



EXPLORE & SERVE 2020

Celebrating Research and Service of our
Pre-medical and Pre-health Students

Hosted by:
Division of Pre-medical
and Pre-health Programs

Virtual Event:
Monday, April 13
Monday, April 20 & Tuesday, April 21



DREXEL UNIVERSITY
Graduate School of
**Biomedical Sciences
and Professional Studies**
College of Medicine

Explore & Serve:

Welcome to our Pre-medical & Pre-health Division's third annual Explore & Serve Day. Our vision for this event has been to highlight and celebrate your work outside of the classroom in Drexel's spirit of Experiential Learning. Much of that work, be it research in a biomedical science lab and the clinics, or community service, happens out of the spotlight. However, this work is just as important for shaping your future career as a healthcare professional as your work in the classroom. The broad range of projects, which students enthusiastically shared during our first two events, was genuinely inspiring and attested to their passion for their chosen path. Our students contribute to cutting-edge research, find inspiration to serve in many organizations, and even founded a new club, the DragonClaws, and a charitable organization, Dayna's Footprints, both of which are centered on service. It is safe to say that Explore & Serve Day more than fulfills our vision, but also one of our Division's missions - to train our students to become compassionate, and forward-thinking healthcare professionals. We look forward again this year to learning about exciting, high-caliber research on a variety of topics, such as neurobiology, epidemiology, efficacy of natural products, and more. This year, we also host students from our MD program who spend a year conducting research in our Graduate School to earn their master's degree. We also look forward to hearing about the community service endeavors with which our students are involved, both focused on the Philadelphia community, and globally. We will learn how their research and community service experiences transformed and enriched their perspectives as they honed their critical thinking skills or reflected on the needs of the communities with which they work. We are especially grateful to our Medical School Dean, Dr. Cairns, for welcoming and addressing our students today. Many thanks to Dean Elisabeth Van Bockstaele for her continued support of our event. Thank you to all attendees for joining us today in celebrating the accomplishments of our students in research and service. And a special Thank You to all the presenters and their mentors and supervisors who guided them. We hope that you will enjoy sharing your experiences, learning from each other, and continuing to Explore & Serve.

Monika Jost, PhD, Director, Pre-medical and Pre-health Graduate Programs, Graduate School of Biomedical Sciences and Professional Studies

ORAL PRESENTATIONS

Faith Blamon **MS in Interdisciplinary Health Sciences (IHS)**

Surgical and Medical Mission to Liberia West Africa (2019)

Faith Blamon¹ in partnership with Bethel World Outreach Ministries Inc. International, Bethel SOZO International Medical Ministries Inc., Dr. Darlington G. Johnson Medical Center, John F. Kennedy Memorial Hospital Liberia, Medical Missions for Global Health, Redemption Hospital

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Liberia is a small country on the west coast of Africa with a reported population of 5 million. The country is rich in iron ore, diamonds, gold, lumber, and rubber but remains underdeveloped due to corruption and global volatility. Underdevelopment accompanies poverty, and an impoverished country remains vulnerable to decreased literacy, reduced industry, and an overall decrease in quality of life. The overall goal of Bethel SOZO Surgical and Medical Ministries, a branch of Bethel World Outreach Ministries, is to improve the quality of life for people living in Liberia and around the world, specifically those in the African diaspora. The main concern of Bethel SOZO is health, but we also incorporate aspects of education and religion. In November 2019, Bethel brought a team of coordinators and medical professionals to Liberia. Through the collaborative effort of the major hospitals (John F. Kennedy Memorial, Redemption, ELWA) and the Darlington G. Johnson Medical Center, the medical mission served over 1,000 patients in six days. We also distributed 114 hospital beds donated by the JFK memorial hospital, and we performed 84 surgeries. We are planning another mission trip to Liberia and one to Sierra Leone, each for two weeks for November 2020. On this trip, we aim to import more medical supplies and treat a larger patient population. As of now, our team has grown from 33 to 212 volunteers. We look forward to continually making an impact on Liberia and the rest of Africa.

Ultrastructural Localization of Serotonergic 5-HT₃ receptors in the Rat Locus Coeruleus

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Deficiency of monoamines, norepinephrine (NE) and serotonin (5-HT) has been implicated in the pathophysiology of depressive disorders. Neurochemical studies show interactions between serotonin and NE systems. Lesioning of the serotonergic nuclei increases LC neuronal firing whereas electrical stimulation of the serotonergic pathways inhibits noradrenergic neurotransmission. Serotonin has been shown to modulate noradrenergic pathways through the involvement of the serotonin receptors. Pharmacological studies have shown that activation of the 5-HT₃ receptor (5-HT₃) in the locus coeruleus (LC), the primary noradrenergic nucleus in the brain, decreases the firing of LC neurons and release of NE in prefrontal cortex. A recent pharmacological study shows a functional role of 5-HT₃ in the LC. However, the cellular substrates for interactions between 5-HT₃ and noradrenergic LC have not been elucidated. In the present study, we investigated the cellular sites for interactions between 5-HT₃ and noradrenergic neurons in the LC using immunofluorescence and immunoelectron microscopy. Tissue sections were collected through the LC and processed for immunocytochemical detection of tyrosine hydroxylase (TH), a marker for catecholaminergic neurons, and 5-HT₃. Immunofluorescence microscopy revealed that TH-containing perikarya and somatodendritic processes exhibited 5-HT₃ immunoreactivity. Ultrastructural analysis using immunoperoxidase labeling for TH and immunogold-silver labeling for 5-HT₃ confirmed that 5-HT₃ are localized within TH-containing somatodendritic processes. Taken together, these results indicate anatomical substrates for proposed interactions between the noradrenergic and serotonergic systems in the LC.

**Mentoring and Guiding Youth to Service Through
Vietnamese Culture and Christian Teachings**

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²Vietnamese Eucharistic Youth Movement

The Vietnamese Eucharistic Youth Movement (VEYM) is a global youth movement that trains youth to become well-rounded citizens and better Christians. VEYM welcomes all youths willing to learn about Vietnamese traditions and Catholic teachings, while building their leadership skills. Within this movement, youth members and youth leaders build a sense of community using culture, strengthen relationships through mentorship, and provide service work to the less fortunate in the community. VEYM is subdivided into nationwide regions and branches, each hosting retreats, camps, and service projects to promote social interaction within the group and with the community. As a trained youth leader in the Austin, Texas branch, I designed and organized multiple service projects, including assembling homeless care packages, making cards for children's hospital patients, and collecting canned food during the holidays. I strengthened my relationships with VEYM youth by encouraging participation in these service projects, and by entrusting members with individual responsibilities based upon their interests, as well as on their leadership, communication, and collaboration skills. It was rewarding for me to see members develop their own passions for service work. In addition, I recently connected with the Philadelphia VEYM branch, and am becoming acquainted with its leaders and members. We have discussed ways in which I can use my experiences with service and leadership to help create and organize local events. We have begun a service project in which we will be encouraging youth to collect spare change for donation to a local children's charity.

k-Means Clustering of Sensitivities to 25 Common Aeroallergens Identifies Novel Patterns of Allergenicity in Philadelphia Inner-City Asthmatics

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Background: While reliable lab testing for sensitivity to common aeroallergens has been readily available since 1967, clinical interpretation of the results for a poly-sensitized patient remains elusive. This is an np-hard clustering problem, however heuristic approaches were developed to find locally optimized solutions.

Methods: We performed a retrospective chart review of Philadelphia inner-city allergic asthmatics who presented to the Drexel Pulmonary Outpatient clinics and constructed a database of each patient's allergic sensitization to 25 aeroallergens tested in the ImmunoCAP® assay (IRB ID# 1803006182). Exclusion criteria included > 10 pack/years of smoking, age < 18 years old, ABPA, and COPD. Clusters and cluster number were identified using the k-means clustering packages cluster, factoextra, and NbClust in R Statistical software.

Results: Eight clusters of allergic profiles were reproducibly identified. The first represents a low to non-sensitized cohort (n = 302). The second consists of patients with moderate sensitivity to a wide range of aeroallergens (n = 42). The next two represent two distinct cohorts of highly poly-allergic patients, one with primarily fungal sensitivities, the second with both fungal and pet dander sensitivities (n = 17 and 14, respectively). The next two clusters represent distinct patterns of extreme levels of poly-allergy (n = 3, and 3). The final two clusters are single individuals with extreme and unique patterns of poly-allergy. Comparisons between clusters show increasing sensitivity to aeroallergens was associated with decreased FEF_{25-75} and FEV_1/FVC as a percent of predicted, and increased serum IgE.

Conclusion: We provide the first clinical interpretations of poly-aeroallergy.

