Discovery Day 2020

ANNUAL DAY OF RESEARCH

Thursday, October 8, 2020

Virtual Poster & Platform Presentations

DREXEL UNIVERSITY
College of
Medicine

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

Schedule of Events

TIME	EVENT
	Welcome by Deans Van Bockstaele and Cairns (*YouTube*)
9: 00 – 10: 15 a. m.	Poster Session 1 [1] (*iPosterSessions*)
10: 15 – 10: 45 a. m.	Break; breakout rooms for mingling and conversation** (*Zoom*)
10: 45 a. m. – 12: 00 p. m.	Poster Session 2 [1] (*iPosterSessions*)
12: 00 – 12: 30 p. m.	Break; breakout rooms for mingling and conversation** (*Zoom*)
12: 30 – 1: 30 p. m.	Lunch on your own
1: 30 – 2: 30 p. m.	Platform Presentations Session 1 [2] *Zoom* • **Anthony DiNatale / Pharmacology and Physiology** *AR regulates IL-1ß expression in prostate cancer cells* • **Kiran Madugula / Microbiology and Immunology** *MEF-2A/C dysregulation mediated ATLL induction/maintenance via interactions with HBZ at the 3'LTR* • **Avantika Ahiya / Microbiology and Immunology** *Accessible Cholesterol in the Erythrocyte Plasma Membrane is Essential for P. falciparum Invasion and Growth* • **Emily Black / Neurobiology and Anatomy** *Hypocretin receptor 1 knockdown in select populations of ventral tegmental area neurons: A potential therapeutic target for cocaine use disorder*
2: 30 – 3: 00 p. m.	Break
3: 00 – 4: 00 p. m.	Platform Presentations Session 2 [2] *Zoom* • **Hemalatha Muralidharan / Neurobiology and Anatomy** *KIFC1 steers the trajectory of neuronal migration* • **Sara Blazejewski / Neurobiology and Anatomy** *Rpsa signaling regulates cortical neuronal morphogenesis via its ligand, PEDF, and plasma membrane interaction partner, Itga6* • **Michelle Swift / Biochemistry and Molecular Biology** *DNA repair pathway choice is regulated by recruitment of 53BP1 through cell cycle-dependent regulation of Sp1* • **Lorela Ciraku / Biochemistry and Molecular Biology** *OGT/CDK5/ACSS2 axis regulates breast cancer brain metastatic growth*

1. Links to presenters' individual live sessions are available on the posters on iPosterSessions
2. The Discovery Day 2020 landing page includes links to the Hallway Conversations, Info Booth and Platform Presesntations on Zoom

DREXEL UNIVERSITY College of Medicine

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

About Discovery Day

Discovery Day is Drexel University College of Medicine's annual research day.

This year's event features over 260 presentations on biomedical science and clinical research topics from doctoral, postdoctoral, master's, medical and undergraduate students across the University.

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Platform Presentations

Name/Program	Mentor	Co-Authors	Abstract
Anthony C. DiNatale / Pharmacology and Physiology	Alessandro Fatatis, MD/ PhD	Asurayya Worrede, Melisa Diaz, Ramanpreet Kaur, Alessandro Fatatis	**AR regulates IL-1ß expression in prostate cancer cells:** The universal understanding that prostate cancer progression is dependent on the Androgen Receptor (AR) has driven the development of therapeutics interfering with the activity of this receptor. Despite moderate success, a majority of patients being treated with androgen deprivation therapy (ADT) progress to metastatic castration resistant prostate cancer (mCRPC), which is invariably fatal. . Recently, we have demonstrated that skeletal metastases in prostate cancer patients are heterogeneous in their AR status, with a significant percentage of cells lacking the AR. We have additionally shown that AR negative prostate cancer cells express Interleukin-1beta (IL-1ß), while AR positive cells lack this cytokine. Since we have pre-clinical evidence that IL-1ß promotes metastatic progression, understanding the mechanistic underpinning of the inverse correlation between AR and IL-1ß expression is of outmost importance. We found that inhibition of AR activity by androgen-deprivation or by administering Enzalutamide, a potent AR antagonist, results in a time- and dose-dependent increase in IL-1ß transcription. These findings were validated in vivo by intra-tibial grafting of cancer cells in animals treated with either Enzalutamide or surgically castrated. Here we provide the first evidence that the AR epigenetically regulates IL-1ß expression by binding to its promoter and repressing transcription via HDAC4 recruitment. These results provide mechanistic understanding for the expression of IL-1ß by prostate cancer cells either lacking AR or with this receptor targeted by ADT and will help defining novel and more effective therapeutic strategies for mCRPC.
Kiran Madugula / Microbiology and Immunology	Pooja Jain, PhD	Nicholas Polakowski4, Isabelle Lemasson4, Hilda Ye, Pooja Jain, Sydney Wilson, Vanessa Teixeira, Rashida Ginwala, Julie Joseph, Zafar Khan, Catherine Demarino, Fatah Kashanchi, Amanda Cushing	**MEF-2A/C dysregulation mediated ATLL induction/maintenance via interactions with HBZ at the 3'LTR:** HTLV-1 is a complex human retrovirus, an etiologic agent in causing malignant and intractable T-cell neoplasia. About 5% of infected population would progress to a more aggressive form of non-Hodgkin's lymphoma, termed as Adult T-cell leukemia/Lymphoma (ATLL). MEF-2 (Myocyte enhancer factor-2) are a family of genes, whose isoforms 2A-D are involved in distinct functions in various tissues and whose mutations are implicated in various cancers. We performed novel cyto-analytical techniques to quantitate gene transcripts and protein expression patterns of various ATLL cell-lines and acute ATLL patient cohort of North American ATLL, and established MEF-2A and MEF-2C as the predominant isoforms that were highly over expressed in ATLL patients. Knock-down and chemical inhibition of MEF-2A & 2C resulted in the decrease of the viral copy number and down-regulation of the transactivation viral protein TAX and anti-sense transcribing HTLV-b-zip protein (HBZ), which are important for viral pathogenesis. We also observed protein interactions of MEF-2A and MEF-2C with HBZ, along with transcriptional activators which control the pathogenesis of the virus. We further used chromatin immuno-precipitation assay to establish the role of MEF-2 isoforms, we observed enrichment of activator and repressor complexes that form the transcriptional machinery at 5' and 3' LTR promoter regions. In summary this study exemplifies the role of MEF-2 in the induction and maintenance of ATLL modulating the transcriptional activation via various factors at the viral LTRs.
Avantika Ahiya / Microbiology and Immunology	Akhil Vaidya, PhD	Suyash Bhatnagar, Joanne Morrisey, Josh Beck	**Accessible Cholesterol in the Erythrocyte Plasma Membrane is Essential for P. falciparum Invasion and Growth:** We have recently shown that a wide range of antimalarials targeting two different transmembrane proteins (PfATP4 and PfNCR1) cause rapid disruption of cholesterol homeostasis in P. falciparum. Neither the parasite nor its host RBC is capable of cholesterol synthesis, and thus proper dispensation of this important lipid requires redistribution of cholesterol that was endowed to the RBC at the time of its maturation. Here we report that depletion of accessible cholesterol from the RBC plasma membrane by methyl-ß-cyclodextrin (MBCD) has dramatic consequences, resulting in an inability of the parasite to invade RBC as well as in inhibition of the parasite growth. These defects were complemented by reconstitution with cholesterol or epicholesterol but not with desmosterol. These results suggest an important role for the aliphatic portion of the sterol, but not the polar group, in parasite invasion and growth. Using live time-lapse videography of fluorescently tagged trophozoite stage parasites, we detected rapid expulsion of the parasite when exposed to MBCD for just 30 min. The propelled trophozoites were still surrounded by parasitophorous vacuolar membrane (PVM) while remaining tethered to intact RBCs. Electron microscopy revealed the PVM to be compromised in the extruded parasites. Remarkably, prior 2 h treatment with PfATP4 or PfNCR1 inhibitors prevented the extrusion of trophozoites when exposed to MBCD. Overall, these findings suggest a dynamic movement of accessible cholesterol within P. falciparum-infected RBC that is critical for parasite survival. It would be fruitful to explore molecular players participating in this hitherto unknown aspect of parasite physiology.

Platform Presentations

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Emily M. Black / Neurobiology and Anatomy	Rodrigo España, PhD	Bethan O'Connor, Jessica Barson, Caroline Bass, Rodrigo España	**Hypocretin receptor 1 knockdown in select populations of ventral tegmental area neurons: A potential therapeutic target for cocaine use disorder:** Cocaine use disorder is a deadly and debilitating chronic disease. Although opiate use disorder has recently taken center stage due to major increases in opioid-related deaths, cocaine-related deaths have also been on the rise. Moreover, unlike for opiates, there are currently no approved pharmacotherapies for cocaine use disorder. One potentially valuable therapeutic target is the hypothalamic, hypocretin peptide system, which impacts neural processes that support cocaine use via actions on hypocretin receptor 1 in the ventral tegmental area. However, hypocretin-based studies have traditionally used non-specific approaches for hypocretin receptor 1 manipulation, posing a significant hurdle to understanding their therapeutic potential, as hypocretin receptor 1 are on both dopamine and GABA neurons. Thus, to date it is unclear whether the therapeutically-relevant effects of disrupting hypocretin receptor 1 are mediated through actions on dopamine or GABA neurons. To address this issue we developed a combinatorial viral approach to selectively knockdown hypocretin receptor 1 on either dopamine or GABA neurons and tested the effects of these manipulations on cocaine-related changes in nucleus accumbens dopamine and self-administration behavior. Data demonstrate that knockdown of hypocretin receptor 1 on dopamine neurons decreases the effects of cocaine on dopamine in the nucleus accumbens while enhancing these effects in GABA neurons. Further, data suggest that dopamine-specific knockdown of hypocretin receptor 1 reduces motivation to self-administer cocaine. These findings provide a more comprehensive understanding of hypocretin modulation of dopaminergic and behavioral responses to cocaine and serve to uncover specific targets for development of pharmacotherapies for cocaine use disorder.
Hemalatha Muralidharan / Neurobiology and Anatomy	Peter Baas, PhD	Shrobona Guha, Kiran Madugula, Ankita Patil, Sarah Bennison, Xiaohuan Sun, Kazuhito Toyooka, Peter Baas	**KIFC1 steers the trajectory of neuronal migration:** Formation of the mammalian cortex involves radial migration of newly born neurons from the ventricular zone to form the layers of the brain. Microtubules attached to the centrosome are pulled upon (to advance the soma toward the leading process) by cytoplasmic dynein, which also moves the nucleus along microtubules emanating from the centrosome back into the soma. The tightly-regulated sliding of centrosome-unattached microtubules modulates the trajectory of neuronal migration, much like a cattle-prod keeps a herd of cattle on a linear trajectory to their destination. As for the nucleus, such an enormous structure cannot simply be walked along the microtubules like a smaller organelle, but must rotate fluidly in the direction of migration (so that it does not bleb or tear). Here we investigated potential roles in neuronal migration of KIFC1, a minus-end-directed kinesin that is able to alternately slide and crosslink microtubules and also interact with membrane proteins. Our studies were conducted on cultured rodent neurons and in vivo rodents, using live imaging techniques, depletion of KIFC1 by RNAi, drugs that inhibit KIFC1, and expression of KIFC1 with mutations to various functional domains. Our studies indicate that KIFC1 regulates the sliding and crosslinking of centrosome-unattached microtubules and enables the nucleus to rotate fluidly in the direction of neuronal migration. In both these ways (regulated by signaling cascades that we are now studying), KIFC1 ensures the proper trajectory of the migrating neuron. These findings are relevant to developmental disorders such as autism that are hallmarked by improper neuronal migration.
Sara M Blazejewski / Neurobiology and Anatomy	Kazuhito Toyooka, PhD	Sarah Bennison, Ngoc Ha, Xiaonan Liu, Trevor Smith, Kimberly Dougherty	**Rpsa signaling regulates cortical neuronal morphogenesis via its ligand, PEDF, and plasma membrane interaction partner, Itga6:** All stages of neuromorphogenesis must occur with fidelity, as deficits in neuronal morphology are implicated in the etiology of neurodevelopmental disorders. We identified a function for Rpsa in regulating neuromorphogenesis using in utero electroporation to knockdown (KD) Rpsa, which results in apical dendrite misorientation at P3 and fewer/shorter extensions with decreased arborization and decreased spine density with altered spine morphology at P15. To delineate the signaling mechanism, we investigated Rpsa's interacting partner on the plasma membrane, Itga6, and its ligand, PEDF. Serpinf1, the gene for the PEDF protein, is encoded in the Miller-Dieker Syndrome critical region that is frequently deleted or duplicated in a variety of neurodevelopmental disorders, making the relationship between PEDF and its receptor Rpsa in the developing cortex clinically relevant. Itga6 and PEDF KD via in utero electroporation revealed phenotypes similar to Rpsa KD, with Rpsa and Itga6 overexpression rescuing defects in PEDF deficient neurons in vivo. Taken together, this suggests that PEDF initiates Rpsa signaling to regulate neuronal morphogenesis. Itga6 overexpression also increases and stabilizes Rpsa expression on the plasma membrane by preventing ubiquitination of Rpsa. Interestingly, Itga6 KD did not cause dendritic spine deficits, but Rpsa and PEDF KD caused decreased spine density and a shift towards immature spine morphology. Since spine morphology relates to function, GCaMP6s was used to analyze the effects of Rpsa KD via ex vivo calcium imaging. Rpsa deficient neurons showed less fluctuation in fluorescence intensity, suggesting defective sub-threshold spontaneous calcium signaling. We identified a role for PEDF-Rpsa-Itga6 signaling in regulating functionally relevant aspects of neuromorphogenesis. Further analysis of these molecules may yield insights into potential therapeutic candidates for neurodevelopmental disorders like Miller-Dieker syndrome.

