
11:50 a.m. – 12:50 p.m.

Closing remarks/end of symposium

Poster set-up: please have your posters set-up before 08:30. Poster boards are numbered. Please set-up your poster based on the number assigned to you in the abstract book below.

ABSTRACTS – TALKS

Undergraduate student talk

Effects of a Fungal Pathogen on Mating Behaviors and Disease Transmission in Terrestrial Salamanders

Amy Ritchie
Thiel College, Greenville, PA

Amphibians are experiencing population declines, partially due to a pathogenic chytrid fungus. One specific strain, *Batrachochytrium dendrobatidis*, or *Bd*, infects the amphibian's skin, possibly leading to the disease chytridiomycosis, which can be lethal. A recently discovered strain, *Batrachochytrium salamandrivorans*, or *Bsal*, is devastating many amphibian species in Europe. This fungal pathogen infects the amphibian's skin, forming lesions that can be fatal. While these fungal strains are lethal to some species, the cutaneous bacteria of amphibians can provide a natural immune defense. Certain bacterial genera have exhibited anti-fungal properties against *Bd* zoospores in culture. The goal of this study was to examine the inhibitory properties of isolated skin bacteria against both *Bd* and *Bsal*. Cutaneous swab samples were taken from *Plethodon cinereus*, the red-backed salamander, to isolate and identify *Chryseobacterium*, *Pseudomonas*, and *Jathinobacterium* bacteria. After isolation, these bacteria will be co-cultured with *Bd* and *Bsal*, in order to observe possible inhibitory effects. Additionally, understanding the impact these fungal pathogens have on amphibians is crucial, especially as it concerns their deleterious impacts on mating in salamanders. In our second study, mating rituals of *Desmognathus ochrophaeus* salamanders were observed, in order to determine optimal mating behaviors and how *Bd* infections impact mating levels.

ABSTRACTS – POSTERS
In alphabetical order

POSTER 1

Foraging behaviors in bird communities: differenced in response to predation risk in caching and non-caching species
Ashton Grimm and Benjamin Henrichs
Washington and Jefferson College, Washington, PA

Caching and non-caching birds are species who either store food or do not store food. In autumn and winter months in southwest Pennsylvania, caching species store food to retrieve later food resources are scarce. In southwest Pennsylvania, common caching species are Carolina Chickadees, Tufted Titmice, and White-breasted Nuthatches. Caching species may have lower predation risk due to their lower levels of subcutaneous fat that allow them to escape a predator quicker compared to non-caching species. Since mobbing is an important behavior of avian species in response to perceived predation risk, we predicted that caching species would be more likely to initiate a mob toward perceived predation because of their lower subcutaneous fat levels. We conducted predator playbacks using an Eastern Screech Owl model and call to observe if there were differences in mobbing responses (e.g., number of species and individuals responding) between caching and non-caching bird species. Titmice and Nuthatches were the caching species to mob first. Cardinals were the non-caching species to initiate a mobbing event most often. Our hypothesis that caching species were more likely to mob first was supported by this study. We found no statistical difference between average number of caching and non-caching individuals present during the playback and post-playback. These results suggest that while both caching and non-caching species will mob, caching species are the first to respond when perceived predation risk may be greatest.

POSTER 2

The Effect of Supplemental Feeding on Species Richness and Relative Abundance of Avian Species near Forest Edges

Brian Graytok, Ryan Konek, Kirsten Mendel
Washington and Jefferson College, Washington, PA

Supplemental bird feeding is not only conducted in backyards. Besides the benefit of reducing risk of starvation, there are also other implications associated with this activity, such as the potential to alter a community's ecological dynamics. In this study, we examined the effects of supplemental feeding on species richness and relative abundance. We hypothesized that with the supplementation of food we would see an increase in the species richness and relative abundance of birds along a forest edge. We observed eight sites at two locations over a two-week period. For our control, observations were performed at each site without supplemental food (one week) and then supplemental food was added and observed again (an additional week). We did not detect any significant change in either species richness or relative abundance after the addition of supplemental food. Providing supplemental food requires spatial and episodic memory, which may take time for birds to develop and would require extended observations beyond a span of 2 weeks to initiate change in behavior. Although spatial memory was not tested, this may have been an influential factor in our results and may be a route for future experimentation. The type of food used could also have an effect. This experiment was conducted with black-oil sunflower seed; further studies could include a variety of seed.