**Lauren Haack, Jose Collazo, Louis Fedele,
Haizea Alemany, Cameron Holmes
MS in Biomedical Studies (MBS)**

3D-Printed Pediatric Elbow-Powered Upper Limb Prosthetic

Drexel Dragon Claws

Haizea Alemany¹, Anthony Cappellino¹, Jose Collazo¹, Steven DiStefano¹, Louis Fedele¹, Lauren Haack¹, Kyungwon Han¹, Cameron Holmes¹, Han Ool Lim¹, Gabe Pertierra¹, Brittany Smith¹

Supervisors: Monika Jost, PhD¹ & Tina Ross, PhD¹

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As an independent chapter of e-NABLE, we are part of a global community of volunteers using 3D-printing to provide individuals with upper-limb amputations and/or reductions with cost-effective prosthetic devices. The goal of our project was to design an upper limb prosthetic for a socioeconomically disadvantaged pediatric client with a congenital left arm reduction. Our aim was to create a device that allowed our client to effortlessly and independently grip and release objects. We printed the Alfie v2.0 model, which was obtained from UnLimbited, another e-NABLE chapter. The circumference of the left bicep and the lengths of the unaffected right forearm, hand, and fingers were measured and used to customize the design of the .STL file for the Alfie v2.0. The device was then printed using 3D printing computer software, a desktop consumer 3D printer, and PLA plastic. After printing, we strung the 16 separate parts together with clear fishing line and molded the prosthetic to the client's arm to create the final functional device. Upon testing, the client successfully grasped and released objects. However, after prolonged use, our client reported discomfort and some pinching. We adjusted various aspects, such as the molding angles and amount of padding, in order to achieve the maximum comfort levels. The 3D-printed prosthetic provided our client with the ability to grasp objects and increased the dexterity of his left arm, giving him greater independence with handling medium-sized objects.

Alyssa Lage
MD – Master of Medical Science (MD-MMS)
Dual Degree Program

Effects of Isometric Handgrip Training on Peripheral and Central Blood Pressures and Aortic Pulse Wave Characteristics in African Americans

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About 46% of Americans over 19 years of age have hypertension. It is the leading risk factor for cardiovascular events. These risks are higher in African Americans. A 10 mmHg increase in systolic blood pressure (SBP) increases stroke risk by 24% in African Americans and 8% in Caucasians. Isometric hand grip (IHG) training reduces blood pressure, but has only been tested in predominately Caucasian subjects, not in African Americans. Our intervention was designed to study the effects of IHG exercise on blood pressure in African Americans. Based on previous observations in Caucasian subjects, we hypothesized that after one month (4 weeks, 5 days/week) of home-based IHG training, compliant subjects would have lower brachial and aortic systolic and diastolic blood pressure. Brachial and aortic blood pressure characteristics were measured at baseline, after one-month IHG training, and after one-month deconditioning. A total of 9 subjects participated, 5 of whom were compliant. Among compliant subjects, mean arterial pressure ($p=0.049$) decreased ($\Delta = -5.4 \pm 1.9$ mmHg) from baseline to post-IHG, with no difference between deconditioning and baseline values (83.4 vs 83.6 mmHg, respectively, $p = 0.994$). Diastolic blood pressure was, on average, lower ($\Delta = -5.4 \pm 2.2$ mmHg) from baseline to post-IHG; however, this difference did not reach statistical significance ($p = 0.094$). SBP showed no significant change ($p=0.083$) among baseline, post-IHG, and deconditioning measurements. When noncompliant subjects were included in analysis, no significant change in any blood pressure outcomes were observed. Our findings suggest that adherence to an at-home IHG training program may lead to reductions in arterial blood pressure among African Americans.

Bryan Pham
MD – Master of Medical Science (MD-MMS)
Dual Degree Program

Identification of Bioactive Compounds in *Monotropa uniflora*

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Monotropa uniflora, commonly known as Indian pipes, is a mycoheterotrophic plant with a wide geographic distribution throughout the United States (USDA and US Forest Service). *M. uniflora* has historically been used by Native American Tribes and continues to be used by alternative medical practitioners for the treatment of a wide-variety of neurological disorders including anxiety, depression, epilepsy, fever, and pain. Alternative medical practices continue despite lack of scientific research into the plant's bioactivity, efficacy and toxicology. The only effort to identify bioactive compounds dates back to 1889 when grayanotoxin/andromedotoxin was detected in plant isolates using limited methods from that period. Grayanotoxins are voltage-gated sodium channel agonists with significant toxicity found in rhododendron flowers and other members of the Ericaceae family. We therefore hypothesize that ingestion of the plant and its bioactive compounds affect neuronal excitability. *M. uniflora* specimens were collected locally and plant identification confirmed. Steam distillation isolates and ethanolic tinctures of plant material were prepared and tested in acutely isolated cerebellar slices and cultured cell lines expressing voltage-gated, TTX-sensitive SCN2A channels. The plant extracts were found to increase sodium conductance in all of the preparations tested. With bioactivity confirmed, analysis and comparison of the compounds in the samples against a library of known compounds will be reported using updated chromatography and spectroscopy methods.

Gal Daskal
MD – Master of Medical Science (MD-MMS)
Dual Degree Program

**The Effects of GABA Agonists on Traumatic Brain Injury-induced
Social Behavior Deficits in Adolescent Rats**

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About 475,000 children ages 0-14-years old in the United States sustain a traumatic brain injury (TBI) annually. The sequelae of TBI in children include neurological and neuropsychiatric problems such as substance abuse, cognitive deficits, sleep dysregulation, and social behaviors. Using postnatal day (PND) 11 rats (an age equivalent to a child below the age of 3), we have previously demonstrated that a closed head injury (CHI) resulted in spatial learning and social recognition deficits at 4 weeks after injury. Furthermore, preliminary data indicate that the inhibitory neurotransmitter Gamma aminobutyric acid (GABA) may underlie these behavioral deficits. The present study examined the effect of the GABA_B receptor agonist Baclofen (1.5mg/kg) and the GABA_A receptor agonist Muscimol (0.5mg/kg) on TBI-induced social recognition deficits and spatial learning/memory deficits at 6 weeks following CHI in a PND11 rat. Administration of a combination of baclofen and muscimol (N=5) appeared to reduce the injury-induced deficit in social recognition as compared to the vehicle injected group (N=6). In contrast, administration of the two GABA-R agonists worsened the injury-induced deficit in spatial learning. Together these data provide evidence of a differential role of the GABAergic system on TBI-induced behavioral deficits in the pediatric rat.

Malia Voytik
MD – Master of Medical Science (MD-MMS)
Dual Degree Program

**The Use of a Novel pH-sensitive Fluorescent Probe
for Intra-operative Tumor Detection**

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Introduction: While pre-operative imaging of solid tumors improves early detection and helps with surgical planning, surgeons largely rely on inspection and palpation to determine surgical margins intraoperatively. One strategy to address the challenges that physicians face during surgery and to overcome oncologic complexity is to target metabolic vulnerabilities that are ubiquitous in cancer. ONM-100, the novel fluorescence imaging agent in development, exploits the ubiquitous pH difference between tumor and normal tissue. The purpose of this study is to determine the utility of ONM-100 in detecting tumor and metastatic nodes when imaged intraoperatively and postoperatively with commercially available near-infrared (NIR) cameras.

Methods: Four solid tumor patients were enrolled: one primary breast cancer, one recurrent ovarian cancer, and two primary HNSCC. Patients received an IV infusion of ONM-100 6+3 hours before surgery. ONM-100 fluorescence from *in vivo* and excised tissues was imaged using intraoperative and post-operative NIR cameras. Diagnostic performance of ONM-100 was assessed by calculating the sensitivity and specificity of ONM-100 fluorescence overlap with histologically confirmed tumor post-operatively.

Results: All patients tolerated ONM-100 infusion with no adverse side effects. 100% of primary tumors and recurrent ovarian tumors showed fluorescence compared with surrounding tissues. ONM-100 positivity showed 100% sensitivity for pathologic nodes in axillary node dissection for breast cancer; however, for both HNSCC patients, non-pathologic nodes also fluoresced.

Conclusions: ONM-100 should be considered for intraoperative imaging in cancer patients undergoing routine surgical resection.