Platform Presentations

Name/Program	Mentor	Co-Authors	Abstract
Michelle Swift / Biochemistry and Molecular Biology	Jane Clifford, PhD	Jane Azizkhan-Clifford	**DNA repair pathway choice is regulated by recruitment of 53BP1 through cell cycle-dependent regulation of Sp1:** DNA double-strand breaks (DSBs) are life-threatening lesions that must be repaired to preserve chromosomal integrity. These lesions are repaired by two primary pathways: homologous recombination (HR) and non-homologous end-joining (NHEJ). The factors that mediate pathway choice are critical to maintain genomic integrity. While many of these factors, epigenetic changes and cell cycle stages are known, with HR predominating in S and G2, the underlying mechanisms that determine pathway choice are not well understood. Previously, we found that the transcription factor Sp1 is rapidly recruited to DSBs and is necessary for repair. Here, we demonstrate that Sp1 integrates repair pathway choice with cell cycle by promoting NHEJ in G1. Sp1 localizes to DSBs in G1 to recruit the NHEJ repair factors 53BP1 and Ku70. Sp1 is phosphorylated by Cyclin A/cdk2 upon entry into S phase, evicting both Sp1 and 53BP1 from the break site, thereby permitting BRCA1 binding and HR. Mutation of this phosphorylation site (Sp1-S59A) results in persistence of Sp1 and 53BP1 at DSBs in S phase cells, precluding BRCA1 binding and HR. HR proteins are commonly mutated in cancers, resulting in cellular "addiction" to alternative repair pathways. Exploiting this addiction is the basis of synthetic lethality and is applicable to the treatment of many types of malignancies. Similar to BRCA1 deficiency, expression of Sp1-S59A also increases cell sensitivity to PARP inhibition in BRCA1+/+ cells because of the inability to recruit BRCA1. Alternatively, synthetic lethality in BRCA1-/- cells requires 53BP1, whereas loss of 53BP1 confers PARPi resistance in a BRCA1 deficient cell. Consistent with this, depletion of Sp1 also results in PARPi resistance in BRCA1-/- cells. Interestingly, Sp1 is underexpressed in many tumors and is associated with poor prognosis. These data corroborate our finding that Sp1 is required for NHEJ and provide preliminary evidence that Sp1 may be a biomarker for PARPi sensitivity.
Lorela Ciraku / Biochemistry and Molecular Biology	Mauricio Reginato, PhD	Emily Esquea, Rebecca Moeller, Joshua Jackson, Mauricio Reginato	**OGT/CDK5/ACSS2 axis regulates breast cancer brain metastatic growth:** Onset of brain metastases (BMs) in breast cancer patients is considered an end-stage event, with no effective drug treatment and a median survival after diagnosis measured in months. Thus, there is an urgent need to develop novel treatment strategies for these patients. Metastatic breast cancer cells colonizing the brain encounter adverse 'nutritional environment', as the levels of key metabolic fuels such as glucose are much lower, in part because they are avidly consumed by neurons. To overcome this challenge, brain-metastatic cancer cells rely on acetate as a fuel source and convert it into acetyl-CoA via upregulation of acetyl-CoA synthetase 2 (ACSS2) enzyme. Our lab has previously shown that brain tumors increase the nutrient sensing post-translational modification O-GlcNAcylation and O-GlcNAc transferase (OGT) levels to regulate acetate metabolism into acetyl-CoA via increased phosphorylation of ACSS2 on Ser-267 in a cyclin dependent kinase 5 (CDK5)-dependent manner, thereby increasing the ACSS2 stability and increasing brain tumor growth. Here, we show that human breast cancer cells selected to metastasize to the brain contain increased levels of O-GlcNAc, OGT and ACSS2-Ser267 phosphorylation compared to parental cells and show that human breast cancer brain metastatic patient samples contain elevated ACSS2-Ser-267 levels. Moreover, we show that overexpression of OGT or ACSS2-S267D phospho-mimetic mutant confer a growth advantage on breast cancer cells in the brain using an in vivo intracranial xenograft model. Additionally, we show that pharmacologically targeting CDK5 and ACSS2 with small molecule inhibitors reduces tumor growth in a novel orthotopic ex vivo brain slice model. These results suggest a crucial role for OGT/CDK5/ACSS2 signaling in transducing nutritional state to regulate acetate metabolism in breast cancer BM cells and identify CDK5 and ACSS2 as novel therapeutic targets for treatment of breast cancer brain metastasis.

Poster Presentations

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
1	Richa Pande / Microbiology and Immunology	Seena Ajit, PhD	Ayush Parikh, Sujay Ramanathan, Botros Shenoda	**hsa-miR-605 mediated downregulation of pro-inflammatory chemokine CXCL5 in CRPS patients:** Complex regional pain syndrome (CRPS) is a chronic pain condition characterized by inflammation and nerve dysfunction. Circulating miRNAs are beneficial prognostic and diagnostic biomarkers. miRNAs can negatively regulate gene expression by binding to the 3'untranslated region (3'UTR) of target mRNA. In addition to patient stratification, miRNAs or their target mRNAs can also serve as therapeutic targets. Subanesthetic doses of ketamine is used to treat patients with refractory CRPS. Our previous studies investigating circulating miRNAs in blood from CRPS patients found a 22-fold downregulation of hsa-miR-605 in poor responders relative to responders, prior to ketamine treatment. We sought to investigate the functional significance of miR-605 downregulation. Using bioinformatics prediction, we identified miR-605 can target CXCL5. A proinflammatory cytokine, CXCL5 plays a role in neutrophil recruitment and activation. We hypothesized that downregulation of miR-605 in poor responders could contribute to an increase in CXCL5 expression and thereby inflammation in patients. We confirmed the binding of miR-605 to the CXCL5 3'UTR using luciferase reporter assay. Overexpressing miR-605 decreased endogenous levels of CXCL5 mRNA and protein in human primary endothelial cells. Conversely, downregulation of miR-605 significantly upregulated CXCL5 mRNA expression. We then sought to study the effect of CXCL5 on migration of immune cells using transmigration assay. Inhibition of miR-605 increased CXCL5 secretion and migration of the human monocytic cells, thereby demonstrating the functional impact of miR-605 on chemotaxis. We also confirmed the upregulation of CXCL5 mRNA in whole blood from poor responders. Future studies will assess migration changes in immune cells from CRPS patients. Investigating target mRNAs of differentially expressed miRNAs can provide important insights on aberrant gene expression that contributes to disease pathology.
2	Caya McFalls / Microbiology and Immunology	Carol Artlett, PhD		**IL-11 expression in Systemic Sclerosis pulmonary fibroblasts is mediated by caspase-1:** Interleukin-11 (IL-11) has been shown to be associated with idiopathic pulmonary fibrosis, cardiac and kidney fibrosis. Scleroderma (SSc) is a fatal fibrotic disease of the vasculature, skin, and internal organs. Patients die of scarring and dysfunction of organs due to uncontrolled deposition of collagen and other extracellular matrix proteins. Our laboratory has been studying the signaling cascade mediated by caspase-1 in fibrosis. Caspase-1 activates downstream profibrotic cytokines including IL-1b, IL-18, and IL-33. We hypothesize IL-11 may be linked to the fibrotic process in SSc through activation of caspase-1. Pulmonary fibroblasts derived from SSc patients display a statistical trend for higher basal expression of IL-11 compared to normal fibroblasts (p=0. 07) with a significantly increased expression of the IL-11 receptor, IL-11Ra1 (p=0. 0002). When caspase-1 activity is inhibited with Z-YVAD-FMK in SSc fibroblasts, IL-11 expression is reduced (p<0. 0001), whereas receptor expression is not altered. We further show that blockade of the IL-1 receptor with IL-1RA significantly reduces IL-11 (p=0. 03), but not IL-11Ra1 expression. Bleomycin, an inflammasome activator, induces IL-11 expression in normal lung fibroblasts, and this response can be blocked with either Z-YVAD-FMK (p=0. 008) or IL-1RA (p=0. 02). Our studies have demonstrated that IL-11 expression in SSc is dependent on inflammasome activation of caspase-1.
3	Saher Kazi / Psychiatry	Heather Basehore, PhD	Aidan Flynn, Gabriella Navarro	**Exploring the links between Opioid, Alcohol, and Stimulant Use Severity and Post-Traumatic Stress Disorder Symptoms in a US Veteran Population:** While it has been established that PTSD has a high rate of co-occurrence with various substance use disorders (SUDs) in Veteran populations, it is necessary to better understand the specifics of these relationships. Extant literature has focused on the presence or absence of certain SUDs and their impact on the four symptom clusters of PTSD (intrusion, avoidance, negative cognition, and hyperarousal). This study aims to gauge the relationship between the severity of alcohol, stimulant, and opioid use disorders in a US Veteran population and each of the four PTSD symptom clusters. A multiple regression model was used. The independent variables included symptom scores from the stimulant and opioid screenings in the Structural Clinical Interview for DSM-5 (SCID) and a self-reported alcohol use measure (AUDIT). Dependent variables were each of the PTSD cluster scores from the PTSD checklist for DSM-5 (PCL-5). These screenings were conducted as part of a larger study at the Veterans Affairs Medical Center (VAMC) in Coatesville, PA investigating the links between traumatic brain injury and substance use in a cohort of 100+ veterans. A significant positive correlation was found between alcohol use severity and hyperarousal, intrusion, and negative cognition cluster scores. These results suggest that among the SUDs commonly found with PTSD, alcohol use severity may have the greatest impact on PTSD symptomology. Additional studies are required in this area to account for the limitations of this study and to further clarify these relationships.