POSTER 3

The Effects of Acid Exposure on Incidence of a Fungal Pathogen in Red-Backed Salamanders

Brook Simpson and Shannon Simpson
Thiel College, Greenville, PA

Amphibian populations are experiencing significant worldwide declines, with nearly 200 species having gone extinct. These declines have been linked to various natural stressors, including the fungal pathogen *Batrachochytrium dendrobatidis,* or *Bd.* Infections with *Bd* may lead to the disease chytridiomycosis, which can prove fatal to certain amphibian species. Although numerous environmental stressors can increase the prevalence of *Bd* infections in amphibians, exposure to acidic pH may also influence how infections arise. The goal of this experiment was to determine the effect of an acidic solution on *Bd* infection and chytridiomycosis development in red backed salamanders (*Plethodon cinereus)*. Experimental groups consisted of salamanders exposed to both *Bd* zoospores and a pH of 5.5, with other groups exposed solely to *Bd* zoospores or a pH of 5.5. Skin swabs were taken to measure *Bd* infection levels, with disease symptoms, such as weight loss and mortality, also being measured. Preliminary results indicate that the salamanders exposed only to *Bd* zoospores had the highest levels of mortality, whereas the group exposed to both acid and *Bd* experienced no mortality. Additionally, the group exposed only to *Bd* appeared to lose the most weight, with the group exposed solely to acid appearing to lose the least amount of weight. Future experiments will involve analysis of skin swabs to determine possible changes in infection levels. Based on these initial findings, it is possible that exposure to low pH conditions may be decreasing progression of *Bd* infection and disease development, potentially due to acidic killing of *Bd* zoospores.

POSTER 4

Seasonal Variation and Association Among Ant Species In Western Pennsylvania
Brooke Gates, Lyndsay Krut, Chris Simpson, and Hunter Young
Thiel College, Greenville, PA

Certain species of ants are native to Western Pennsylvania and as the seasons change, researchers have found ant species uncommon to this area. This study aims to test whether seasonal variation impacts ant abundance and if co-occurrence patterns appear between specific species pairs. By recording the frequencies by which each and every single ant species occurred together, we were able to test statistically for patterns associated with association among common species. We found evidence for seasonal variation between *Aphaenogaster picea, Stenamma brevicorne, Stenamma schmitti*, and *Stenamma diecki*, along with species association among species between *Aphaenogaster picea* and *Stenamma diecki.*

POSTER 5

The effect of habitat structure on vigilance behavior in Picidae.

Cassidy Costello and Maggie Zhang
Washington and Jefferson College, Washington, PA

Woodpeckers and other birds rely on visual cues to avoid predators and so birds spend time scanning their environment for predators (vigilance). But the trade-off between this vigilance behavior and foraging can mean a decrease in time spent foraging and an increase in time spent being vigilant. The purpose of this study was to determine if woodpeckers spend more time being vigilant near the forest edge or in the forest. We predicted that woodpeckers will be more vigilant near the forest edge compared to the forest, because they will perceive themselves at a higher predation risk due to more exposure at the forest edge. In this study, we observed and recorded the behaviors of permanent and winter residents of the Picidae family that were observed along the forest edge or the interior forest at two public parks: Mingo Creek County Park and Washington Park for six weeks. We calculated the percent time spent being vigilant and used linear regression analysis ($\alpha = 0.05$) to determine the relationship between vigilance time and distance from forest edge for woodpeckers: Red-bellied Woodpeckers, and Hairy Woodpeckers.Other studies had significant findings of a higher vigilant behavior near the edges compared to interior forest because of the high density of vegetation that can obstruct vision. However, in our study we could not detect any significant relationship between the percent of time spent being vigilant and distance from the forest edge for any of the woodpecker species.