**LABORATORY
AND CLINICAL
RESEARCH POSTERS**

Reconstitution of Sarcomere Proteins on an Engineered Chitin Substrate

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Cardiomyopathies are a group of diseases that affects the ability of the heart to efficiently pump blood. Within this group of diseases, hypertrophic cardiomyopathies cause a thickening of the heart muscle and can lead to sudden death in adults and adolescents. Cardiomyopathies often go undiagnosed but are predicted to affect 1 in 500 people. Causes of hypertrophic cardiomyopathies include genetics, acquisition through lifestyle habits (drug abuse, alcoholism, and sedentary lifestyle), or a mixture of both. Current treatments include surgical implants, non-surgical ablation, and surgical myectomy, depending on the type and severity of the cardiomyopathy. There is no cure for cardiomyopathies, so the goal of treatment is to stop disease progression and prevent complete heart failure. To develop more effective treatment mechanisms, this study aims to reconstitute an *in vitro* model of cardiac muscle contraction. Our first aim is to reconstitute sarcomere-associated proteins. Then, we plan on testing their contractility by placing them on an engineered chitin substrate which has a piezoelectric property allowing us to measure the production of electricity during contraction. We were able to reconstitute multiple sarcomere-associated proteins such as troponin T, troponin I, tropomyosin, and myosin, confirming the feasibility of reconstituting these protein *in vitro*. Our next steps will be to reconstitute the remaining components of the sarcomere *in vitro*, assemble protein complexes *in vitro*, visualize protein colocalization, attempt to bind the complex to the chitin surface, and measure contractility of these sarcomere associated proteins when bound.

**So Many Doctors, So Little Time:
Impact of NICU Infant Medical Severity
and Family Resources on Parental Stress**

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Approximately 7-15% of infants spend time in a Neonatal Intensive Care Unit (NICU) annually. NICU infants who continue to experience health problems post-discharge are medically-complex, typically requiring more time and resources from their parents. These parents report greater stress than parents of non-NICU children, which can negatively impact child development. It is unknown how specific infant medical issues and family resources (i.e. basic needs, money, time) influence parental stress. To inform NICU family-based interventions, we examined how infant medical issues and family resources (i.e. money, basic needs, time for self, time for family) influence parental stress. Parents ($N = 199$) with children discharged from NICU 6 months – 3 years prior were recruited via Internet. Parents reported infant medical issues, stress (Parenting Stress Index, Short Form) and family resources (Family Resource Scale, Revised) through an online survey. Using multivariable hierarchical regression, we examined how infant medical severity and family resources are associated with parenting stress. Parents of infants with a diagnosed medical condition post-NICU ($\beta = .23$) and more medical specialists ($\beta = .18$) reported greater stress than parents of infants with no diagnosis post-NICU and fewer medical specialists, $F(3, 163) = 6.98, p < .0001$. Controlling for infant medical issues, less family resources was associated with greater stress, $F(7, 159) = 13.14, p < .0001$. Less parental time for themselves was the only predictor of stress ($\beta = -.59$). Findings suggest that interventions focused on increasing self-care among parents of medically-complex children may be important to alleviate NICU parental stress.

Co-assembly of Purified Mammalian Septin Octameric and Hexameric Complexes

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The septins are a family of filament-forming proteins found throughout eukaryotes. Mammalian septins have been implicated in fundamental cell biology, including cytokinesis, membrane trafficking, organization of microtubules and stabilization actin stress fibers. In addition, they have roles in numerous cancers, inherited diseases and pathogenic infection. These modified GTPases assemble into soluble complexes, generally thought to be hetero-hexamers and hetero-octamers. We describe here the first reported recombinant production and characterization of mammalian Septin hetero-octamers, the SEPT2/SEPT6/SEPT7/SEPT3 complex, through heterologous expression in bacteria. Intriguingly, these octamers must be assembled through co-expression, as purified hetero-hexamers and the remaining subunit fail to assemble into octamers *in vitro*. Moreover, we provide direct evidence for the organization of the octameric complex, with the SEPT2 subunit being found on the end of the octamer. Analysis by confocal microscopy revealed that SEPT2/SEPT6/SEPT7/SEPT3 complexes could polymerize into filaments. Additionally, we found that the SEPT2/SEPT6/SEPT7/SEPT3 hetero-octamer copolymerized with the SEPT2/SEPT6/SEPT7 hetero-hexamer. This implies that mammalian Septin polymers will adopt a continuum of compositions, as opposed to discrete compositions. The availability of this protocol and the ability of the hetero-octamer to copolymerize with hetero-hexamer opens the door for more complex studies on how these complexes form mixed filaments.

Adolescent Cannabis Use and Associations With Educational and Employment Outcomes: A Systematic Review

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Cannabis is the world's most widely-used illicit drug, with about 3.8 percent of the global population reporting use in their lifetime. Since 1998, annual recreational cannabis use has increased by approximately 30%. Previous research has found that cannabis use by adolescents correlates with deficits in cognitive functioning. Our goal is to examine current literature to create a systematic review of longitudinal studies investigating potential psychosocial and functional outcomes of adolescent cannabis use. One important question raised is whether adolescent cannabis use is associated with impacts on educational outcomes (grade point average, graduation rate, drop-out rate) or employment outcomes (educational level, job level, employment status and/or income). We hypothesize that adolescent cannabis use will have a negative impact on educational and employment outcomes. Literature searches were conducted using PubMed, Web of Science, EMBASE, and Google Scholar, and articles were screened using the computer program Covidence. Longitudinal, cohort, observational, and prospective studies were included. Article analysis is ongoing, using Cochrane Tool to Assess Risk of Bias. Internal, external, and construct validities are also going to be analyzed. Preliminary results suggest a negative association of cannabis use and educational and employment outcomes in adolescents. Once we confirm association, we will further determine causality.

Self-stigma of Help Seeking as a Predictor of Treatment Retention for HIV+ Individuals with Low Education Levels

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Introduction: 1.1 million Americans live with HIV/AIDS, with the largest prevalence in impoverished, low SES urban neighborhoods. Low SES is associated with low educational levels and low levels of mental health literacy. Mental health literacy focuses on understanding how to obtain and maintain positive mental health. One important aspect of mental health literacy is the self-stigma of help seeking (SSOHS), an individual's perception that seeking mental health treatment would cause feelings of inadequacy.

Methods: At the Partnership Comprehensive Care Practice (PCCP), HIV+ individuals who screened high for depressive symptoms on the Beck Depression Inventory-II were referred for psychotherapy. Prior to initiating therapy, each patient completed self-reports on their educational level and SSOHS. In addition, a tracking sheet is used to tabulate compliance with attending 6 required psychotherapy sessions.

Results: Of 115 patients, 5.1% dropped out after their intake session, 32.5% dropped out after sessions 1-5, and 62.4% completed all 6 psychotherapy sessions. 52.2% completed high school education or lower and 44.5% have a college degree or had some training after high school. A positive relationship was found between education level and SSOHS ($r = -.087$ $p = .355$). But there was no relationship found between education level and sessions attended. Contrary to the hypothesis, SSOHS did not predict treatment retention.

Conclusion: HIV + patients screened high for depression and having lower education levels, scored higher on the SSOHSS. However, scores on the SSOHSS cannot be used as a predictor of treatment retention.

Validating a Behavioral Measure in a New Animal Model of Neuropathic Pain

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A recent estimate has reported the annual incidence of spinal cord injury (SCI) is approximately 54 cases per one million in the United States. In addition to the major disability associated with SCI, 80% of SCI cases result in one or more types of neuropathic pain (NP), allodynia, hyperalgesia, and/or spontaneous pain in the absence of a peripheral input. The mechanisms behind the development of NP associated with SCI are unknown. An important element to finding a biological mechanism is developing a viable measurement of behavioral NP in animal models. We used the mouse model(s) of cervical SCI injury to study NP. Currently, for mouse cervical SCIs, there are two validated measurements of NP, Hargreaves and Von Frey. To expand the potential utility of a cervical SCI induced NP model we determined if the Grimace Scale (GS) would be a viable behavioral measurement. We hypothesized increased GS in mice who received cervical SCI versus those that did not. 14 C56/B16 mice (9 male and 5 female) were used. 8 mice (5 males and 3 female) received a contusion and the remaining received a laminectomy. To measure Grimace, we videotaped each mouse once a week for six weeks, took 10 images from each session, and used those images to obtain the GS. We found the contusion group had a higher GS score than the laminectomy, but no difference in the change of GS score over time between the two groups.

The miR-196b/TLR8 Signaling Axis in *DNMT3A*-mutant AML

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Acute myeloid leukemia (AML) is a heterogeneous group of hematologic malignancies characterized by the proliferation of myeloid progenitor cells. Prognosis and treatment recommendations vary depending on the chromosomal and molecular abnormalities identified at diagnosis. Targeted therapies specific to genetic mutations have been increasingly successful in the treatment of certain subtypes of AML. However, the overall five-year survival rate is only 28.6%. Mutations in the DNA methyltransferase *DNMT3A* convey intermediate to poor risk and occur in up to 36% of cytogenetically normal AML. Mutant *DNMT3A* is associated with global DNA hypomethylation that promotes aberrant self-renewal of hematopoietic progenitor cells. We have identified an association between *DNMT3A*-mutant AML and the overexpression of microRNA-196b (miR-196b) and confirmed miR-196b represses MAPK3 and IRAK4 signaling proteins activated downstream of TLR stimulation. Therefore, we hypothesized that activation of TLR7/8, by agonist R848, would diminish the survival of *DNMT3A*-mutant leukemic cells, and this response would be enhanced upon inhibition of miR-196b. While treatment with R848 had no effect on survival, R848 induced myeloid differentiation of mouse and human *DNMT3A*-mutant leukemic cells. Conversely, inhibition of miR-196b in human AML cells induced both myeloid differentiation and cell death. Next steps will determine if the combined treatment of R848 with miR-196b inhibition synergize to further drive differentiation and cell death. Overall, the results of this project thus far suggest a potential connection between microRNA regulation and TLR signaling and that these two pathways may be exploited to treat AML.