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4	Caroline Tipton / Medical College	Meghan Berkenstock, MD	Caroline Tipton, Grace Reilly, Paulina Liberman, Meghan Berkenstock	**Attitudes Towards Parental Leave and Breastfeeding During Ophthalmology Residency:** Background- The Accreditation Council for Graduate Medical Education (ACGME) mandates residency programs have parental leave policies, but a lack of standardized requirements leads to inconsistencies between programs. Purpose- We assess resident and program director (PD) attitudes toward parental leave and examine the range of policies on parental leave and breastfeeding within ophthalmology residency programs. Methods- Two surveys assessing perceptions toward parental leave and breastfeeding were created for ophthalmology residents and PDs. Surveys were co-sponsored and distributed by the Association of University Professors of Ophthalmology (AUPO). Results- The most reported effects on training were missed surgical training and impact on research. Nearly 60% of residents reported receiving negative feedback surrounding the leave. The majority of residents felt PDs and co-residents were supportive (53. 8%, 48. 1%, respectively), but leave negatively affected co-residents (46. 2%). PDs reporting more negative impacts on surgical training for female residents (p=0. 035). Twenty-five PDs reported written parental leave policies in place at their institution. All PDs were supportive of breastfeeding, but only half reported a breastfeeding policy. Conclusion- National discussion on standardizing parental leave policies across ophthalmology residency programs is warranted. Residents should be provided a written plan addressing call responsibilities, meeting milestones in alignment with peers, and breastfeeding on return to clinic.
5	Anne Glenney / Medicine	Ross Budziszewski, MS	Rochelle Thompson, Susan McInerney, Heather Lavella, Ross Budziszewski, Loreen Meyer	**Implementation of a hospital wide abusive head trauma prevention program:** Background: Abusive head trauma and shaken baby syndrome is a brain injury resulting from violent shaking of a child's intracranial contents or skull. National studies indicate that SBS/AHT cause roughly 4,000 confirmed cases annually, however, many cases go undetected. SBS/AHT can lead to lifelong ailments. Pediatric trauma is a significant issue in North Philadelphia and families who often need educational interventions are unable to receive training. Nursing staff may serve as educators for families who are admitted to the hospital and may not have access to prevention resources. The present study aimed to evaluate an SBS/AHT prevention program on nursing knowledge. Methods: Nurses from six departments (N =156) were included in the present sample. The intervention was designed to improve nurses' knowledge using a three-part approach: (1) pre-test knowledge assessment, (2) SBS/AHT education through training modules, and (3) post-test knowledge assessment. Mean differences were calculated from pre-post utilizing independent t-tests. Results: Results indicated that nurses' knowledge increased significantly after they received the training: t(301) = -5. 12, p < . 001, d = 0. 37. Nurses who had previous SBS/AHT training had significantly higher scores at baseline: t(155) = 2. 71, p = . 008, d = 0. 50. Conclusion: Results demonstrated that the program improved nurse knowledge of SBS/AHT and that the training has a positive long-term impact. This study provides initial evidence that this training can improve nurse knowledge in order to educate caregivers while they are at the hospital with their child in order to decrease the likelihood of SBS/AHT.
6	Thomas Lucido / Trauma Services	Ross Budziszewski, MS	Ross Budziszewski, Rochelle Thompson, Janelle Walker, Loreen Meyer, L. Grier Arthur, Harsh Grewal	**Measuring the Effectiveness of a Car Seat Program in an Urban, Level One Pediatric Trauma Center:** Background: Motor vehicle collisions (MVCs) are a significant safety issue in the United States. Young children are disproportionally impacted by car accidents and suffer high rates of injuries and mortality. When used properly, car seats have been found to reduce the severity of injuries. However, individuals from low-income areas often do not have access to education or car seats compared to those in suburban or higher income areas. Therefore, the goal of the present study was to measure the effectiveness of a car seat program in an urban, Level I Pediatric Trauma Center on caregiver car seat knowledge. Methods. Caregivers (N = 200) attended a single, one-hour car seat educational program with a Child Passenger Safety Technician (CPST). The sessions included educational and hands-on components, where caregivers were asked to complete a seven-item pre-post knowledge assessment. For completion of the course, caregivers received a car seat for their child. Results. A paired t-test revealed that the workshop significantly increased caregiver knowledge from pre-post: t (199) = -12. 56, p < . 001; d = 1. 27. McNemar's Chi-Square analyses displayed that caregivers increased in all knowledge categories (p < . 001). Conclusions. While caregivers in urban areas or in low-income areas may have less access to resources, hospital-led car seat courses can increase knowledge of proper car seat usage in these communities. These findings should be used to establish programs in hospitals in areas where these resources are not readily available to caregivers.
7	Zachary Nawrocki / Biochemistry and Molecular Biology	Jane Cavender, PhD		**The Effect of SV40 T-antigen and Sam68 on SRSF1 isoform Expression in Virally Transformed Human Diploid Fibroblasts:** Cancer commonly results from the accumulation of mutations within a cell or dysfunction due to viral protein expression. To study the mechanisms by which tumor viruses may induce this alternative splicing, a study was designed utilizing Human Diploid Fibroblasts (HDF) immortalized with telomerase and transformed with the Simian Virus 40 (SV40) T-antigen oncoprotein. To determine if alternative splicing plays a role in T-ag-transformation this project investigated the SAM68 splicing of the protein SRSF1. SRSF1 is involved in the splicing, nuclear export and translation of mRNA. SRSF1 contains two functional domains: an arginine-serine rich regulatory region and two RNA-recognition-motifs, for binding with RNA and other splicing factors. There are four known SRSF1 isoforms created by alternative splicing. SRSF1 with the inclusion of intron 4, has been correlated with cell transition from an epithelial-to-mesenchymal state (EMT) leading to a more aggressive and invasive tumor. It has been shown that Sam68 induces the inclusion of intron4 in SRSF1 transcripts. Our data shows that T-antigen expression induces higher levels of SAM68 in HDF cells. This study aims to determine if this increase in SAM68 alters SRSF1 isoforms to potentiate to EMT. RT-PCR data shows that all SRSF1 isoforms SRSF1(wt), SRSF1(in4), SRSF1606 and SRSF1747 are present in all cell line; however, the expression of T-antigen is correlated with higher SAM68 and the tumor isoform SRSF1(in4). Experiments are ongoing to determine if downstream targets of SRSF1 are altered.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
8	Jessica White / Public Health	Esther Chernak, MD, MPH	Esther Chernak, Edward Gracely	**Association of Social Determinants with Disparities in Colorectal Cancer Screening Among Residents of Southeastern Pennsylvania:** Colorectal cancer (CRC) is the second leading cause of death due to cancer in Pennsylvania. CRC screening is effective in reducing mortality, but there are social and economic barriers to access. We examined how race (black versus white), income, and health insurance coverage were associated with use of CRC screening services in the 5-county Southeastern Pennsylvania region using data from a telephone survey conducted by the Public Health Management Corporation from 2004 to 2018. We used univariable and multivariable analyses to study the association between these factors and CRC screening. Both analyses found that black respondents received CRC screening more frequently than white respondents in each study year. Insured respondents had higher frequency of CRC screening than uninsured respondents in all study years from 2004 to 2012, and respondents whose income was above the national poverty line had higher frequency of CRC screening than those below it in several years. While insurance and poverty status were predictive, race remained the most consistent predictor of CRC screening in all years analyzed. Contrary to findings in prior research, black respondents were more likely than white respondents to undergo CRC screening. This may be related to selection bias with respect to white and black survey respondents, or successful public health efforts promoting CRC screening in black populations. Further studies using these data should include comparisons between Philadelphia county and the surrounding suburban counties and identify factors associated with cancer screening.
9	Athan Zavras / Orthopedic Surgery	Matthew Colman, MD	Matthew Gasparro, Charles Gusho, Michael Fice	**Comparison of 3D-Printed Patient-Specific Cutting Guides to Freehand Method for Surgical Resection of Pelvic Sarcoma of Bone:** INTRODUCTION: Wide-margin resection of pelvic tumors is one of the most challenging procedures in musculoskeletal oncology. Advancements in 3D technology have led to patient-specific cutting guides that may better achieve negative margins through more accurate and precise cuts. METHODS: A retrospective evaluation of a twenty-year consecutive period was performed. Patients with primary or metastatic pelvic sarcoma of bone who underwent resection using a 3D-printed cutting guide were control-matched to patients with primary or metastatic pelvic sarcoma of bone in whom the freehand method was utilized. For each group, demographics and tumor characteristics, perioperative data, and complication profiles were recorded. RESULTS: Twenty-two patients treated with freehand resection were matched to 5 patients for whom 3D-printed cutting guide was used with median follow up of 37. 04 (1. 97-188. 71) and 8. 75 (0. 23-25. 71) months respectively. Surgical margins were significantly larger in 3D-printed cutting guide patients (11. 00±5. 35mm) than in the freehand cohort (4. 5±4. 06mm). In the freehand group, 13. 6% of patients had positive margins vs 0% in the 3D-printed cutting guide group. Local recurrence was significantly more frequent in the freehand group (55. 0% vs 0%; p=0. 027), as was distant metastasis (68. 4% vs 0%; p=0. 006). Revision surgery was more common in the freehand cohort although the difference was not statistically significant. DISCUSSION AND CONCLUSION: The utilization of 3D printed technology has led to successful resection of pelvic sarcoma. This technology can be useful but has not emerged in clinical practice as a clear determinant of margin status, disease progression, or survival, mostly due to rarity of use. While this technique offers advantages over freehand cutting and navigated surgical techniques such as a lower rate of local disease recurrence and improved surgical margin status, there is no substitute for anatomic understanding and operative experience.
10	Kristopher Raghavan / Biochemistry and Molecular Biology Fox Chase Cancer Institute	Edna Cukierman, PhD	Ralph Francescone, Janusz Franco-Barraza, Jaye Gardiner	**NetrinG1's Role in Tumor Survival on Stroma-Derived Extracellular Vesicles in Pancreatic Cancer:** Pancreatic Ductal Adenocarcinoma (PDAC) is a devastating disease which is driven and supported by changes in its microenvironment, or stroma. This project dissects the intercellular communication that exists between the primary stromal component, cancer-associated fibroblasts (CAFs) and PDAC. Specifically, we focus on how CAF-secreted vesicles promote PDAC progression, with an additional goal to identify biomarkers suitable to generate a non-invasive "liquid biopsy" test for early PDAC detection and prognosis. PDAC communicates with its microenvironment, in part, through the exchange of specific types of extracellular vesicles (EVs), which include exosomes and recently characterized "exomeres. "We observe distinct types of CAF-derived EVs containing unique surface receptors. One novel surface protein, NetrinG1, is expressed on the plasma membrane of pancreatic CAFs, but not their normal/healthy counterparts. Further, PDAC cells, but not healthy pancreatic epithelial cells, upregulate NetrinG1's lone binding partner, suggesting a role for these factors in PDAC-selective EV uptake. Functional assays designed to test PDAC viability suggest these NetrinG1(+)-EVs protect PDAC cells from programmed cell death as a result of physiological stress. We show Netrin G1 localizes to the novel "exomere" EV sub-population, suggesting it possesses unique cargo and is packaged into EVs and secreted through a yet-unknown mechanism separate from canonical exosome trafficking. Pursuing our biomarker goal, we confirm stromal NetrinG1 expression prior to tumor development and are currently seeking to validate NetrinG1(+)-EVs in blood of PDAC patients. Altogether, this research shines light on a novel mechanism of tumor-stroma communication, and introduces EV biomarkers potentially capable of identifying both early PDAC occurrences and predicted efficacy of certain adjuvant interventions.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