POSTER 6

Trained immunity and the development of 5-(piperazine-1-yl)nicotinamide analogues

Chase McKevitt* and Freek Janssen
Department of Synthetic Organic Chemistry, Radboud University, 6525 AJ Nijmegen, The Netherlands
Washington and Jefferson College, Washington, PA

The world is facing a growing struggle of developing new and efficient approaches to cancer treatment. Traditionally cancer treatment has involved procedures which are not cell specific but effect a broader range of body tissue, leading to unwanted treatment outcomes. An approach to cancer treatment gaining interest is in the field of epigenetics. Specifically histone deacetylation is receiving attention because of its relation to unwanted maladaptive states that result when the process is unregulated. Histone deacetylation is facilitated by histone deacetylase enzymes (HDAC enzymes) which remove acetyl groups from histone proteins. Ultimately this removal results in the suppression of genes for apoptosis which allows for the uncontrolled growth displayed in malignant tumors. In this study a library of cell selective HDAC inhibitors were developed. Due to confidentially the identification of targeted HDAC enzymes are undisclosed. Specifically the study developed analogues of 5-(piperazine-1-yl)nicotinamide using a novel synthesis including a palladium-catalyzed synthesis of aryl amines, the Buchwald-Hartwig coupling reaction. In total eight potential HDAC inhibitors were synthesized and processed for further inhibition testing at the Radboud University Medical Center in Nijmegen, the Netherlands.

POSTER 7

Creating a Tolerogenic Approach to a Contact Allergen
Christopher Fiorina
Washington and Jefferson College, Washington, PA

Allergic contact dermatitis (ACD) is a cutaneous response to allergens (e.g., poison ivy) that affects 15-20% of the population. Current treatments involve topical anti-inflammatories, which suppress inflammation, but fail to address the underlying immune issue. To prevent future ACD responses (i.e., induce tolerance), we sought to modify the skin microenvironment to provide a tolerogenic environment for allergen introduction. This approach was inspired by how ultraviolet light causes synthesis of an immunosuppressive form of vitamin D_3 in the skin, which induces skin-resident dendritic cells (DCs) to adopt a tolerogenic phenotype. These tolerogenic DCs present antigen (e.g., allergen encountered in the skin) to naïve T cells, promoting their differentiation into ACD-suppressing regulatory T cells (Tregs) instead of pro-inflammatory effector T cells. To mimic this natural tolerance-inducing pathway, we used microneedle arrays (MNAs) to simultaneously deliver a vitamin D_3 analog (MC903) and model protein allergen (ovalbumin, OVA) into the skin of mice. This approach to allergen tolerization altered both cellular and humoral immune responses (i.e., OVA-specific antibodies).

Enzyme-linked immunoabsorbent assays (ELISAs) were utilized to evaluate the humoral immune responses and H&E staining was used to evaluate the swelling of the ear. Overall, allergen tolerance was induced by the co-delivery of the allergen and MC903 MNAs. Specifically, OVAe MNA treatment (with or without MC903) increases OVA-specific IgG1 production and shifts T-cell responses from Th1 to Th2. This shift in responses would result in a less harmful immune response and is therefore beneficial to the organism.

POSTER 8

Bioinformatics: Analysis and Annotation of a Section of the Mycobacteriophage *Pipsqueak* Genome

Crystal Carradine
Thiel College, Greenville, PA

Bioinformatics is a useful tool to process and classify genetic information. It has been used to study the genomes of various organisms, including the genomes of viruses. Although viruses are usually associated with animal hosts, some viruses have been known to infect bacteria; such viruses are called bacteriophages (phages). In this study, a section of the *Mycobacterium phage pipsqueak* genome, which is a recently discovered bacteriophage that infects *Mycobacterium smegmatis* (mc^2155), was annotated and analyzed using bioinformatics. The three primary bioinformatical tools used in this study were a genetic analysis program called *DNA Master,* a genomic comparison program called *Phamerator,* and a *GeneMark-Smeg* graphical output displaying the coding potential of *pipsqueak's* genes. From these programs, the start and stop sites of *pipsqueak's* genes were verified, along with the ORF prediction made by Glimmer or GeneMark. The distance or overlap between each gene, the open reading frame length (ORF), and the Shine-Dalgarno score (SD) were also determined to check DNA Master's auto-annotation, and the product of each gene was also subjected to a NCBI BLAST test to see if any genes had a possible genetic function. Lastly, genes with unusual coding potentials or gaps were checked using a genome comparison map in *Phamerator.* Studying the genomes of mycobacteriophages and the genetic relationships between phage species can reveal the function and conservation of phage genes and possibly indicate what genes are important to phage survival. As a result, genomic annotation of phage genomes can possibly help further bacteriophage-based research.