**Teen and Young Adult STIs in an Urban Clinic (TAYAS):
STI Incidence, Prevalence, Re-Infectivity Rates, Trends,
Pregnancy Rates and Contraception use**

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Young adults (ages 13-21) have a higher risk of contracting sexually transmitted infections (STIs) than other age groups. The increasing risk of STIs and teen pregnancy in the urban population solidifies the need for adolescent-specific reproductive health interventions. Thus, this cohort study aimed to retrospectively analyze rates, trends and factors associated with STIs in young adults in Philadelphia. These data will help to target prevention programs and increase access to reproductive health services for young adults in Philadelphia. We studied a cohort of 409 young adults who were treated in the Division of Adolescent Medicine at Saint Christopher's Hospital for Children in Philadelphia from 06/13/2006 to 06/13/2009, and relevant information was gathered in compliance with HIPAA regulations. Medical records were screened for inclusion by using an STI-positive log of patients. At the time of testing and treatment, the following demographics were collected: Ethnicity, Socioeconomic status, Pregnancy status and Contraception use at time of testing and treatment. Subjects served as their own internal control and were also compared to the general population using the most recent data available from the CDC. Young adults with STIs had increased re-infectivity rate, increased pregnancy rate and increased contraception use. Furthermore, when compared to the general population using the CDC data, young adults in Philadelphia did not appear to have a conclusively lower rate of STIs than the general population. These findings highlight the need for further retrospective cohort research to better adapt intervention strategies.

The Effects of Education on Weight Loss and Treatment Task

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Introduction: Obesity affects around 39% of US adults. When using behavioral treatment (BT) for patients with obesity, 30-50% of patients do not achieve clinically meaningful weight loss (>5%). We aim to assess the correlation between an individual's educational attainment and their weight loss while using BT. We also evaluated whether this relationship was independent of the association between education and socioeconomic status (SES).

Methods: 36 participants were enrolled in an obesity treatment trial that examined individual predictors of weight loss with 4 weeks of BT. Participants self-reported their highest year of school completed, and SES was reported as household income. Participant food diaries were collected to measure self-monitoring adherence. Pearson correlations and regressions were used to examine the relationship between education and percent weight loss at week 5, with or without controlling for SES.

Results: We obtained complete data for 29 participants. They had an average of 15.0 years of school (3 years of college), a mean weight loss of 1.5% at week 5, and they completed 78.1% of their food diaries. A positive correlation was found between education and weight loss ($r=.38$, $p=.024$), but not between education and self-monitoring ($r=.14$, $p=.417$). Of those who provided SES information, education and SES together accounted for 25.4% of the variance in weight loss ($p=.040$). However, neither education ($p=.097$) nor SES ($p=.101$) were independent predictors.

Conclusions: These findings suggest that BT should be tailored to help individuals with lower educational attainment execute treatment goals more effectively, which would lead to greater weight loss.

**The Creation of a Measure of
Maternal Postpartum Parental Self-efficacy**

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Parental self-efficacy (PSE) is a parent's belief about their capability to parent well. Parental self-efficacy is a significant positive predictor of both parent and child well-being. Current tools to measure this construct are considered to be lacking in several ways. Specifically, measures of maternal postpartum self-efficacy have under-utilized qualitative work, in this case, lack of maternal input. Many of the previous measures were not specific to self-efficacy and would mislabel the term, using interchangeable terms such as "self-confidence" and "self-esteem" instead. The purpose of this mixed-methods study is to create a new measure of maternal postpartum self-efficacy based on maternal input. The qualitative component involved interviewing postpartum mothers about the factors that inform their PSE. The quantitative component will include a chi-square analysis that will look at the frequency of different interview themes. Preliminary themes revealed thus far include accurate locus of control, adaptive attitude towards learning and adjustment, and support from other individuals in the mother's life. Themes gleaned from these interviews will be used to create a new measure of maternal postpartum self-efficacy. This new measure will be one of the first to generate items based on qualitative work with mothers.

**Relationship of Distal Social Determinants of Health to
Worsened Cardiovascular Health Outcomes in Black Males
in the Philadelphia Metropolitan Area**

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Wide health disparities in cardiovascular disease treatment exist between black and white males in the United States. However, the degree to which these disparities vary by city is unclear. The objective of this study is to evaluate the degree of cardiovascular disease health disparities between black and white males in Philadelphia compared to 18 large metropolitan areas (>3 million people). We obtained age-adjusted cardiovascular mortality rate data from CDC WONDER stratified by race. We also obtained cardiovascular disease prevalence data from the Behavioral Risk Factor Surveillance System and used direct standardization to adjust for age, income and education. Results show that cardiovascular mortality between cities in our study is more variable among blacks than whites. In terms of disparities, all cities showed higher mortality among blacks compared to whites, but the degree of this disparity was heterogeneous. Philadelphia had the 4th largest gap in the black-white mortality difference, with a mortality difference of 115.9 deaths per 100,000 people and a mortality rate ratio of 1.44. The results looking at cardiovascular disease prevalence are forthcoming. These results agree with other studies showing wide health disparities between blacks and whites and confirms that Philadelphia has wide health disparities. Future studies should broaden the conversation regarding city policies and how they can have an impact on health disparities and incorporate a wider set of distal societal determinants of health that contribute to racism/discrimination in policies, norms, and values.

UnityPhilly: A Smartphone Application for the Delivery of Naloxone & Preferred Opioid of Non-medical Opioid Users

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Background: UnityPhilly is a novel smartphone application to help combat the Philadelphia opioid crisis by facilitating delivery of naloxone in overdose emergencies. Using the app, participants send an alert to other users during a suspected opioid overdose, who choose whether or not to respond with a dose of naloxone. The app simultaneously notifies emergency services. This study will test the practicality of UnityPhilly and determine the preferred opioid of study participants.

Methods: 111 participants owning a smartphone were recruited from Kensington (Philadelphia) October 2018 - January 2020. 52 participants are community members with proximity to the opioid crisis but not active opioid users. 59 participants are non-medical opioid users (NMOU). All participants received the UnityPhilly application, naloxone, and overdose response training, and were administered a comprehensive baseline quantitative survey examining preferred opioids, buying habits, and use method.

Results: UnityPhilly signaled 84 overdoses March-December 2019. Participants responded to 33 cases (39%) and delivered 52 doses of naloxone. Fifty-two UnityPhilly participants arrived on location during these events (mean 2.1 responders/event). Among NMOUs, 49% preferred fentanyl alone, 33% preferred heroin alone, and 18% preferred mixed opioids. 91% of NMOUs intentionally purchased fentanyl < 30 days before study enrollment. 61% of NMOUs used fentanyl concurrently with non-opioid substances (e.g. stimulants and synthetic marijuana).

Conclusion: The majority of NMOUs prefer fentanyl, actively seek it, and use simultaneously with other substances. Such information may help curb the opioid crisis, providing otherwise unavailable insight into the illicit opioid market. Further analysis is required to evaluate response behavior.

Assessing the Additive Values of Three-Dimensional Printing in Surgical Planning of Congenital Heart Disease

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Background: Three-dimensional (3D) printing technology has become an indispensable tool to complement the traditional medical imaging modalities in congenital heart disease (CHD), which often presents unique anatomical variations. Comprehension of the complex 3D spatial relationships of the intracardiac structures is often difficult using two-dimensional images. Because 3D printed models are tangible and can be manipulated, they optimize the viewing plane and assist visualizing the complete 3D anatomical features. These benefits have the potential to improve surgical planning and ultimately improve patient outcomes.

Objective: Minimal literature has assessed the utility of 3D printing in the surgical planning of double-outlet right ventricle repair (DORV). Moreover, the precise additional information gained from consulting 3D models, which could contribute to the procedural planning of DORV repair, has not been identified nor assessed. The aim of this research is to identify this potential new information obtained from implementing 3D prints in DORV repair planning.

Method: We acquired cardiac magnetic resonance (CMR) images of 3 patients with DORV from the HVSMR 2016 Segmentation Challenge. We manually segmented these images to construct 3D digital models. Then, we 3D printed these models with a plane cut to optimize the viewing of the intracardiac pathologies. A total of five surgeons, cardiologists, and radiologists were recruited for a 5-point Likert scale survey. Survey questions were constructed based on structural defects in DORV and DORV repair procedures.