11	Anna Fuchs / Psychiatry	Eduardo Espiridion, MD	Anna Fuchs, Adeolu Oladunjoye, Olubunmi Oladunjoye, John Gurski, Oluwatoyin Olubiyi, Oluwatosin Ayeni, Maria Yee, Eduardo Espiridion	**Seasonal Trends in Hospitalization of Attempted Suicide and Self-Inflicted Injury in US Adults:** Introduction: Suicide is the tenth leading cause of death in the United States and the numbers only continue to rise. It is estimated that there is an average of 25 attempted suicides for every 1 completed suicide in the US, and a resulting high economic burden due to hospitalization. Identification of those at risk for suicide and attempted suicide can help with early and prompt intervention. Studies in Europe and Asia have shown that there is a relationship between seasonal patterns and suicide risk; however, this pattern has not been evaluated in the US. Methods: The current study evaluates trends of patients with attempted suicide and self-inflicted injury by weekday vs weekend, and by month and season of the year over a five-year study period in the US. Sex was also assessed as a modifying factor of the prevalence of suicidal behaviors. Hospitalized adult patients with suicide attempts and self-inflicted injury were identified using the discharge data from National Inpatient Sample (NIS) from January 1, 2010 to December 31, 2014. Results: Out of 249,845 patients, self-injurious behavior increased by 15% throughout the duration of the 5-year study period; 70% of patients were males, 65. 5% white, and 38. 8% were between the age of 40-64 years. An overall prevalence of about 168-200 self-harming patients per 100,000 hospitalizations was reported. There was a higher admission rate on weekends of 190-300 per 100,000 hospitalizations as compared to a weekday prevalence of 150-178 per 100,000 hospitalizations. Admissions for self-injurious behavior peaked during the months of July and August with a prevalence of 200-230 self-harming patients per 100,000 hospitalization in a year. Conclusion: The prevalence of attempted suicide is steadily rising. Awareness of the seasonal and epidemiological trends of attempted suicide and self-inflicted injury is a very important step toward developing effective strategies to prevent suicide and attempted suicide.
13	Adib Rushdan / Family, Community and Preventive Medicine	Annette Gadegbeku, MD	Raghda Bchech	**Implementation of a Standardized Handbook & Virtual Platform with Motivational Interviewing Module to Improve Efficacy of Smoking Cessation Program Delivery:** Currently, there is a lack of standardized intervention training and resource proficiency among medical student coordinators for the Drexel Health Outreach Project (HOP) Clinic Smoking Cessation Intervention Program. The initial program at Salvation Army, a long-term substance abuse treatment facility for disadvantaged individuals, focuses on current everyday smokers. The difficulty of maintaining a knowledgeable base of clinic coordinators is challenging due to constant turnover among medical students. The value of smoking cessation intervention programs are well established in the literature especially among at risk or disadvantaged populations who have high usage rates (double to triple) in comparison to the general population. We plan to develop a coordinated training platform and guide that allows for medical student coordinators to have sustainable access to the knowledge necessary to run an effective smoking cessation intervention program. Our intervention is the development of a 2-hour training module that is focused on resource education and program structure from session start to finish that is based upon a "newly-established" Program Handbook and Motivational Interviewing (MI) module. The primary outcome of interest will be the "change in attitude" towards program implementation after the intervention amongst medical student coordinators. This evaluation will be conducted via pre- and post- questionnaires. Secondary outcomes will be focused on program outcomes such as the number of program participants, reduction of cigarettes smoked, and program expansion to additional sites that can be used in future analysis. Our hypothesis is that medical student coordinators will have improvement in their comfort and confidence levels with program structure and motivational interviewing following implementation of the training module. ?
14	Samyuktha Manikandan / Pharmacology and Physiology	Peter Gaskill, PhD	Stephanie Matt	**Dopamine Mediated Epigenetic Regulation of Neuroinflammation and NeuroHIV in Myeloid Cells:** A Literature Review and Dopamine Receptor Analysis: The co-burdens of substance abuse and HIV often produce neuroinflammation through effects on CNS myeloid cells (microglia and macrophages). Data from our lab show that dopamine, increased by all substances of abuse, plays an important role in the inflammatory process in these cells, suggesting dopamine could potentiate HIV-associated neuroinflammation. Dopamine acts via five distinct G-protein coupled receptors that are classified into two sub-groups, D1-like receptors (DRD1 and DRD5) and D2-like receptors (DRD2, DRD3, and DRD4). Our data indicate that myeloid cells express more D1-like receptors, which instigate pro-inflammatory activity, than D2-like receptors, which mediate anti-inflammatory activity. We also demonstrate that drug-induced dopamine concentrations increase inflammatory cytokine production (IL-1ß and IL-6) in human monocyte-derived macrophages (hMDM), mediated partly by differences in dopamine receptor expression. Our preliminary studies also indicate these changes may be induced through dopamine-associated epigenetic mechanisms. Therefore, a dopamine receptor expression ratio table was generated to function as tool to examine the inflammatory activity mediated by both HIV and substance abuse. Numerous studies have examined the role of epigenetic mechanisms concerning HIV/SIV, dopamine-related modifications, and inflammation, but few have connected these factors. Thus, a cohesive review table was generated to organize information from relevant journal articles for a new project in the lab investigating dopamine and HIV-mediated epigenetic regulation of neuroinflammation in myeloid cells.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
15	Bhavani Tara-mangalam / Medicine	Elias Haddad, PhD	Marita Chaktoura, Jennifer Connors, Talibah Metcalf	**ADA-1 as a stimulant of DC maturation and pro-Tfh signaling:** Due to their role as professional antigen-presenting cells (APC), dendritic cells (DC) bridge innate and adaptive immunity. They are strong activators of adaptive immunity due to their unique capacity to present antigen from invading pathogens to cytotoxic and helper T cells. The heterogeneity in the resulting immune responses makes DCs a potent tool in the repertoire of vaccine immunology. One of the effector functions of T cells is their ability, upon maturation, to travel to the germinal centers (GC) within secondary lymphoid organs (SLO) and interact with cognate B cells to stimulate T-cell dependent antibody responses. These specialized T cells are known as follicular helper T cells (Tfh) and they are critical for humoral immunity following infection or immunization. Therefore, identifying the underlying mechanisms and specific molecules that enhance this phenotype is crucial. To this end, adenosine deaminase-1 (ADA-1), an enzyme of the purine metabolism pathway, has been identified as a key player in the Tfh program and murine studies have investigated its effects as an adjuvant in conjunction with vaccines. Despite encouraging results from these studies, the underlying mechanism of ADA-1 in DCs is still poorly understood. The importance of DCs in Tfh priming leads us to postulate that ADA-1 may be acting upon the DC maturation pathway. We predict that upon stimulation by ADA-1, DCs will upregulate maturation markers and promote a specific microenvironment that is ideal for Tfh priming. To investigate this hypothesis, we cultured monocyte-derived DCs (MDDC) with ADA-1 protein to assess the DC phenotype and microenvironmental changes.
16	Jennifer Connors / Medicine	Elias Haddad, PhD	Mariana Bernui, Michele Kutzler, Elias Haddad	**The Impact of Aging on Antiviral Pathways and Consequences for Immune Function:** In 7 months the COVID-19 pandemic has claimed the lives of almost a million people worldwide, with those over the age of 65 having the highest fatality rate (13. 1%). This susceptibility is associated with immunosenescence, a chronic condition that increases basal inflammatory levels in the elderly. Immunosenescence results in diminished vaccine responses and immune system dysregulation, leading to grave implications to the clinical presentation of COVID-19. Using a cohort of young and old individuals (n=24), we are investigating approaches that will identify and target deficient pathways in elderly individuals to increase a vaccine response. Certain innate cell subsets are critical for antiviral immunity and progression to a fulfilled adaptive response such as conventional dendritic cells 1 (cDC1) and 2 (cDC2), responsible for cross-priming and priming CD4+ T cells, respectively, and CD14dimCD16+ monocytes that patrol the vascular endothelium for antigen. A critical function of these innate cells involves the production of type I IFN, an antiviral cytokine. Two critical pathway points in the production of type I IFN are the phosphorylation of IFN-response factor 7 (pIRF7) in the TLR 7/8 pathway and of TANK-binding kinase (pTBK-1) in the RIG-I and cGAS-STING pathways. Utilizing this cohort of young and old, we show a decrease in pIRF7 and pTBK-1 in cDC1s, cDC2s, and CD14dimCD16+ monocytes from elderly individuals following stimulation with pathway specific agonists in comparison to healthy individuals using multiparametric flow cytometry. The decrease in these key antiviral pathway proteins correlated with decreased phagocytosis by cDC1, cDC2, and CD14dim CD16+ monocytes also measured via flow cytometry. These data support our lab's reports of a delayed and decreased pro-inflammatory output following stimulation. These results demonstrate key targets of antiviral pathways that can resolve dysfunctions of the aging immune system for effective vaccination responses
17	Hasan Zaidi / Medicine	Meera Harhay, MD, MSCE	Ann Klassen, Janet Fleetwood, Michael Mittelman, Rebecca Bertha	**Living Organ Donor Perspectives and Healthcare Priorities during the COVID-19 Pandemic:** Background: After the COVID-19 pandemic began, many U. S. transplant programs paused living organ donor surgeries due to uncertainties about risks. We conducted a national survey to determine prior and prospective living organ donor perspectives on risks and priorities, to address pandemic-related donor needs. Methods: In April-June 2020, the survey was distributed over 8 weeks in an online donor-only support forum. Respondents ranked sources of pandemic-related information, perceived pandemic-related burdens, and preferences to enhance donation safety with comments via open text. Results: Respondents included 101 prior (76% kidney, 24% liver) and 47 prospective donors (72% kidney, 28% liver), representing 29% of active forum members. Respondents resided in 41 US states, with 60% age 31-50, 91% female, and 94% non-Hispanic white. Personal doctors were the most important information source, and transplant recipient health and availability of COVID-19 testing the most important risk considerations. Risks to emotional well-being and health insurance loss were rated more important among prior donors than among prospective donors. Donors in high COVID-19 prevalence regions rated concerns for recipient health higher. Adjusted for age, COVID-19 prevalence, relationship to recipient, prior/prospective donor status, and organ type, donors from programs postponing surgeries and donors unsure of program status were less likely to believe donation should continue during the pandemic, compared to donors from programs not postponing surgeries. Conclusions: In pandemic conditions, living organ donors rely strongly on transplant program decision-making and prioritize transplant recipient health and COVID-19 testing availability. Transplant programs should consider additional support for donor emotional and financial well-being.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