POSTER 9

The effect of forest canopy cover on bird species richness and abundance in deciduous forests of Pennsylvania

Greg Fantaski and Megan Wang
Washington and Jefferson College, Washington, PA

Species richness and abundance are important indicators of bird population persistence. In this study, we investigated the relationship between canopy cover and bird species richness and abundance. We predicted that as canopy cover increases, both species richness and bird abundance would also increase because areas with more canopy cover would offer more resources and protection for birds. Higher amounts of canopy cover would afford greater cover for birds to hide from avian predators. Our study included three sampling sites in Washington County, Pennsylvania: Washington Park, Mingo Creek County Park and Washington and Jefferson College's Abernathy Field Station. We performed point counts at three locations within each sampling site and each location was sampled between two and four times. Our results showed that both species richness and bird abundance decreased significantly with an increase in percent canopy cover. Additionally, the results showed that mean species richness and mean abundance did not significantly change with increasing canopy cover. Studies that report a negative trend between canopy cover and species richness and abundance are scarce. One possibility is that some factors, such as habitat heterogeneity, may have a stronger effect on species richness and abundance than canopy cover. A variety diverse habitat would offer more niche hiding places, and thus a higher chance for greater species richness and abundance when compared to a habitat that is less diverse in terms of forest cover.

POSTER 10

Study of mutagenesis in *Escherichia coli* via the *dgt* gene knockout

Jason Takacs, Katie Altman, and Dr. Sarah Swerdlow
Thiel College, Greenville, PA

DNA replication is an important process that is necessary for cell survival. To keep mutations low, DNA replication needs to be performed accurately. We are utilizing *Escherichia coli* as a model system to understand mutations in DNA replication. When a gene is inactivated and it results in an increased number of mutations that gene is known as a mutator gene. *Dgt* is a recently discovered mutator gene in *E. coli,* which requires further investigation to determine what type of interactions it has within the cell. To further understand this mechanism a double knockout was performed. The *dgt* gene, as well as the*uxuR* gene or the *dsdC* gene, was knocked out to analyze if the rate of mutations changed. We found that when both *dgt*and *uxuR* genes were knocked out the number of mutations decreased when compared to the single *dgt* knockout. When both *dgt* and *dsdC* genes were knocked out the number of mutations was similar to the single *dgt* knockout. Determining the mechanism of how *dgt* works in bacteria and its role in DNA replication is important and can be applied to how mutations in human DNA replication occurs.

POSTER 11

Susceptibility of a *Listeria monocytogenes* ActA mutant to intracellular killing by neutrophils

Jonathan Papa
Thiel College, Greenville, PA

Listeria monocytogenes is an intracellular bacterial pathogen that causes listeriosis, a disease that is ordinarily harmless in healthy individuals, but can be fatal to those that are immunocompromised. Currently, ActA knockout *Listeria monocytogenes* mutants are being investigated as a platform for the development of a vaccine that could be potentially used as a treatment for various types of cancer. However, the current literature so far has only characterized how an infection with an ActA *Listeria monocytogenes* mutant occurs within macrophages. While macrophages play an important role within the immune system, the current literature is lacking information on how other cells involved in an immune response, such as neutrophils, respond when exposed to this *Listeria monocytogenes* mutant. To build a more complete understanding of how innate immunity is impacted by an infection with a *Listeria monocytogenes* ActA mutant, we aim to investigate how neutrophils respond to an infection with a WT strain of *Listeria monocytogenes* and an ActA MUT strain. We intend to first determine if there are differences in the rate at which neutrophils are capable of killing these two strains of *Listeria monocytogenes* to illustrate if one strain is killed more efficiently than another. Then, we plan to further investigate these two strains of *Listeria monocytogenes* by investigating intracellular signaling mechanisms involved in the generation of pathogen-specific immune responses. Data generated so far indicate that the mutant ActA-deleted strain of *Listeria monocytogenes* is killed less in neutrophil-bacteria co-cultures.