Results: Data collection is on-going.

Conclusion: We predict that there is an additive value obtained from consulting 3D printed models during surgical planning.

Preventing T1DM Pathogenesis, a Few TIPE(s)

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Type 1 diabetes mellitus (T1DM) results from immune mediated destruction of pancreatic beta-cells. Multiple factors, including Tumor necrosis factor- α (TNF- α), are involved in the development of T1DM. Previously, we found that novel lipid transfer proteins, Tumor necrosis factor- α -induced protein 8-like (TIPE/TNFAIP8) family regulates immunity and is induced by the inflammatory cytokine TNF- α . Therefore, we hypothesize that TIPE family proteins are involved in the pathogenesis of T1DM. To test this, we knocked out TIPE family genes in mice, and tested the hypothesis using the Streptozotocin (STZ)-induced diabetic mouse model. Mice were injected intraperitoneally with STZ (60-80 mg/kg) daily for 5 days. Diabetes incidence was then monitored every other day via the urine glucose strips. Interestingly, we found that TIPE^{-/-}, TIPE2^{-/-}, and the TIPE^{-/-} TIPE2^{-/-} double KO (DKO) mice showed resistance to diabetes compared to the wild-type (WT) control group. To further discern the exact mechanisms of TIPEs function in the pathogenesis of diabetes, mice were sacrificed on day 14 and 18, and samples of the pancreas were harvested to assess insulinitis and beta cell apoptosis. Serum was also taken to compare the levels of inflammatory cytokines and immunoglobulins with those of wild type mice. The preliminary results showed that KO mice retain large pancreatic islets and produce relatively high levels of immunoglobulin. Data collection and analysis is on-going. Once obtained, these results could provide insight into the molecular mechanisms of T1DM with the hope of developing an effective prevention or treatment.

**Prefrontal Top-down Control of Anxiety
via the Paraventricular Thalamus**

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Anxiety disorders represent the most prevalent mental health disorders in the US and are one of the most highly comorbid disorders affecting nearly 20% of the population. Investigators interested in the top-down control of behavior have identified the prefrontal cortex (PFC) as an essential locus controlling emotion in humans and animal models. Anxiety is thought to arise from dysfunction in a set of highly interconnected loops, of which the prefrontal cortex is a key node. Recent research shows that the PFC to paraventricular thalamus (PFC-PVT) pathway is linked to arousing and stressful stimuli in rodents, however, whether this pathway is essential for controlling anxiety behaviors remains unclear. In this study, we used Designer Receptor Exclusively Activated by Designer Drugs (DREADDs) to determine whether inhibition of PFC-PVT neurons inhibits the expression of innate anxiety in a mouse model organism. Assessment of emotional states after injection of inhibitory and excitatory virus into the PFC, shows that application of clozapine-N-oxide (CNO) virus to inhibitory hM4D-expressing mPFC-PVT neurons decreased anxiety-like behavior in approach-avoidance conflicts, specifically in the elevated plus maze and social interaction assays. Additionally, DREADD mediated activation of this pathway induced social withdrawal. These results suggest that the mPFC-PVT pathway exerts bidirectional control over anxiety-related behaviors in mice, and that this circuit may be a potential therapeutic target for anxiety-related disorders.

How Does Autism Spectrum Disorder (ASD) Severity and Expressive Language Level in Toddlers Relate to Joint Engagement?

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Background: Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by atypical social communication skills (e.g. difficulty understanding others' feelings or maintaining eye contact) and the presence of restricted and repetitive behaviors (RRBs). Language delays are also common. Joint engagement (JE) is the triadic interaction between a child, adult, and shared object that exposes children to new words during play. RRBs and difficulty understanding others limit children with ASD's JE with adults and delay language learning.

Purpose: To see how children's JE during an interaction with a trained examiner relates to ASD severity and expressive language level (ELL).

Methods: Sessions of the Brief Observation of Social Communication Change (BOSCC), a structured play protocol, between examiners and 59 16-35-month-old children of various ASD severity were rated with the Joint Engagement Rating Inventory (JERI) on 15 different JE items. The Autism Diagnostic Observation Schedule, 2nd Ed. (ADOS-2) Social Affect score measured severity. The Mullen Scales of Early Learning (MSEL) Developmental Quotient measured ELL.

Results: Autism severity and ELL were correlated ($r=-.442$), so we analyzed severity's relationship with JERI ratings. ANOVA, performed using dichotomized (high/low) ADOS scores, indicated that the lower the ASD severity, the higher the overall JE, Quality of Behavior (QB), and Fluency and Connectedness (FC) ratings observed ($ps \leq .048$, $\eta^2 \geq .111$).

Discussion: ASD severity and ELL relate to the difficulty that children with ASD have with socially engaging with examiners during playtime. By alleviating these difficulties, current ASD early intervention strategies simultaneously reduce ASD severity and improve ELL.

Assessment of Psychological Distress in Mild Traumatic Brain Injury

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Head injuries frequently cause Emergency Department visits with over 2.8 million cases of traumatic brain injury (TBI) per year in the United States. The high prevalence of TBIs results from several mechanisms including falls, assaults, and motor vehicle collisions. Consequences involve loss of consciousness, severe headaches, and emotional suffering. Mild TBI cases represent the majority of brain injuries; however, they may be underreported by 50% due to diagnostic limitations. Current methods of diagnosing TBIs are costly, time-consuming, and often inconclusive. For example, CT scans can only identify moderate-to-severe TBI, impose a financial burden on patients, and involve radiation exposure. However, patient surveys may provide a low-risk tool for diagnosing mild TBI by assessing emotional wellbeing. In this study, we hypothesize that questionnaires will aid in the identification of mild TBI. We plan to enroll 100 patients ≥ 18 years old who presented to the Emergency Department at Temple University Hospital with a Glasgow Coma Scale (GCS) score of ≥ 13 due to a head injury. Patients received surveys asking them to assess their emotional state immediately after the event, and 30 days prior. Subsequent questionnaires on Days 3 and 7 evaluated the persistence of their distress. Responses were compared to GCS score, ED treatment, and previous medical history. Our data analysis is currently ongoing, but we anticipate that patient responses will demonstrate an association between emotional distress and mild TBI. If our hypothesis is correct, mental anguish would serve as an indicator for mild TBI.

Alcohol Drinking Reduces the Number of Myelinated Axons in the Prefrontal Cortex in Male Adolescent Rats

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Alcohol binge drinking impairs myelin-associated proteins in the medial prefrontal cortex (mPFC) and is associated with changes in the integrity of the prefrontal white matter. Myelination provides rapid and efficient conductance in axons. Abnormalities and changes in myelination impair information processing and cognitive performance as mPFC is involved in executive functions, emotional and cognitive behavior. While our previous research indicates that voluntary binge drinking reduces myelin fiber density and myelin-related proteins in the mPFC of male adolescent rats, the changes that occur at the ultrastructural level have not been studied. In the present study, we used electron microscopy to quantify the number of axons, myelin sheath thickness using the g-ratio, and myelin abnormalities in the adolescent male and female mPFC in a rat model following two weeks of operant self-administration of sweetened alcohol or sweetened water (postnatal days 28-42). One day after drinking ended, brains were glutaraldehyde-fixed and further processed for ultrastructural analysis of myelin. Our preliminary results show that voluntary binge drinking seems to increase the g-ratio, and percentages of uncompacted and degenerating myelin in male and female rats; however, alcohol appears to have more robust effects in male rats. Additionally, alcohol decreases the number of myelinated axons in male and female rats, and this effect is more pronounced in males. These results suggest vulnerability of the myelinated mPFC axons to the adverse effects of alcohol exposure, which may underlie impaired cognitive performance associated with early alcohol use in humans.

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Biomechanical Assay of a Custom-Made Silicone Toe Padding for Hammertoe Deformity

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Introduction: Diabetic foot complications are a common problem caused by peripheral neuropathy. Peripheral neuropathy is loss of sensation; this can exacerbate a patients' condition by inducing pathologies such as hammertoe(s). Hammertoe(s) reorient the plantar contact areas by shifting mobility at the metatarsal-phalangeal joint and detrimentally altering the distribution of plantar pressure. Surgery traditionally treats this condition; however, a noninvasive procedure using silicone toe padding may be just as effective at reconstructing the plantar pressure.

Objective: To quantify the biomechanical effect a custom-made silicone pad has in relieving immediate plantar pressure at the tip of the toe and at the metatarsophalangeal joint.

Method: We recruited 14 subjects (3 subjects with diabetes) with rigid hammer-toe from the Foot and Ankle Institute of TUSPM. Temple University's IRB approved this protocol and all participants provided informed consent. Doctors of Podiatric Medicine (DPMs) made the custom silicone pad for all subjects. Data was collected using EMED X Plantar system to measure the plantar pressure as participants walk barefoot with and without the silicone toe pad. Subjects served as their own internal controls by walking barefoot without the silicone toe pad.