18	Julia Oleksak / Pharmacology and Physiology	Edward Hartsough, PhD		**Harnessing CADM1 associated Caspase-Independent Cell Death Mechanism in Melanoma:** Melanoma is the deadliest form of skin cancer and incidence is on the rise. If detected early, patients have a favorable long-term survival; however, once metastasized prognosis is poor. Melanoma metastasis is a stepwise process that involves survival in the blood stream (circulating tumor cells (CTCs)) and extravasation into distant organs, among other processes. Our previous data demonstrate that cell adhesion molecule 1 (CADM1) inhibits multiple metastatic properties and is downregulated in patients with advanced disease. Importantly, we found that CADM1 triggers a non-adherent cell death, a phenomenon that may be clinically relevant in reducing circulating melanoma tumor cells. Defining the mechanisms by which CADM1 directs cell death will enable the development of new therapeutic avenues to decrease the viability of circulating melanoma cells, thus inhibiting metastasis and increasing survival. We hypothesize that CADM1 elicits a caspase-independent cell death program in melanoma CTCs. One such mechanism, known as parthanatos, is caspase-independent cell death associated with hyperactive PARP-1 activity, mitochondrial membrane depolarization, and metabolic energy failure. We have previously shown characteristics of parthanatoic cell death by increased poly-ADP ribosylation, reduction in oxidative phosphorylation, and loss of mitochondrial membrane potential in non-adherent melanoma cells expressing CADM1. However, aspects of other caspase-independent cell death mechanism such as pyroptosis and necroptosis may also contribute to this process. The goal of this project is to better define CADM1 associated non-adherent cell death and investigate how to therapeutically harness this mechanism to reduce the viability of circulating melanoma tumor cells and thus metastasis.
19	Jessica Smart / Pharmacology and Physiology	Edward Hartsough, PhD	Edward Hartsough, PhD	**Immunomodulatory Function of CADM1 in Melanoma:** The treatment landscape for metastatic melanoma patients has been transformed since the 2011 FDA-approval of mutant specific targeted inhibitor vemurafenib. Other targeted inhibitors have since been approved and have demonstrated impressive response rates and improved survival. Unfortunately, many patients become refractory to treatment and experience relapse after 6-9 months. As an alternative, a number of immune checkpoint inhibitors such as nivolumab and ipilimumab have recently been approved, providing a more durable response – highlighting the importance of immune surveillance in melanoma therapy. Our lab is studying a novel adhesion protein, CADM1, which is known to contribute to inflammatory and immune processes in a number of disease settings. We previously demonstrated CADM1 inhibits invasiveness and is correlated with non-adherent cell death; traits that are associated with melanoma metastasis. However, the role of CADM1 in melanoma immune surveillance is unknown. Our preliminary data indicates that tumors created with CADM1 knockout melanoma cell lines grew significantly slower in syngeneic mice compared to the wild-type equivalent. This observation is likely immune-mediated, as the result was abrogated in parallel experiments in immune deficient NSG mice. We hypothesize that CADM1 expression recruits FOXP3+ T regulatory cells in tumors, creating an immune suppressive environment conducive to tumor growth. Our data suggest CADM1 expression recruits FOXP3+ T regulatory cells, providing an immune-mediated basis for our prior observation and encouraging further study into the effects of CADM1 on the immune microenvironment in melanoma, especially given the poor prognosis linked with CADM1 expression in ipilimumab treated patients.
20	Maria Cavallo / Pharmacology and Physiology	Edward Hartsough, PhD		**Exploring the Fine-Tuning Capabilities of RAFi Resistant Melanoma:** Melanoma is the deadliest form of skin cancer due to its high metastatic potential. Half of melanomas are driven by activating mutations of the serine-threonine kinase BRAF. BRAF is central to the MAPK signaling pathway and contributes to proliferation and invasiveness. The most common BRAF mutation is V600E/K, prompting the development of several FDA-approved mutant specific inhibitors. In the clinic, patients have a high initial response rate, but invariably acquire drug resistance in 6-9 months. Second line treatment options for relapsing patients are limited. However, in some instances resistant tumors become addicted to inhibitors, potentially enabling the use of a drug holiday to induce hyperactive MAPK activation thereby mimicking a state of oncogene induced senescence (OIS) with potential therapeutic benefit. In this study we hypothesize that RAFi resistant melanoma cells calibrate the magnitude of resistance mechanism to the level of pathway inhibition. This fine tuning has clinical relevance as the more robust resistance mechanisms may have an increased responsiveness to drug withdrawal, where the less robust may benefit from a higher dose of drug. Our preliminary data suggests resistant melanoma cells grow more efficiently in the drug concentration they originally became resistant to, and drug removal reduces viability. We also demonstrate the contribution of other tangentially activated signaling pathways which may potentiate the effects of drug withdrawal. Taken together, the overall goal of this project is to explore the therapeutic benefit of patient-specific dose modifications in combating relapse and drug resistance.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
22	Priscilla Macias / Microbiology and Immunology	Celine Heskey, DrPH, MS, RD		**Free-living Dietary Intervention Studies:** Theory-Based Protocols to Improve Subject Compliance: Objectives: Subject compliance in free-living dietary intervention studies is difficult to achieve. Published studies suggest various theoretically based strategies that can be used to improve compliance. Methods: A weight-management dietary intervention for free-living subjects, based on a vegetarian dietary pattern, was created. Development of 7-day menus was conducted using McGraw Hills's NutritionCalc Plus software. Menus utilized a framework from the 2015-2020 Dietary Guidelines for Americans' Healthy Vegetarian Eating Pattern (macronutrient ratios and food group servings). A literature review was conducted to identify various counseling and technology strategies that may be effective at increasing subject compliance with their assigned study diet. The findings of the literature review was used to create study protocols. Protocol development for a food demonstration was also explored. Results: A 1-week menu cycle for a vegetarian diet intervention was created, including a set of menus each for 1200, 1800, and 2000 calories levels. The menus are inclusive of foods and portions that meet the Dietary Guidelines for Americans. Three study protocols were developed for strategies that may improve subject compliance: 1. A nutrition counseling protocol based on motivational interviewing; 2. A technology protocol on use of a dietary-self monitoring app; and 3. A food demonstration protocol highlighting vegetarian recipes. The protocols are designed to be used by study clinicians/dietitians in future intervention studies. Conclusion: Theory-based protocols can be used to develop standardized protocols for research studies. These protocols theoretically may help to improve subject compliance.
23	Tess Lukowiak / Dermatology	H. William Higgins, MD		**Mohs Micrographic Surgery for the treatment of cutaneous Merkel cell carcinoma has low rates of local recurrence:** Introduction: Merkel cell carcinoma (MCC) is a rare, aggressive neuroendocrine tumor with high rates of local recurrence. Consensus guidelines recommend wide local excision for the treatment of MCC. However, there is growing evidence to suggest that Mohs micrographic surgery (MMS) may be beneficial and provide enhanced local control. This study is the largest single institution investigation of MMS for treatment of MCC. Methods: An IRB-approved retrospective review was performed to identify all patients with MCC treated with MMS between 1/1/2006 and 4/1/2020. Relevant case information was obtained from the medical record. The primary outcomes were local recurrence, which was defined as tumor arising within the MMS scar, regional recurrence, and distant spread. Secondary outcomes were disease-specific and overall survival. Descriptive statistics and Kaplan-Meier survival curve analyses were obtained using Stata v. 16 statistical software. Results: We identified 32 patients with MCC treated with MMS. The average age was 70. 59. 53. 12% (17/32) were males (Table 1). There were no local recurrences. 8 patients (25%) had regional recurrences and 4 patients (12. 5%) experienced distal metastases. 5-year overall survival was 86. 88% (95% CI: 56. 55% to 96. 59%). Only two patients had disease-specific death at 1. 34 and 2. 44 years after MMS, respectively. Figure 1 show the Kaplan-Meier curves for overall and disease specific survival. Discussion: MMS provides good local control for MCC and should be considered in the treatment of this rare and aggressive tumor.
24	Christopher Nichols / Medicine	Michael Howley, PhD	Michael Howley, Michael Weingarten	**Pediatric Surgical Readmissions: Are Social Determinants of Health reliable predictors?:** IntroductionChildren being readmitted to the hospital soon after a surgical procedure can put immense financial strain on their families and those responsible for their care. Deficiencies in social determinants of health, such as economic stability or insurance-payer, perpetuate a cycle of hospital readmission if unaddressed. The purpose of this paper is to evaluate social determinants as predictive risk factors for readmission within 60 days post-surgical procedure. MethodsTo evaluate this research question, we conducted a secondary data analysis out of the Nationwide Readmissions Database. Variables assessed include: patient insurance-payer, patient income quartile, patient location, hospital teaching status and hospital location. Relative risk, Fisher's exact test of independence and Chi-square analyses were performed to assess differences in readmission rates. ResultsThe rate of readmission was calculated to be 26% (499/1933). 55% were enrolled in a government-payer insurance. Application of Fisher's test to the patient income variable yielded a p-value < 0. 05 suggesting that a greater proportion of readmissions in families making less than $75,000/year. The relative risk of being readmitted after treatment at a non-teaching hospital or at a hospital in a micropolitan area was increased by ~95% (RR 1. 9484, p-value = 0. 0269). Discussion & ConclusionOur research revealed certain determinants to be main drivers of readmission - location of the patient, teaching status of the hospital and surgical complexity of the procedure. Committing time and resources to addressing areas in which some of those determinants are lacking may have permanent positive effects on patients and their families.
26	Kamil Evy Bantol / College of Medicine	Joyce Javier, MD	Arielle Villanueva, Joyce Javier	**Exploring the Potential Role of Social Networking in Promoting the Retention of Filipino Americans in Parenting Programs:** Background: Evidence-based parenting interventions are proven to be efficacious in preventing child mental and behavioral health problems. However, there are significant challenges in engaging and retaining parents, particularly among hard-to-reach populations such as Filipino Americans. The purpose of this study is to investigate the potential role of social networking in promoting the retention of Filipino families in the Incredible Years® parenting program. The Incredible Years® (IY) is a program that targets parenting knowledge and skills to strengthen parent-child relationships and prevent child conduct problems. Methods: We conducted interviews with Filipino parents (N=15) who previously enrolled in IY. Questions explored parents' social media use, input on creating an online private group for parents, and input on the potential content of this online group. Interviews were then transcribed and coded to identify themes. A grounded theory analytic approach was used to analyze transcripts. Results: Participants supported using a social media-based online group as a supplement to evidence-based parenting classes. We found mixed opinions regarding privacy in this online group; however, participants generally agreed that potential benefits of an online group include having a source of parental social support and a tool to maintain program interest among enrolled parents. Conclusion: Social networking is a promising medium to increase parenting program engagement and retention in the Filipino American community.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