POSTER 12

Characterizing the Role of Dual-Specificity Phosphatase 11 (*dusp11*) on Eye Development and Age-Related Macular Degeneration in Zebrafish

Joseph Yano, Krista Angileri, Jeffrey Gross
Washington and Jefferson College, Washington, PA

Age-related macular degeneration (AMD) is a debilitating disease that severely reduces the central vision of millions of individuals and is the leading cause of blindness in developed countries. The accumulation of deposits of cellular waste (drusen) is a hallmark of AMD and indicates disruption in the retinal pigment epithelium (RPE). Degradation of the RPE has been linked to toxic non-coding RNA levels, and disruption of RNA silencing pathways. Recently, dual specificity phosphatase 11 (dusp11) has been identified as an enzyme involved in these RNA silencing pathways. In this study, we investigate the role that *dusp11* plays in the pathology of AMD as well as characterize its expression activity in zebrafish. We show that *dusp11* is indeed expressed in zebrafish embryos through 72 hour post fertilization. When zebrafish embryos with mutant alleles of *dusp11* were generated, however, they did not exhibit aberrant phenotypes of RPE disruption as expected in AMD. Though initial results suggest *dusp11* is not critical to normal RNA silencing, further investigation into *dusp11* is warranted to potentially reveal novel targets for therapies to treat AMD.

POSTER 13

Creating less "artificial" grammars to test language-learning in the laboratory
Katherine Muksuris, Dr. Benjamin Wilson, Dr. Christopher Petkov, and Ryan Calmus.
Washington and Jefferson College, Washington, PA

Artificial grammar learning (AGL) has been widely used in order to uncover the evolutionary basis of language by testing humans and non-human primates (NHPs). This summer research experience sought to test the hypothesis that as a grammar becomes more complicated, it activates the dorsal areas of the brain which are thought of as evolutionarily "newer." The goals of this experience were twofold: to explore an established AGL paradigm, and to help develop a new paradigm involving center-embedding. For the first part of the study, adjacent and nonadjacent types of traditional AGL were used. The adjacent condition was representative of a simple grammar and nonadjacent condition was representative of a complicated grammar. Participants were tested both behaviorally and in an fMRI scanner to determine if they could learn the AGL and to observe which areas of the brain were activated. The adjacent condition did not show significant activation of language areas while the nonadjacent condition showed activation of Broca's area (BA 44/45). These results seem to support the dorso-ventral hypothesis. The second experiment involved working on a new paradigm of AGL that concentrates on center-embedded sentence structure. Preliminary behavioral tests were done on this new AGL and support the theory that semantics greatly influence whether or not a grammar is learnable in the first place. This finding has caused intriguing skepticism on the original AGL paradigm, which is solely based off of grammatical pattern recognition without semantics.

POSTER 14

Genetic variation in the human relaxin 2 (*RLN2*) promoter affects in vitro expression, with potential implications for susceptibility to preterm birth

Loughner, Lindsay G.; Pollock, Taylor; Zapf, Rachel; Carnahan-Craig, Sarah J.; Jensen-Seaman, Michael I.
Department of Biological Sciences, Duquesne University, Pittsburgh, PA 15282

Relaxin 2 (RLN2) is a hormone produced primarily by the corpus luteum during pregnancy. Increased RLN2 levels decrease the tensile strength of fetal membranes and can therefore cause early rupture, resulting in preterm birth. Past genetic association studies have linked serum RLN2 levels and preterm birth with a single nucleotide polymorphism (SNP rs3758239) in the *RLN2* promoter. This study investigates the functional consequences of variation at SNP rs3758239 and a nearby linked dinucleotide repeat $(CT)_n(GT)_n$ within the putative promoter of *RLN2* on expression of this gene. To do this, a diverse panel of 44 global human DNA samples was genotyped at the SNP and the dinucleotide repeat. The allele frequencies at SNP rs3758239 were 79.7% and 20.3% for the T and C alleles, respectively, consistent with previous reports. The number of dinucleotide repeats ranged from 23 to 38, with 31 being the most common. From these data, six different *RLN2* promoter haplotypes found in the human population were cloned into luciferase reporter vectors, and subsequently transfected into a human trophoblast cell line. Expression was measured by luciferase activity and normalized with a co-transfected constitutive *Renilla* reporter construct. We observed significant differences in *RLN2* transcription between individual haplotypes ($p < 0.005$) through one-way ANOVA with Tukey's multiple comparison test. Our data suggest that nucleotide variation at both the SNP and the dinucleotide repeat affect *RLN2* expression. Future work will examine the mechanistic basis for differing expression levels among haplotypes, and the potential for clinical relevance.