Results & Conclusion: Preliminary findings indicate the silicone toe padding decreased the plantar pressure at the tip of the affected toe. These findings suggest that custom toe padding may be a practical non-surgical treatment option for subjects with rigid hammertoes.

Factors that Influence Patient Decision About Lung Cancer Screening

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Introduction: Patient-centered care can be promoted via interactive decision support interventions (DSIs) to facilitate shared decision making (SDM), which is the process of helping patients learn about health care options and make informed choices among available options.

Methods: The Decision Counseling Program[®] (DCP) is an online DSI used in SDM. A trained decision counselor uses DCP to help patients review educational materials about their options, identify values (decision factors) related to the options, and clarify patient preferences. This study aims to categorize and tabulate decision factors identified by patients who were guided through the DCP to clarify their preference whether to have lung cancer screening.

Results: For 530 patients, the frequency distribution of decision factors that favored screening (N=751) was as follows: worries and concerns (20%), perceived susceptibility (23%), salience and coherence (11%), social support and influence (30%), response efficacy (13%), and other (1%). The distribution of decision factors that favored not screening (N=133) was as follows: worries and concerns (70%), perceived susceptibility (7%), salience and coherence (9%), social support and influence (8%), response efficacy (0.7%), and other (5%).

Conclusion: Distribution of patient decision factors favored lung cancer screening as opposed to not screening. Leading factor influencing screening was social support and influence. Social interaction within their social network influenced favoring to screen. Not screening was influenced by factors of worries and concerns. Factors consisting of emotional fear and worries influenced favoring not to screen.

**Eosinophilic Esophagitis-associated Risk Variant in
Distal Promoter of Thymic Stromal Lymphopoietin
Modulates Target Gene Expression**

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Eosinophilic esophagitis (EoE) is a chronic, inflammatory, food allergy-mediated disease of the esophagus that affects children and adults. Typical symptoms of EoE involve failure to thrive and vomiting in small children, and dysphagia and food impaction in adolescents and adults. While environmental and dietary effects on EoE are well studied, little is known about genetic contributions. Recent genome-wide association studies have identified risk loci associated with EoE, but mechanistic insights are limited, as it remains unclear how non-coding variants contribute to disease pathogenesis. One single nucleotide polymorphism (SNP), rs3806932, maps to a linkage disequilibrium (LD) block on chromosome 5q22 containing eleven other SNPs. This block spans the promoter of thymic stromal lymphopoietin (*TSLP*). The role of *TSLP* in atopy diseases is described as an epithelial-derived, proinflammatory cytokine that induces a Type 2 T-helper response. This study attempts to identify functional SNPs within the LD block, as well as to interrogate the cis-acting effects on *TSLP* gene expression using molecular biology techniques in primary esophageal biopsies and cell lines. Current EoE therapy revolves around empirical dietary elimination or long term use of topical corticosteroids, both of which are accompanied by a significant endoscopic burden to the patient and healthcare system. Future directions are to provide a rationale for the use of immune modulators in EoE and to clinically transform the results so providers can offer personalized treatment.

**Community Service,
Volunteering and
Independent Research Posters**

Volunteering at Magee Rehabilitation Hospital's Day Room

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Magee Rehabilitation Hospital treats patients suffering from various neurological injuries through speech, occupational, and physical therapy. Their mission is to create a compassionate environment to facilitate engagement and to motivate patients during their entire stay. As volunteers, our goal is to extend this mission to the Day Room by engaging with patients through arts and crafts, puzzles, board games, and personal conversations. By doing so, we predict that patients continue improving skills they learn in therapy, thereby increasing their rate of recovery. At times, it was challenging to encourage patients who were unmotivated to be involved in activities. However, creating an activity board with scheduled events so patients can come in ready if interested, has helped increase participation in the Day Room. As a result, more patients practice their fine motor skills and open communication is increased overall. Without volunteers in the dayroom, many of the activities would not be possible. By bringing enthusiastic and optimistic attitudes, we hope to build relationships and lift patients' spirits. Throughout our experience, we have learned that rehabilitation is more than working on physical health. We witness patients becoming happier, feeling more confident, and even gaining back motor functions that they have lost due to stroke or traumatic brain injuries. Our service at Magee has taught both of us to always practice patience, humility, and empathy as we become future physicians, because every patient's journey to recovery is different.

Reading to Learn with Philly Reading Coaches

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Background: Philly Reading Coaches (PRC) is part of Philadelphia's Citywide Out of School Time (OST) initiative to lessen the achievement gap in kindergarten through third grade students from low income families. PRC is funded through a three-year grant from the William Penn Foundation and the City of Philadelphia, which allows each student to receive 25 books of their choice over the course of the school year. PRC was designed after the Start Making a Reader Today (SMART) program, which used reading enjoyment and motivation as the focus point.

Methods: PRC requires all coaches to undergo training and obtain security clearances from the FBI and state of Philadelphia police department. As a volunteer, I spend at least one hour per week reading one-on-one with kindergarten to third grade students, helping them build decoding, fluency, and comprehension reading skills. At the end of the session I record the reading activities and progress made.

Results: As the volunteer-student relationship strengthens, students can see volunteers as friends. Therefore, I found myself having to employ new strategies to keep students engaged in reading, but I also observed students' newfound confidence and the resulting improved classroom performance. My personal goal as a volunteer is for each student to develop an appreciation for reading. Therefore, instead of 'learning to read' they begin 'reading to learn' at lower grade levels and ultimately become more efficient learners.

The Medical Potential of Psychedelic Drugs: Psilocybin-Assisted Therapy for Treatment of Depression

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Depression is a debilitating medical illness that negatively affects feelings, thoughts, and actions. It is the result of a complex interplay between brain chemistry, genetics, personality and environmental factors. It is hypothesized that the diminished activity of serotonin pathways plays a role in the pathophysiology of depression. Current treatment options include antidepressant medications such as selective serotonin reuptake inhibitors (SSRIs), psychotherapy and in more severe cases electroconvulsive therapy (ECT). Two thirds of patients with unipolar depression do not show clinical improvement after two or more trials of antidepressants. Recently, the FDA expedited the use of psilocybin for treatment-resistant depression (TRD) by designating this compound a breakthrough therapy despite its previous schedule 1 drug status. Psilocybin mimics serotonin to stimulate the 5-HT_{2A} serotonin receptors through an unknown mechanism. To determine if psilocybin is an effective medication, I developed objective criteria to evaluate the validity of studies on the effects of psilocybin in patients with TRD. I searched for literature published in the last five years using PubMed, DynaMed and Google Scholar. I analyzed construct, external and internal validity of each study and graded them on a four-point scale. Most studies lacked internal validity by not having a healthy control group or placebo; construct and external validity analysis is ongoing. The studies suggest long lasting decrease of depressive symptoms after psilocybin-assisted psychotherapy. The study with the highest validity score found a dose-dependent treatment response that altered communication pathways in the brain; however, more studies with higher validity are required.

**Molecular Mechanisms in Alzheimer's Disease:
The Role of the Wnt Signaling Pathway**

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Background: Alzheimer's Disease (AD) is a progressive neurodegenerative disease, characterized by amyloid-beta (A β) plaques, tau hyperphosphorylation, and neurofibrillary tangles (NFT's). Patients present with reduced synaptic plasticity and impaired memory function and cognition. Therapies directed at specific signaling pathways are needed, and multiple potential targets are under investigation. For example, Wnt pathway protein expression is suppressed in a mouse model of AD, and pathway activation stimulates glucose metabolism and improves cognition. Therefore, this review will examine the validity of the current literature investigating relevance of the Wnt signaling pathway in AD pathogenesis.

Methods: Relevant literature (2010-2019) was retrieved using NCBI PubMed and Web of Science. Study validity was evaluated using an objective five-point rating scale to score appropriateness of experimental design, laboratory techniques and statistical analyses.

Results/Conclusions: Preliminary literature review revealed that agonist stimulation of the Wnt pathway in vitro and in vivo increases glucose metabolism and glycolytic rate by decreasing GSK3 β activity. In addition, glucose recovery via Wnt signaling improves cognitive performance in a murine model of AD. Furthermore, TGF- β 1 rescues suppressed Wnt pathway activity and restores the synaptic plasticity necessary for memory function. Preliminary evaluation of study designs revealed high scores for experimental design, laboratory techniques and statistical analyses. Therefore, collectively, these results suggest a unique neuroprotective effect of increased Wnt signaling on AD, which could be used for future therapeutic design.