27	Amber Jones / Biology	Zachary Klase, PhD	Svetlana Khakhina	**Characterization of CD8+ T cell exhaustion in HIV-1 Controllers:** Infection with HIV results in a cascade of immunological events that leads to chronic immune activation. These deleterious events result in the dysregulation of the immune system and the inability to fight off opportunistic infections. During chronic infections, T-cells up-regulate inhibitory immune checkpoint receptors as a homeostatic mechanism to prevent tissue damage from persistent immune activation. Up-regulation of these inhibitory receptors results in the hierarchical loss of T cell polyfunctionality which defines T-cell exhaustion. T-cell exhaustion represents a spectrum of progressively impaired effector functions which impacts the ability of CD8+ T-cells to control infection. We hypothesize that efficient control of viral replication becomes compromised by CD8+ T-cell exhaustion. To characterize CD8+ T-cell exhaustion, we utilized a cohort of HIV-1 controllers who have an inherent ability to control viral replication in the absence of antiretroviral therapy (ART) but eventually gain viral susceptibility due to unknown immune mechanisms. Unique to our study, we have several HIV-1 controllers who maintained clinical viral control but were placed on ART after enrolling in the study. These HIV-1 controllers eventually lost the ability to control viral replication in tissue culture. In efforts to identify the mechanism of CD8+ T-cell mediated viral suppression, a longitudinal analysis of T-cell exhaustion in HIV-1 controllers was evaluated using a panel of exhaustion markers pre and post-loss of control to determine if their increased expression mediates HIV-1 susceptibility. Evaluation of CD8+ T-cell exhaustion markers from HIV-1 controllers revealed elevated expression during times of viral susceptibility compared to times of viral control.
28	Gina Cusimano / Microbiology and Immunology	Michele Kutzler, PhD	Jennifer Connors, Matt Bell, Ebony Gary, Nicholas Tursi, Bhavani Taramangalam, David Weiner, Elias Haddad, Michele Kutzler	**Unveiling the Mechanism of Action of Adenosine Deaminase 1 (ADA-1) as a Molecular Adjuvant in a COVID19 DNA Vaccine Formulation:** Adenosine deaminase 1 (ADA-1) is a key enzyme involved in purine metabolism and when not functioning, leads to approximately 15% of heritable severe-combined immunodeficiencies (SCID). There are several ADA1 receptors expressed on immune cells and when engaged, is thought promote the formation of an immunological synapse [1, 2]. Previous studies in both Dr. Kutzler's and Dr. Haddad's lab have shown ADA-1 can act as a molecular adjuvant to enhance vaccine induced humoral and cellular responses in the context of both HIV and Sars-Cov2 DNA vaccines. Noteworthy is that ADA-1 enhanced anti-spike serum and lung IgG production and T and B cell responses in spleen of aged mice immunized with a Sars-Cov2 DNA vaccine. This is of particular importance since aged populations are known to exhibit impaired immune responses following immunization and aged populations are of significant risk for COVID-19 disease. Although clearly demonstrated as a molecular adjuvant, the mechanism by which ADA-1 is functioning has yet to be unveiled. This research project is therefore aimed to characterize the axis of ADA-1 and its several receptors (CD26, A1, and A2B) activity. This characterization will take place in young vs aged human and mouse cells to determine any age related differences in ADA-1's expression levels and enzymatic activity. We will also examine ADA-1's effect on innate pathways and adaptive pathways. Overall this study aims to characterize ADA-1's mechanism as a molecular adjuvant to further its potential as a clinical adjuvant that can be used across many vaccine modalities.
29	Shivangi Bhatt / College of Medicine	Kevin Lutsky, MD	Richard McEntee, Tyler Henry, Pedro Beredjiklian, Jonas Matzon, Kevin Lutsky	**Wound Dehiscence Following Cubital Tunnel Surgery:** PurposeCubital tunnel syndrome is the second most common upper extremity compressiveneuropathy, and persistent symptoms can necessitate operative treatment. Surgicaloptions include simple decompression and ulnar nerve transposition. The rate ofwound dehiscence after surgery is not well known, and factors leading to thedevelopment of these complications have not been previously described. MethodsPatients undergoing ulnar nerve surgery from 1/1/2016 to 12/31/2019 wereretrospectively evaluated for the development of wound dehiscence within threemonths of surgery. There were 295 patients were identified who underwenttransposition, and 1106 patients were identified who underwent simple decompression. Patient demographics and past medical history were collected to evaluate for riskfactors for development of wound dehiscence. ResultsThe overall rate of wound dehiscence following surgery was 2. 5%. In the simpledecompression group, the rate of wound dehiscence was 2. 7% (30/1106), whichoccurred a mean of 21 days (2-57) following surgery. In the transposition group therate of dehiscence was 1. 7% (5/295) which occurred a mean of 20 days (12-32)following surgery. The difference in rate of dehiscence between decompression andtransposition was not significant. Five patients in the simple decompression grouprequired a secondary surgery for closure of the wound, and one patient in thetransposition group required a secondary surgery. Age, BMI, smoking status, andmedical comorbidities were not found to contribute to the development of wounddehiscence. ConclusionsWound dehiscence can occur following both simple decompression and transposition,even after the initial post-operative visit suggests a healed wound. Our rate of wounddehiscence following ulnar nerve surgery was found to be similar to previouslyestablished rates. Patient demographics and comorbidities were not found tocontribute to the development of this complications.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
30	Elijah Davis / Microbiology and Immunology	Sonia Navas-Martin, PhD		**Characterization of Innate Immune Cargo in Microglia-derived Exosomes:** Background: Emerging evidence suggests a critical role of exosomes in cell-to-cell communication within the Central Nervous System (CNS). These extracellular vesicles are derived from endosomal pathways and transport genetic material and proteins throughout the CNS. Uptake of exosomal cargo has been shown to alter the behavior of recipient cells, inducing phenotypical changes that can affect homeostasis. Exosomes serve as potent mediators of inflammation. In-depth analysis of neuroinflammatory diseases such as Parkinson's reveal alterations in exosome biogenesis and cargo selection. Microglia, innate immune cells of the CNS, are also essential in regulating neuroinflammation; however, the cargo content of microglia-derived exosomes is poorly understood. Considering their role in innate immunity, microglia may produce exosomes that act as key immune messengers. Emerging data implicates innate immune sensors Toll-Like Receptor 3 (TLR3) and TLR4, highly expressed by microglia, in neuropathogenesis. These transmembrane proteins have been shown to localize to endosomes and the plasma membrane, suggesting they may interact with nascent exosomes prior to secretion. The relationship between these TLRs and exosome-mediated inflammatory responses remains unclear. Here, we investigate if TLR3 and/or TLR4 and their signaling adaptors are present in microglia-derived exosomes. Hypothesis: TLR3 and TLR4 are incorporated into microglia-derived exosomes; this incorporation is altered during neuroinflammation. Method: Murine WT microglia were co-incubated with fluorescently-labeled exosomes, and either TLR4 agonist LPS or TLR3 agonist HMW Poly I: C for up to 24hrs. The dynamics of exosome uptake during naïve and inflammatory conditions was observed using confocal microscopy. Additionally, exosomes were isolated from naïve and LPS-stimulated microglia and probed for the presence of TLR3 and TLR4, as well as their adaptors TRIF and MyD88 via near- infrared western blotting.
31	Emily Esquea / Biochemistry and Molecular Biology	Mauricio Reginao, PhD	Lorela Ciraku, Josh Jackson, Mauricio Reginato	**Role of CDK5 in Breast Cancer Brain Metastatic Growth:** Brain metastasis (BM) in breast cancer patients occur in 10-16% of patients with metastatic tumors and it represents a terminal event associated with poor prognosis and limited treatment options. Thus there is a critical need to discover new treatment strategies for breast cancer patients with BM. Overexpression of Cyclin Dependent Kinase 5 (CDK5), an atypical cyclin dependent kinase, has been linked to tumor proliferation, metastasis and angiogenesis in different types of cancers. However, the role of CDK5 in breast cancer brain metastasis has not been examined. Here, using publicly available databases, we identified a correlation between elevated CDK5 levels and reduced overall survival in breast cancer patients. In addition, we show that CDK5 expression is elevated in the triple negative breast cancer brain seeking cells, MDA-MB-231 BR, compared to the parental breast cancer cells MDA-MB-231. Preliminary results suggest that CDK5 overexpression in the brain seeking cells promotes proliferation and tumorigenesis of the cancer cells in vitro. Additionally, CDK5 appears to be required for tumor growth in vivo and in vitro as stable knockdown of CDK5 shows smaller tumor size and reduced colony formation. Pharmacologically targeting CDK5 with small molecule pan-CDK inhibitor dinaciclib was shown to preferentially reduce growth of brain seeking breast cancer cells compared to the parental cells. Importantly, we show that dinaciclib treatment reduces growth of preformed intracranially induced tumors using an ex vivo brain slice model. These results suggest that CDK5 may regulate breast cancer BM growth and be a novel therapeutic target for treatment of breast cancer brain metastasis.
32	Anirudh Rao / Biochemistry and Molecular Biology	Mauricio Reginato, PhD	Giang Le Minh, Neha Akella	**Identification of OGT-regulated genes in breast cancer stem cells:** Understanding metabolic shifts experienced by cancers serves as a promising way to understand the mechanism of cell proliferation in cancer tissues. One critical enzyme that regulates numerous metabolic pathways is O-GlcNAc transferase (OGT) and it is frequently overexpressed in many cancers. This important enzyme facilitates the addition of O-linked-GlcNAc moieties, which is critical for various cellular functions, including modulating cellular signaling and transcriptional processes. Recent studies have found that OGT and O-GlcNAcylation is elevated in breast cancers and more recently that OGT plays a critical role in breast cancer tumor initiation and cancer stem cells. RNAseq analysis between control and OGT overexpressing mammospheres identified a number of potential OGT-regulated genes in conditions that enrich for cancer stem cells. Here, we screened over 20 genes regulated by OGT using a number of cancer databases to identify genes associated with poor clinical outcome in breast cancers patients. We identify two genes, Melanoma-Associated Antigen 11 (MAGEA11) and Lipolysis-Stimulated Lipoprotein Receptor (LSR) whose high expression are associated with poor overall survival in breast cancer patients. Western blot analysis showed that MAGEA11 is potentially regulated by OGT in breast cancer cells. Furthermore, preliminary data suggests there may be multiple isoforms of LSR in cancer cells, each differentially regulated by OGT. Overall, these early results identify two OGT-regulated genes associated with poor clinical outcome in breast cancer patients. Future studies will determine whether these genes contribute to OGT-mediated regulation of cancer stem cells.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
33	Giang Le Minh / Biochemistry and Molecular Biology	Mauricio Reginato, PhD	Neha Akela, Tejsi Dhamelia, Mauricio Reginato	**KLF8 is a required downstream effector of OGT/O-GlcNAcylation in regulating breast cancer stem-like cells:** One of the main challenges in treating breast cancer is the intra-tumor heterogeneity, which is maintained and promoted by breast cancer stem-like cells (BCSCs). BCSCs shares traits of mammary stem cells, capable of self-renewing and differentiating, while promotes invasion, metastasis, drug resistance and relapse. BCSCs are highly adaptive, capable of reprogramming metabolism and signaling activity in response to tumor microenvironment. One key component of cell nutrient sensing mechanism, linking alteration in metabolism to cell signaling, is O-GlcNAc transferase (OGT). OGT is responsible to adding O-GlcNAc moieties to target nuclear, cytoplasmic and mitochondrial proteins from UDP-GlcNAc – final product of the hexosamine biosynthetic pathway. This modification is termed O-GlcNAcylation and both OGT and O-GlcNAcylation are upregulated in many cancers. Recently, we showed that OGT/O-GlcNAcylation is enriched in BCSC, promoting the stemness and tumorigenesis of breast cancer cells in vitro and in vivo. RNA-seq analysis of BCSC-enriched mammospheres with OGT overexpression revealed Kruppel-like-factor 8 (KLF8) as a downstream target of OGT in regulating BCSCs. Here, we showed that KLF8 expression in breast cancer cells is regulated by OGT at protein and mRNA level. Knockdown of KLF8 reduced mammosphere forming efficiency (MFE) and NANOG expression in breast cancer cells, while overexpressing KLF8 increased MFE, NANOG+ and CD44H/CD24L BCSC population. Importantly, KLF8 knockdown abolished the effect of elevated O-GlcNAcylation in breast cancer cell MFE and BCSC population, while KLF8 overexpression rescued OGT knockdown in MFE and BCSC population. suggesting that KLF8 is required in promoting BCSC. Supporting the idea that KLF8 and OGT are critical for breast cancer progression, breast cancer patient survival was lower with high KLF8 or OGT levels. Together, our results suggested that KLF8 is a downstream target of OGT/O-GlcNAcylation in regulating BCSCs.