POSTER 15

Soil near decaying logs inhibits seedling growth...but not for garlic mustard (*Alliaria petiolata*)

Lucy C. Elkin and Jason S. Kilgore
Washington and Jefferson College, Washington, PA

Garlic mustard (*Alliaria petiolata*) is an invasive biennial plant to eastern North America that produces allelopathic secondary metabolites which kill mycorrhizae and reduce seed germination of native plant species, thus altering the composition of many forest plant communities. In addition, soil invaded by garlic mustard, which is itself non-mycorrhizal, has higher nutrient availability (N, P, Ca, Mg) and soil pH. In some but not all sites, garlic mustard populations will persist for extended periods of time. Even within a local habitat, plant size and abundance can vary, possibly from some microheterogeneity in resources. In this study, we investigated the effects of coarse woody debris (CWD, *Prunus serotina*) and soil collected from close (<30 cm) to and far (>100 cm) from a decaying log on the growth of seedlings of garlic mustard and other species in a controlled greenhouse experiment. We also tested the effect of pre-soaking the CWD, which we only found to increase the abundance of non-garlic mustard plants (p=0.02). Furthermore, the physical presence of CWD had no effect on the growth of garlic mustard (p>0.7) or on the abundance (p=0.09) or growth (p>0.12) of non-garlic mustard plants. Soil that came from close to a log had no effect on garlic mustard biomass (p=0.98), number of open leaves (p=0.15), or number of emerging leaves (p=0.52) but did result in longer leaf lengths (p=0.01). On the other hand, non-garlic mustard plants in soil far from CWD had greater biomass (p<0.001) and greater abundance (p<0.001) but no significant difference in height (p=0.09). While the species, decay state, and thus nutrient availability of the CWD may also be important, the growth of other plants was clearly inhibited in the soil close to the CWD. This suggests that residual secondary metabolites from garlic mustard in the soil near the CWD, where larger plants were observed in the field, may prevent growth of non-garlic mustard species, yet not affect the growth of garlic mustard.

POSTER 16

Improved cardiac remodeling after *in vivo* knockdown of type VI collagen following myocardial infarction

Nicholas Baker
Washington and Jefferson College, Washington, PA

Rationale: Our previous studies have shown that hearts of Col6$^{-/-}$ mice are protected from myocardial infarction (MI) injury, as these hearts exhibit reduced myocyte apoptosis, fibrosis and wall thinning leading to preserved long-term cardiac function. The current project was designed to test whether knockdown of Col6 is feasible in the rat MI model and carries a similar cardioprotective effect during post-MI remodeling.

Objective: To utilize a novel, non-viral delivery method to deliver and determine whether siRNA-mediated knockdown of Col6 is effective in the infarcted rat heart and affords cardioprotection *in vivo* in the weeks following MI injury.

Methods and Results: MI was induced via ligation of the left anterior descending artery (LAD) in adult Sprague-Dawley rats and cardiac function was measured by transthoracic echocardiography. Calculated changes in endocardial volume, percent ejection fraction (%EF), and percent fractional shortening (%FAC) were performed at 1-6 weeks post-MI. We witnessed a decrease in mean endocardial %EF of 44.7 ± 1.4 % in vehicle treated (control) rats, a parameter that was higher in siRNA treated hearts at 47.4 ± 1.8 %. A similar improvement was also seen in endocardial %FAC, which was 30.1 ± 1.4 % in vehicle treated rats versus 34.0 ± 1.3 % in siRNA treated rats. Knockdown of Col6 *in vivo* resulted in lower endocardial diastolic volume in siRNA treated rats (654.1 ± 81.3 µl in the vehicle group compared to 549.8 ± 8.4 µl for the siRNA treated group) and lower systolic volume in siRNA treated rats (362.7 ± 49.9 µl in the vehicle group compared to 291.6 ± 9.6 µl in the siRNA treated group).

Conclusions: siRNA mediated Col6 knockdown using JET-PEI as a novel delivery method was effective *in vivo*, reducing Col6 expression levels over 75% in the anterior wall of the LV. Echocardiography revealed that the siRNA injections preserved cardiac function and prevented left ventricular chamber dilation following MI, indicating that this approach may have a positive therapeutic benefit in the recovery from MI injury.