**Graduate Students Guiding the Youth of Spring Garden School
Through Educational Enrichment Promoting Achievement
and Learning through Science (PALS)**

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Students in the public-school system of North Philadelphia face significant barriers to education, such as high student-to-teacher ratios and under-funded programs, which can cause loss in motivation for academic achievement. The Promoting Achievements and Learning through Science (PALS) organization is a service project founded by Drexel Graduate students in 2009 with the mission to promote the academic growth and development of elementary and middle school aged children of Spring Garden School in Philadelphia. The organization originally extended to 7th and 8th graders and focused on tutoring math and science coursework. Throughout the years, PALS has expanded to tutor students in grades K-8 in all subjects. Large class sizes often necessitate providing students with extra, personalized tutoring. PALS addresses this need by working with students in a one-on-one setting. Volunteers are paired with a class by the PALS coordinator. The volunteer will then communicate with the teacher to coordinate the most efficient hours for volunteering. While helping with academics, volunteers also mentor students and serve as positive role models by directly exposing students to high-achieving Graduate students. As volunteers of this organization, we are dedicated to the growth of each student and continue to hone valuable skills such as patience and empathy. Volunteering has opened our eyes to the realities of the Philadelphian education system and has reminded us of the need for civic engagement in our community.

A Literature Review of Potential Environmental Determinants Related to Juvenile Idiopathic Arthritis (JIA) Risk Development

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Juvenile Idiopathic arthritis (JIA) is a rheumatic medical condition with an unknown etiological origin. JIA is characterized by persistent joint swelling for a period exceeding 6 weeks, before reaching 16 years of age. Though ample data suggest both genetic and environmental contributions to JIA disease manifestation and progression, the evidence for those specific environmental determinants is not substantial. This literature review will investigate the potential environmental factors contributing to increased JIA manifestation and progression through examining internal, external and construct validities of potential environmental determinants and their connection to JIA onset and progression.

Current literature review of various studies shows a variety of different environmental factors contributing to JIA manifestation. These environmental determinants include circulating Vitamin D levels, smoke exposure and maternal workplace toxin exposure (toxin exposure specifically during intrauterine life). Some studies reveal an inverse relationship between exposure to UVR and JIA development. This study will assess the internal validity in regards to selection of controls to ensure that the conclusions were supported by data findings. This study will assess the external validity to determine whether findings are generalizable to a larger population; and the construct validity to determine whether the methodology was appropriate for conducting data analysis. Future directions will examine specific categories of JIA (e.g., systemic JIA vs. psoriatic arthritis, etc.).

Food Is Medicine: Volunteering at MANNA

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²Metropolitan Area Neighborhood Nutrition Alliance

In 1990, MANNA - the Metropolitan Area Neighborhood Nutrition Alliance - was born to provide nutritional aid to members of the Philadelphia community during the growing AIDS epidemic. Since then, MANNA has grown into an expansive non-profit organization that provides meals and nutritional counseling to people suffering from over 85 different serious and/or chronic illnesses regardless of age, income, insurance, or ailment. MANNA brings together a dedicated staff of dietitians, chefs, and volunteers to plan, prepare, and deliver meals to clients spanning the Greater Philadelphia and Southern New Jersey areas. MANNA's focus on "food as medicine" is a bottom-up approach to improve client health through nutrient-packed, individualized prepared meals. At MANNA, we become part of the clients' journey of improving health and are educated on the daily needs of patients with chronic illness. MANNA empowers us to take an active role in the health of our community in a safe and streamlined manner that ensures our efforts reach those in need. While we began volunteering at MANNA as an opportunity to step into care-giver role in a non-clinical setting, we continue to go back each week because we found a family of fellow volunteers who inspire and encourage us to continue providing for those that cannot provide for themselves. MANNA has taught us that although our contributions may seem small, each shift is working to provide a better life for the patients we serve and to improve the overall health of the community in which we live.

**HIV/ AIDS Education & Prevention Within
Underserved Philadelphian Communities**

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²Bebashi- Transition to Hope

Bebashi Transition to Hope was founded as the first African-American organization in the United States to address the AIDS crisis through sexual health education, STD screening, and outreach programs targeting at-risk minorities. Bebash holds the title as Philadelphia's largest non-profit organization devoted to HIV/AIDS education for minority populations. Additionally, Bebash is the second largest food pantry in Philadelphia serving the financially disadvantaged. The mission of Bebash is to provide services for sexual health, breast health and hunger relief. A plethora of underserved communities throughout the greater Philadelphia area lack health-care resources. As preventative care volunteers, we maintain Bebash's mission by tabling events for outreach, assisting the clinical division with STD screenings/BP checks, and helping the mobile unit with client documentation. Furthermore, we provide emotional encouragement through case management support group sessions tailored to follow the wellness adjustments of HIV/AIDS clients. In the past year, Bebash provided HIV case management services to 925 HIV positive individuals, where 80% of their HIV+ clients were virally suppressed as compared to the national average of 58%. Additionally, last year over 1700 women were provided with breast health services. The experience of directly working with underserved populations, specifically HIV+ patients, has been an insightful and rewarding one. It provides us with the knowledge to better educate and diagnose future clients. Moreover, it emphasizes the importance of social and emotional competencies rather than just physical aspects of an individual. Bebash continues to support the Metropolitan area to enrich the quality of health.

The Impact of Early Service Education on Students in the Medical Field

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Background: Physicians with limited service experiences often report more challenges with patient connection and with understanding patient needs. Pre-medical postbaccalaureate programs offer a way of improving this patient-provider relationship by incorporating service education and service engagement opportunities early in their curriculum. While post-baccalaureate students often participate in service opportunities, it is uncertain whether service education alone directly inspires students to engage in subsequent service opportunities. Furthermore, the degree of student involvement in these service opportunities is unknown.

Objective: This study investigates whether including service education early in a post-baccalaureate curriculum directly inspires students to engage in future service opportunities and measures the degree of student involvement in these service activities.

Methods: Two methods of evaluation were used in this study. The first involved a search of two databases for literature on premedical post-baccalaureate program with a service component published within the last 10 years and evaluation of the service component's effect on the students. The second involved a qualitative evaluation of the effects of service education on current students of the Drexel Pathway to Medical School (DPMS) Postbaccalaureate Program and analysis of the degree of the students' involvement in subsequent service opportunities.

Results: Preliminary findings suggest an increase in student interest in ongoing service engagement following early service education as well as a deepened appreciation and connection to the community.

Conclusions: As the study continues, I plan to address whether early service education directly inspires students to engage in future service opportunities and to assess the degree of student involvement.

A Community-based Approach to Fighting HIV/AIDS

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²Philly AIDS Thrift @ Giovanni's Room (Philadelphia, PA)

Background: Giovanni's Room is the oldest LGBTQ+ and feminist bookstore in America. Now run by Philly AIDS Thrift (PAT), this 501c3 organization has distributed over \$2.5 million dollars from donated goods and book sales to local HIV service organizations. It also provides a safe space for the LGBTQ+ community and was once the primary source of public health information for newly diagnosed HIV patients.

Methods: Volunteers keep the store running smoothly by processing donations, tending registers, restocking and organizing merchandise, and selling donated and new books and other goods.

Results: Since September 2019, this volunteer experience allowed me to engage with the local LGBTQ+ community. As a volunteer, I initially greet customers and help provide a welcoming, supportive environment. I've recommended queer authors to customers who are learning to navigate their new identities and made recommendations to those looking for LGBTQ+ friendly health providers. I've met countless people, both customers and volunteers, who have shown me how essential listening, open-mindedness and patience are. This has been a transformative experience that has highlighted the barriers the local LGBTQ+ community face.

Conclusion: PAT @ Giovanni's Room is critical in ensuring the continued visibility of the LGBTQ+ community locally. Volunteers alleviate the overhead allowing the organization to increase their support for HIV service organizations. I am interested in exploring a formal partnership between Giovanni's Room and Drexel to ensure continued volunteer support. I am also interested in becoming trained in rapid HIV testing so I can also volunteer at their testing center.

**Promoting Wellness, Equality, Resource Accessibility
and Anti-Stigma through Action Wellness**

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Action Wellness, originally ActionAIDS, was founded by a group of volunteers in 1986 to provide social services and healthcare connections to people living with AIDS in Philadelphia. The premise of this movement was the notion that “No one should face AIDS alone.” Since then, the agency has expanded to include over 400 community volunteers and over 100 professional staff to promote its current mission of serving clientele living with various chronic illnesses, including HIV. Action Wellness provides medical case management, primary medical care, prevention education, and supportive housing to nearly 4,000 clients and their families. A majority of clients served by the agency are of low socioeconomic status and/or suffering from health and social issues such as addiction crisis and traumatic events. Volunteer programs complement the efforts of professional staff, allowing Action Wellness to continue its mission. These programs include the Buddy Program, which allows volunteers to act as agency liaisons for individual clients, fundraising efforts such as Dining Out for Life and Glamsino, and community outreach initiatives such as Immediate Seating. Through volunteer efforts and comprehensive services provided by staff, the afflictions and stigma associated with chronic illness can be lessened, and perhaps one day erased, through the community-based helping hand that Action Wellness provides for vulnerable individuals living with health and social issues in Philadelphia. While contributing toward the agency as volunteers, we have learned that chronic illness affects a wide variety of individuals and that providing services through empathy and compassion can help lessen disease burden.