35	Tejsi Dhameliya / Biochemistry and Molecular Biology	Maurico Reginato, PhD	Le Minh Giang, Mauricio Reginato	**KLF8 Regulates OGT and Breast Cancer Cell Stemness:** Breast cancer stem cells (CSCs), a subpopulation of tumors cells, can drive tumor initiation, long-term growth, metastasis and chemoresistance. CSCs can generate the more differentiated bulk of the tumor cells and regulate intra-tumor heterogeneity. Importantly, CSCs promote drug resistance and relapse, correlating to poor survival rate. CSCs are regulated by various signaling networks and nutrient status of the cells. One key nutrient-sensing-pathway linking alteration in metabolism and signaling transduction is the hexosamine-biosynthetic-pathway (HBP) which is found to be upregulated in cancer. The final product of HBP, UDP-GlcNAc, is a key substrate for nuclear and cytoplasmic protein glycosylation, or O-GlcNAcylation. O-GlcNAcylation is catalyzed by O-GlcNAc transferase (OGT), which uses UDP-GlcNAc to modify target nuclear and cytoplasmic proteins. Recently, our lab reported that elevated OGT/O-GlcNAc regulates breast CSCs and promotes tumor initiation of breast cancer cells. In addition, we identified that Krüppel-like-factor 8 (KLF8) is a downstream-effector of OGT. KLF8 is associated with epithelial-mesenchymal-transition, invasion and metastasis. We aim to study the interconnection between KLF8 and OGT, the role of KLF8 in regulating CSCs and drug resistance in breast cancer. Here, we show that overexpression of KLF8 resulted in increased level of OGT protein and RNA. Furthermore, KLF8 overexpression increased CSCs-enriched mammosphere formation and the CD44H/CD24L CSCs population. KLF8 overexpression also upregulated level of various CSCs markers including NANOG, OCT4, SOX2 at the protein and mRNA level. Importantly, KLF8 overexpression increased paclitaxel-resistance in breast cancer cells in a dose dependent manner. Together, we show that KLF8 itself can regulate OGT levels and CSCs forming a possible feed-back loop to regulate OGT expression, while also promotes CSCs and drug resistance in breast cancer.
36	Kitty Zheng / Medicine	Gail Rosen, PhD		**Investigation of Protein Mutations Contributing POLE Proofreading Defects:** DNA polymerases are key enzymes involved in DNA replication and repair. Therefore, changes to enzyme function would likely have profound effects on mutagenesis and tumorigenesis. Studies have demonstrated the recurrence of POLE mutations in endometrial and colorectal cancers (CRC) and pointed to specific hotspots (P286R, V411L) across many tumor types. In our study, we investigated the driving role certain POLE mutations may play in the development of CRC in patients. We identified multiple high damaging protein mutations that may affect the structure and subsequently the function of DNA polymerase. Data of de-identified patients with CRC were categorized into POLE driver + 2nd variant, POLE driver only, POLE variant, and POLE potential new drivers. Statistical analysis was performed to determine possible correlations of mutation frequency within the different categories. Annovar was used to determine the damaging condition of protein mutations identified from the POLE data. To determine the effect high damaging protein mutations may play on POLE protein structure, Pymol was utilized for visualization. Analysis of mutation types identified positive correlations between SBS10a with SBS10b, DBS10 with DBS11, and ID1 with ID2. Conversely, SBS15 was negatively correlated to all other mutation types. POLE driver + 2nd variant histograms showed more than half of the patient population presented with < 100 mutation incidences. POLE driver + 2nd variant histograms were more spread out, ranging from 0 to 1800 incidences. Using Annovar, we identified multiple protein mutations with high damaging conditions, which were then visualized using Pymol. Analysis of patient data suggests that POLE mutations have a larger role in CRC development in POLE driver + 2nd variant compared to the POLE driver only patient population. Through Pymol, structural analysis of selected protein mutation with high damaging mutations demonstrated possible hindrance to DNA polymerase function.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
37	Courtney DiSangro / Family, Community and Preventive Medicine	Kristen Ryczak, MD	Brian Park, Kristen Ryczak, Nielufar Varjavand	**Geographic Health Inequities in the Philippines: Rural vs. Urban Health :** During the summer of 2020 while working for the Foundation for International Medical Relief of Children (FIMRC) at their Cavite site in the Philippines, I was asked to create educational campaign materials for Barangay Health Workers (BHWs) to improve rural community health. BHWs are community health workers acting as primary care providers in rural areas. Working on this project illuminated the geographic health disparities in the Philippines for me. I conducted further research on the etiologies of these disparities, and I will discuss these roots of healthcare quality variations between rural and urban regions. These include barriers to healthcare access specific to the rural Cavite region due to lack of nearby health facilities and transportation costs. Specific to national concerns, I will address disparities in maternal health, through outlining differing rates in utilization of institutional delivery services. In 2013, the Philippine government stated that the weakest part of their healthcare system was the existence of these inequities which continue to remain a top threat to Filipino health today. FIMRC and the Philippine government have proposals to address these inequities. These future directions for Filipino healthcare and ways in which they plan to improve national health over the next years are through major health education campaigns and expanding health insurance coverage, family planning, nutritional and healthcare services. Through participating in this project and assisting in health educational development, the wide gaps in healthcare quality in the Philippines due to geographic variation was clearly demonstrated for me.
38	Swetha Vontela / Otolaryngology /Head and Neck Surgery	Robert Sataloff, MD	Baileu Balouch, Padmavathi Tipparaju	**Laryngology Education in Otolaryngology Residency Programs:** Objective: To evaluate resident exposure to laryngology during an otolaryngology residency as well the confidence, independence, and experience level of the new graduated physician in diagnosis and management of laryngology in the scope of voice disorders. Methods: An anonymous web- based, multiple choice, electronic questionnaire was sent to all accredited otolaryngology training programs in the United States. Results: 64 residents (33 PGY-4 and 31 PGY-5) responded to the survey. 85. 9% had training in strobovideolaryngoscopy, but only 7. 8% and 26. 6% had training in objective voice measurements and laryngeal EMG, respectively. An appropriate number of respondents had exposure to micro-direct-laryngoscopy, mass excision, thyroplasty, and subglottic stenosis repair. Only 54. 7% and 14. 1% had exposure to arytenoidectomy and reduction of arytenoid dislocation/subluxation, respectively. Conclusion: More comprehensive laryngeal education could be achieved by increasing exposure to laryngeal EMG and arytenoid dislocation/subluxation procedures during otolaryngology residency.
39	Parastou Azadeh Ranjbar / Otolaryngology /Head and Neck Surgery	Robert Sataloff, MD	Ghiath Alnouri	**The Prevalence of Esophageal Disorders Among Voice Patients With Laryngopharyngeal Reflux—A Retrospective Study:** The study aimed to identify the prevalence of esophageal disorders among voice patients with intractable laryngopharyngeal reflux (LPR) through analysis of 24 pH impedance and esophageal manometry. A retrospective chart review was performed of patients with LPR-associated dysphonia in the absence of subjective dysphagia who underwent 24 pH impedance and manometry after inadequate response to lifestyle modifications, high dose Proton Pump Inhibitors (PPIs), H2 blockers, and alkaline water. 109 patients ages 19 to 80 years were included, with a mean age of 51. 5 (SD 16. 8). Comorbidities, medications, Strobovideolaryngoscopy findings, 24 pH impedance, and esophageal manometry results were analyzed. all patients performed the study on reflux medications. About 24. 8% of subjects were found to have peristaltic wave abnormalities indicating esophageal dysmotility. Lower esophageal sphincter (LES) pressures were normotensive in 56. 9% of patients, hypertensive in 24. 8%, and hypotensive in 18. 4%. In addition, upper esophageal sphincter (UES) pressures were normotensive in 57. 8% of patients, hypertensive in 36. 7%, and hypotensive in 2. 8%. About 12. 6% had both LES and UES dysfunction. The average total reflux events in patients with dysmotility on manometry was 101. 81, which was significantly higher than the mean total of 61. 28 in the group with normal motility (P=0. 0396). In addition, there was a significantly higher prevalence of total events that were weakly acidic in the group with dysmotility compared to the group without (mean total weakly acidic events 70. 2 vs 44. 2, P = 0. 0427). Finally, the mean total supine reflux events and total acidic supine events were both significantly higher in patients with dysmotility than those with normal motility (P=0. 0199, P=0. 0213, respectively). In conclusion, esophageal dysmotility may be a significant cofactor in voice patients with refractory LPR on appropriate medications and lifestyle modifications. Further research is advised.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
40	Janine Yang / Medicine	Anjana Sharma, MD	Anjana Sharma, Ziva Mann, Roy Cherian, Jan Bing Del Rosario	**The real question is why someone had to say #DoctorsAreDickheads to be heard":** Qualitative analysis of a Twitter hashtag: Background: The social media site Twitter has become a popular forum for users to communicate their healthcare concerns and experiences as patients. In the fall of 2018, a hashtag titled #DoctorsAreDickheads emerged, with almost 40,000 posts calling attention to healthcare experiences. Objectives: We sought to identify common healthcare conditions and conceptual themes represented within the phenomenon of this Twitter hashtag. Materials and Methods: We analyzed a random 5% sample (N=500) of available tweets for qualitative analysis between the dates October 2018 – December 2018, when the hashtag was most active. We dual coded 20% of the sample, and the remainder individually. We abstracted the user's healthcare role and clinical conditions, and utilized a phenomenological content analysis to identify prevalent conceptual themes through sequential open coding, memoing, and discussion of concepts until agreement was reached. Results: Our final sample comprised 491 tweets and 282 unique Twitter users. In our sample, 49. 8% were from patients or patient advocates, 4. 3% caregivers, 9. 4% healthcare professionals, 3. 5% journalists/media; 1. 4% academic/researchers, and 31. 6% non-healthcare individuals/other. The most common clinical conditions were chronic pain, mental health, and musculoskeletal conditions. We identified three major themes: disbelief in patients' experience and knowledge which contributes to medical errors and harm; the power differential between patients and providersConclusions: People publicly disclose personal troubling healthcare experiences onsocial media. This adds new accountability for the patient-provider interaction, and shapes the public's viewpoint of how clinicians behave. This valuable opportunities to learn from patient experiences. Recommendations include developing practices for providers to improve communication, supporting patients through challenging diagnoses, and promoting patient engagement.
41	Matthew Young / Microbiology and Immunology	Sujan Shresta, PhD	Sujan Shresta	**Maternally Acquired Zika Antibodies Enhance Dengue Disease Severity in Mice:** Antibody (Ab)-dependent enhancement can exacerbate dengue virus (DENV) infection due to cross-reactive Abs from an initial DENV infection, facilitating replication of a second DENV. Zika virus (ZIKV) emerged in DENV-endemic areas, raising questions about whether existing immunity could affect these related flaviviruses. We show that mice born with circulating maternal Abs against ZIKV develop severe disease upon DENV infection. Compared with pups of naive mothers, those born to ZIKV-immune mice lacking type I interferon receptor in myeloid cells (LysMCre+Ifnar1fl/fl) exhibit heightened disease and viremia upon DENV infection. Passive transfer of IgG isolated from mice born to ZIKV-immune mothers resulted in increased viremia in naive recipient mice. Treatment with Abs blocking inflammatory cytokine tumor necrosis factor linked to DENV disease or Abs blocking DENV entry improved survival of DENV-infected mice born to ZIKV-immune mothers. Thus, the maternal Ab response to ZIKV infection or vaccination might predispose to severe dengue disease in infants.