POSTER 17

The outer mitochondrial membrane receptor FUNDC1 may be required for post-fertilization sperm mitophagy in *C. elegans*

Peter Sobraske[1], Yunki Lim[2], and Keith Nehrke[2]
[1]Washington & Jefferson College [2]University of Rochester Medical Center

Mitochondria are central to metabolism, cell signaling, and apoptotic regulation. Thus, mitochondrial damage is often pathological. If dysfunctional mitochondria cannot adapt via the Mitochondrial Unfolded Protein Response (UPR^{mt}), enzymatic repair, etc., they can be eliminated through selective degradation known as mitophagy. The outer mitochondrial membrane receptor FUN14 domain-containing protein 1 (FUNDC1) has been shown to mediate mitophagy following hypoxic injury. Mitophagy is typically studied in this context, as a component of mitochondrial quality control, however, we hypothesize that FUNDC1 is required for sperm elimination following fertilization in the model organism *C. elegans*.

Nematodes, like humans, follow a strict maternal pattern of mitochondrial DNA (mtDNA) inheritance. Sperm mitophagy has been identified as the mechanism through which uniparental mtDNA inheritance occurs, however the proteins involved remain unclear. In this study, we demonstrate that FUNDC1 is strongly expressed in the spermatheca, the site at which fertilization occurs, but is basally expressed in oocytes. This indicates that FUNDC1-mediated mitophagy is prevalent in sperm cells upon fertilization, suggesting it is involved in paternal mtDNA elimination. Further, in FUNDC1 knockout models, more abundant inheritance of paternally transmitted mtDNA was observed in offspring. This intergenerational persistence of male-derived mtDNA suggests that FUNDC1 is involved in post-fertilization sperm mitophagy.

POSTER 18

Baseline Physical Activity and the Efficacy of Cognitive Behavioral Therapy for Insomnia in Older Adults: Is Low Physical Activity Associated with Worse Sleep Outcomes?

Timothy Yeung[a]; Jennifer L. Martin, PhD[b, c]; Constance H. Fung, MD, MSHS[b, c]; Lavinia Fiorentino, PhD[d]; Joseph M. Dzierzewski, PhD[e]; Juan C. Rodriguez Tapia, MD[c, f]; Yeonsu Song, PhD, RN[b, c]; Karen Josephson, MPH[b]; Stella Jouldjian, MSW, MPH[b]; Michael N. Mitchell, PhD[b]; and Cathy Alessi, MD[b, c]*

[a] Washington & Jefferson College, Washington, PA USA
[b] Geriatric Research, Education and Clinical Center; VA Greater Los Angeles Healthcare System; North Hills, CA, USA
[c]Department of Medicine, David Geffen School of Medicine, University of California at Los Angeles, Los Angeles, CA, USA
[d]Department of Psychiatry, University of California at San Diego, San Diego, CA, USA
[e]Department of Psychology, Virginia Commonwealth University, Richmond, VA, USA
[f]Department of Medicine, Pontificia Universidad Catolica de Chile, Santiago, Región Metropolitana, Santiago, Chile
*** Correspondence:**
Cathy Alessi, MD
cathy.alessi@va.gov

We examined whether baseline physical activity is associated with the efficacy of cognitive behavioral therapy for insomnia (CBT-I) in older veterans. Community-dwelling veterans aged 60 years and older with insomnia received CBT-I in a randomized controlled trial. Participants who received active treatment were divided into low and high physical activity based on self-report. Sleep outcomes were measured by sleep diary, questionnaire, and wrist actigraphy; collected at baseline, post-treatment, 6-months, and 12-months follow-up. Mixed-effects models compared differences between physical activity groups in change in sleep outcome from baseline to each follow-up, and equivalence tests examined if physical activity groups were clinically equal. There were no significant differences in sleep outcomes between physical activity groups. Equivalence tests suggested possible equality in physical activity groups for five of seven sleep outcomes. Efficacy of CBT-I in older veterans was not associated with physical activity. Older adults with low levels of physical activity who have insomnia can benefit from CBT-I.

CAMPUS MAP

Coming into the College:
Turn right onto Amelia Earhart Dr
Turn first right onto Irvin Dr
Park in the Gym parking lot – red square on the map.
Walk up the path to building 9 on the map (Haer Family Science and Arts Connector).
Individuals who may require disability accommodations can park in the small parking lot next to the yellow building (follow the blue arrow).