Comparing the Effectiveness of Active and Passive Music Therapy on the Stress and Pain Management of Patients With Cancer

Background: As oncology has advanced, healthcare providers have begun incorporating music therapy into cancer treatment plans. Music therapy benefits cancer patients psychologically through management of stress, and physiologically through management of pain and physical symptoms. The two main forms of musical therapy are active therapy (creating music) and passive therapy (listening to music). Although the benefits of active and passive music therapy to cancer patients are evident, the benefits of one versus the other remain unclear. Therefore, this literature review investigates the effectiveness of active versus passive music therapy on the psychological and physiological well-being of cancer patients.

Methods: Primary articles (2014-2020) retrieved using Google scholar and PubMed evaluated the psychological and physiological effects of active and passive music therapy on patients with malignant tumors.

Internal validity (test subject randomization, use of experimental controls, and indication of internal conflicts of interest), external validity (sample size, sample diversity, and data statistical significance), and construct validity (comparison of both active and passive music therapy efficacy on both psychological and physiological symptoms) were scored from zero (absent) to four (excellent).

Results: Five of ten articles have been reviewed. Though currently inconclusive, preliminary results suggest that although both active and passive musical therapy relieve the psychological and physiological symptoms of patients with head, neck, and breast cancer, there is no indication that one form is more beneficial than the other. Further research directly comparing the psychological and physiological benefits of active versus passive musical therapy are required.”

A Bench Should Not Be a Bed: Providing Hope to Philadelphia's Homeless Population with Bethesda Project (Philadelphia, PA)

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Bethesda Project began in 1979 when Reverend Dominic Rossi and members of his prayer group provided shelter to a group of homeless women in Center City, Philadelphia. 37 years later, Bethesda Project remains committed to providing emergency shelter, permanent housing, and supportive services to homeless men and women to help them regain dignity and self-worth. Bethesda Project embraces the core values of social work: Service, Social Justice, Dignity and Worth of the Person, Importance of Human Relationships, Integrity, and Competence. I volunteer at Bethesda North Broad, a permanent independent living facility for 49 men and women suffering from mental illness and/or addiction who have experienced chronic homelessness. The closure of Hahnemann Hospital has significantly restricted many of the resident's access to healthcare, highlighting one of many societal inequalities that underserved communities must contend with. To best serve the need of our residents, my roles are constantly changing. I provide companionship to residents, assist with administrative work, and assemble "welcome packages" for new residents. I serve home-cooked meals to residents and decorate the house on special occasions, coordinate recreational activities, and dust the rooms of any resident needing help to promote healthier lifestyles/prevent illness. My ability to listen and react without judgment has proven to be highly effective in developing trusting relationships with residents, especially those who are affected by the hospital closure. My experiences at Bethesda have demonstrated that an individual will not always remember what you say to them, but they will always remember how you made them feel.

Additional Service Organizations and Student Volunteers

Organization	Student Volunteers	Program
Abramson Center for Jewish Life	Richie Madnick	MBS
Action Wellness	Shweta Gupta Vanessa Smith John Thomas	MBS IHS IHS
Baring House Crisis Nursery	Seherzada Softic	MBS
Bebashi	Evan Benza Jordene Downer Sherelle Green Rehana Persaud	MBS MBS MBS IHS
Bethesda House	Esin Bulut Evelyn Cruzatte Shayna Zanker	IHS IHS IHS
Children's Hospital of Philadelphia	Francis Mburu Abay Tadesse	MBS IHS
Drexel Dragon Claws	Haizea Alemany Jose Collazo Louis Fedele Lauren Haack Cameron Holmes	MBS MBS MBS MBS MBS
Eliza Shirley House	Attia Ahmad Eunice Aworanti Shelana Baptiste Kaitlyn Lutz Myar Taha Joe Zwillenberg	MBS MBS MBS IHS MBS MBS
Hepatitis B Initiative of Washington DC	Kayla Addai	MBS
Magee Rehabilitation Hospital	Vlad Derun Jade Doolittle Dana Fiola Mathu Karthikeyan Janae Martin Kristen Moody Breanna Rivera Julianne Salamanca	MBS MBS MBS MBS MBS MBS IHS IHS

Additional Service Organizations and Student Volunteers

Organization	Student Volunteers	Program
MANNA	Monika Adusumilli Alyssa Nguyen Meghan Schilken Kearny Tse Tatyana Young	MBS MBS MBS MBS MBS
PALS	Husein Bakare-Korodo Binta Ceesay Lesley Desriviere Xavier French Rahul Hadap Brianna Hector Brionna Hough Bazilla Imran Adelle Laniyan Yanisel Luna Brandon Mamou Owen McLeod Shahista Mollah Jonathan Pasato Lorena Pena Neil Pillai Jehron Pura-Bryant	IHS IHS IHS IHS IHS IHS IHS IHS IHS IHS IHS IHS IHS IHS IHS IHS IHS
Philly Aids Thrift @ Giovanni's Room	Gabriela Sarriera	IHS
Philly Reading Coaches	Julia Barruga Xavier French Elle McNeiece Kinit Patel	IHS IHS IHS IHS
Planned Parenthood	Tippie Sopho	IHS
Prevention Point Philadelphia	Morgann Adams Donte Bennett Sanya Bhambhani Kelly Bisceglia Robert Liu Steven Sims Heather Slattery	IHS IHS IHS IHS IHS IHS IHS

Additional Service Organizations and Student Volunteers

Organization	Student Volunteers	Program
Puentes Hacia El Futuro	Melanie Veizaga Zurita	MBS
Ronald McDonald House	Rebeca Teves	MBS
Special Olympics of Pennsylvania-Philadelphia	Elia Bregman	MBS
Sunday Breakfast Rescue Mission	Molly Ruiz	IHS
U.S. Dream Academy	Alon Goldblum	MBS
VietLead	Tracy Du	MBS
Vietnamese Eucharistic Youth Movement	Megan Nguyen	IHS
Youth Services Inc.	Caroline Quindlen	MBS

Charles B. Cairns, MD
Walter H. and Leonore Annenberg Dean;
Senior Vice President of Medical Affairs



Charles B. Cairns, MD, FACEP, FAHA, is the Walter H. and Leonore Annenberg Dean, and senior vice president of medical affairs at Drexel University College of Medicine. A leader in emergency medicine and critical care research, Dr. Cairns comes to Drexel from the College of Medicine and Health Sciences at the United Arab Emirates University (UAEU) in Al Ain, Abu Dhabi, where he served as dean.

In addition to the UAEU, Dr. Cairns brings significant experience in leadership roles at several other medical schools. He was dean of the University of Arizona (UA) College of Medicine – Tucson after serving as assistant vice president for clinical research and clinical trials, vice dean of the College of Medicine, and professor in the Department of Emergency Medicine. During his tenure at UA, the College of Medicine experienced a record number of applications and yielded one of the most diverse classes in its history. He oversaw a wave of faculty recruitments, a 31 percent increase in research expenditures, and under his leadership the medical school climbed to 51 from 66 in the NIH ranking. Dr. Cairns also led a \$1.2 billion partnership with Banner Health, which created one of the largest nonprofit health systems in the country.

Dr. Cairns was the principal investigator of the National Collaborative for Bio-Preparedness, funded by the U.S. Department of Homeland Security. He also served as the director of the U.S. Critical Illness and Injury Trials Group, funded by the National Institutes of Health and the U.S. Department of Health and Human Services.

Prior to joining the University of Arizona, Dr. Cairns was a professor and chair of the Department of Emergency Medicine at the University of North Carolina at Chapel Hill. Before that, Dr. Cairns served as associate chief of emergency medicine at Duke University Medical Center and director of emergency medicine research at the Duke Clinical Research Institute.

Dr. Cairns has received numerous awards, including the Emergency Medicine Foundation Established Investigator Award, the American College of Emergency Physicians Outstanding Contribution in Research Award and the 2014 John Marx Leadership Award, the highest award of the Society for Academic Emergency Medicine. He has published more than 200 articles, commentaries and reviews in a number of journals including the *New England Journal of Medicine* and *Science Translational Medicine*. He has served on the editorial boards of *Annals of Emergency Medicine*, *Academic Emergency Medicine* and *Critical Care Medicine*.

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In the spirit of the community service aspect of Explore & Serve Day, The Graduate Student Association has organized a collection of travel size hygiene products, linens, and non-perishable food items. These items will be donated to Prevention Point, a nonprofit organization dedicated to providing harm reduction services to Philadelphia and the surrounding area by promoting health, empowerment, and safety for communities affected by drug use and poverty.



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