42	Madeline Collazo Maguire / Medicine	Karin Silbernagel, PhD	Haraldur Sigurdsson, Phoebe Balascio, Karin Silbernagel	**The effects of kinesiophobia and pain on willingness to perform lower leg functional tests in people with mid-portion Achilles tendinopathy:** Kinesiophobia is defined as the fear of movement due to a desire to avoid (re)injury and is common among people who suffer from Mid-portion Achilles tendinopathy (MidAT). The Tampa Scale of Kinesiophobia (TSK) has been used to measure the level of kinesiophobia in people with a variety of musculoskeletal conditions, including MidAT. In this study we evaluated the effects of kinesiophobia on participants' willingness to perform a series of lower leg functional tests. We hypothesized that participants with higher TSK scores (higher kinesiophobia) would skip performing functional tests more frequently than those with lower TSK scores. We also explored if Achilles tendon pain during functional tests is a contributor to skipping further testing. We hypothesized that participants who reported higher pain levels would skip further testing more frequently than those with lower pain levels, independent of their TSK scores. Results showed that TSK score was not a significant predictor of test completion (beta = 0. 02, 95% CI = -0. 01 – 0. 06, P = 0. 2714), but that pain was a predictor (beta = -0. 16, 95% CI = -0. 27 – 0. 04, P = 0. 006). We concluded that pain, instead of kinesiophobia, was the biggest factor determining if a participant attempted or skipped a lower leg functional test.
43	Ashlyn Byers / Medicine	Aleksander Stanic-Kostic, MD/PhD	Payton Linder	**T-bet Regulated Gene Expression Throughout Pregnancy:** Background: T-bet (Tbx21) is an immune cell transcription factor first thought of as the master regulator of Th1 cell development, though it is now known to regulate both adaptive and innate immune responses. In addition to Th1 cells, T-bet is required for the development and differentiation of CD8 T-cells, B-cells, and innate lymphocytes. Further, T-bet expression is essential for maintenance of immunity at the maternal-fetal interface. Purpose: T-bet has been shown to be down regulated towards the end of gestation, prompting examination of T-bet regulated genes in pregnancy. Therefore, we anticipated that the expression of T-bet regulated genes at the maternal-fetal-interface would correspond with the down regulation of T-bet throughout gestation. Methods: We performed bulk RNA sequencing with four wild type (WT) mice, as well as six red fluorescent protein (RFP) mice with past T-bet expression. The WT mice were sequenced at gestational dates (GD) GD0, GD4. 5, GD11. 5, and GD16. 5, while the RFP mice were sequenced at GD0, GD6. 5, GD14. 5, and GD18. 5. The known T-bet regulated genes were categorized as 'up regulated' or 'down regulated,' then gene expression at the maternal-fetal-interface was analyzed across gestation. Results: We demonstrate the plasticity of T-bet expression across gestation, as genes that are up regulated by T-bet decreased expression throughout pregnancy, while genes that are down regulated increased expression. This was supported by the down regulation of Tbx21, the protein coding gene for T-bet. Conclusion: These results indicate that T-bet is highly plastic at the maternal-fetal interface, revealing a novel framework for immunoregulation throughout pregnancy. Keywords: T-bet; Tbx21; maternal-fetal interface.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
44	Michael Sun / Medicine	Hongbing Sun, PhD		**Exposure to organophosphorus insecticides and increased risks of health and cancer in US women:** Results of this project provide evidence that chronic long-term exposure to organophosphorus insecticides poses a significantly higher health risk for US women than for men, based on dialkylphosphate biomarker data from NHANES cycles 2003-2012. The risk of cardiovascular disease for female non-smokers aged 60-85 years in the highest dimethylthiophosphate (DMTP) urinary concentration quartile is 3. 0 (odds ratio, OD=3. 0, 95%CI 1. 4-6. 4) times higher than that in the lowest quartile. Women with higher urinary DMTP concentrations also have significantly higher risk of asthma at the ages 6-39 years and an apparently higher risk of chronic bronchitis at the ages 60-85. Overall cancer risk is significantly higher for female non-smokers aged 60-85 years in the higher urinary DMTP quartiles (OD=2. 7, 95% CI 1. 3-5. 9). Increasing risks of breast cancer for female smokers and prostate cancer for male smokers aged 60-85 years with higher exposure to organophosphorus insecticides in the US are also significant.
45	Kristen Ampig / Medicine	Zsofia Szep, MD	Karen Ha, Courtney Weintraub, Saishi Cui, Kim Strohmaier	**Association between Frequent Nurse Contact and Successful Smoking Cessation in People Living with HIV:** The morbidity and mortality caused by AIDS for people living with HIV (PLWH) has significantly decreased due to advances in antiviral therapy, but lung cancer continues to burden this population. More than 40% of PLWH used tobacco in 2016 which was greater than the national rate of about 14%, prompting effective interventions to reduce these modifiable risk factors. We conducted a retrospective study of smoking cessation in PLWH at the Partnership Comprehensive Care Practice, Division of HIV/AIDS at DUCOM. We aimed to evaluate whether the frequency of contact with the clinic nurse would be associated with successful smoking cessation at 12 weeks and 24 weeks after starting the program compared to those without visits with the clinic nurse. In our initial chart review, we found 273 patients diagnosed with HIV and prescribed medication for smoking cessation, which included nicotine replacement in the form of patches, gum, and lozenges, Chantix (varenicline), or bupropion. Overall, the median age was 53+/-10, 61% male and 76% were African American. 80 (31%) of patients were referred to the clinical nurse, of which 20 (8%) successfully quit smoking at 24 weeks. Among patients who were referred to the clinic nurse 55% of them quit smoking at 24 weeks versus 36% among patients who were not referred to the clinic nurse with an odds ratio of 2. 2 95% CI (1. 23,3. 17). Our findings encourage clinics to implement frequent follow-ups with a clinic nurse in order to further expand our support for PLWH in reducing these modifiable risk factors.
46	Kelvin Fenelon / Pediatrics	Renee Turchi, MD	Leah Popek, Katie Feehan	**A Preliminary Analysis of Survey Results Assessing Medical First Responders' Needs and their Perceived Level of Preparedness when interacting with Children and Youth with Special Health Care Needs:** Children and youth with special health care needs (CYSHCN) are children with an increased risk of chronic, physical, developmental, behavioral, or emotional conditions who require health services in a greater capacity when compared to their peers. CYSHCN comprise 18. 5% of all children in the US and when considering the complex nature of conditions within this population, they are likely to utilize emergency medical services. In this study, we aim to identify first responders' needs and perceived levels of preparedness for responding to medical emergency calls involving CYSHCN in Pennsylvania. The First Responder Needs Assessment Survey is an online-based survey distributed via Qualtrics to EMS responders who are affiliated with EMS regions within PA. The instrument examined challenges experienced in the field using a series of open-ended questions. The first phase of data collection began in February 2020 and ended in April 2020. A second data collection phase is scheduled for Fall 2020. Of the 413 initial responses, representing 66/67 PA counties, a preliminary qualitative analysis was conducted on the responses that indicated prior work experience with CYSHCN (n=300). The common themes which emerged included: 1) barriers in communication, 2) lack of adequate first responder training, and 3) insufficient acquisition of patient information. By identifying the needs of medical first responders when providing care to CYSHCN, opportunities can emerge at all levels of the emergency health care system to more effectively accommodate the needs of this patient population and their families.
47	Tristan Seton / Surgery	Michael Weingarten, MD	Wilbur Bowne	**Efficacy, Outcomes, and Cost of Laparoscopic vs Open Excision of Rectal Carcinomas:** Why rectal cancers are less straightforward than the colon: IntroductionLaparoscopy has been shown to be efficacious for colon cancer resection, but requires further study for rectal cancer due to pelvic anatomy. Additional study is required to determine if laparoscopy for rectal cancer results in equivalent Total Mesorectal Excision (TME) success with similar operative outcomes and economic benefits. MethodsA retrospective review of prospectively collected data was performed through Pubmed and two of the most recent large RCTs with reported intermediate follow up were identified (ACOSOG Z6051 and ALaCaRT) along with studies analyzing cost differences in rectal cancer treatment. ResultsALaCaRT showed no statistical difference in negative circumferential resection margin, negative distal margin, complete TME, and successful resection for laparoscopic vs open. ACOSOG Z6051 also showed no significant difference with circumferential resection margin, negative distal margin, complete TME, and successful resection. Both trials showed no significant difference in complications at 30 days, and disease free survival and recurrence at 2 years. Both showed laparoscopic had significantly longer operation time, less blood loss, and sooner return to bowel function. Laparoscopic cost more in multiple studies ranging from $69. 36 to $1,810 more per operation. ConclusionLaparoscopic resection is not significantly different in margin efficacy from open. There is no significant difference in operation outcomes at 30 days or two years. Laparoscopic takes longer, but results in less blood loss and time without bowel function. Laparoscopic costs more than open per procedure due to OR time and expense of instruments. Therefore, an open approach to rectal cancers should be preferred.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
48	Kira Smith / MD Program	Ines C. Lin, University of Pennsylvania	Kira Smith*, Natalie Plana	**Is There An Opportunity Cost of Networking in Plastic Surgery?:** Academic advancement in plastic surgery is dependent on publications, editorial positions, and speaking engagements from rising faculty. Although some positions are awarded through blinded applications, other roles are granted through personal connections and networking, which can result in an opportunity cost of diversity and inclusion. This study evaluates gender balance in many positions of plastic surgery that often benefit from internal nomination. Invited discussions published in the journal Plastic and Reconstructive Surgery (PRS) from 2010-2019 were identified, and author gender was recorded. ACGME-accredited plastic surgery training programs were also curated; gender of the currently active chief/chairpersons as well as program directors was documented. Gender of current editorial board members, including editors-in-chief and associate editors of plastic surgery journals were determined. Gender of society-sponsored traveling fellows was also investigated. Public profiles for all authors and faculty were referenced to confirm gender identification. 797 PRS Discussions were included, 18% of which included female first or senior authorship. 11 (10%) chief/chairpersons and 21 (19%) program directors of ACGME programs were identified as female. Women occupied 19% of searched journal editorial board positions, though none were editors-in-chief. Lastly, ASRM, ASMS, ASSH, and PSF traveling fellowships were awarded to 1 (3%), 4 (7%), 5 (13%), and 141 (15%) female plastic surgeons. Invited PRS discussants, academic leadership positions, journal editorial board members, and traveling fellows lag behind in gender balance relative to training and practicing plastic surgeons. This disparity is important to consider as organizations promote inclusion.
100	Richa Gupta / Pharmacology and Physiology	Seena Ajit, PhD	Sujay Ramanathan, Botros Shenoda, Srinivas Somarowthu, Ahmet Sacan	**Protective role of Xist-RNF139 complex in acute inflammation by modulating NF-?B activity:** Biological sex influences inflammatory response. There is a greater incidence of acute inflammation in men, and but chronic inflammation is predominant in women. X-inactive specific transcript (XIST) is a female cell-specific nuclear long noncoding RNA (lncRNA) crucial for X-chromosome inactivation. Our previous studies investigating the sex-specific differences underlying inflammatory response showed that lipopolysaccharide (LPS) stimulation-induced acute inflammation resulted in changes in subcellular localization of Xist. LPS stimulation increased Xist in the cytoplasm of female mouse J774A. 1 macrophage cells. Expression of 5′ XIST in male RAW 264. 7 cells significantly reduced IL-6 and NF-?B activity. Our imaging and RNA-immunoprecipitation studies suggested that Xist associates with the p65 subunit of NF-?B in the cytoplasm under inflammation, an interaction that delayed nuclear migration of NF-?B. To determine the mechanism by which Xist suppresses acute inflammation in female cells and assess if Xist interaction with p65 is direct, we performed RNA antisense purification with mass spectrometry (RAP-MS). We discovered that Xist binds to RING finger protein 139 (RNF139) E3 ubiquitin-protein ligase in the cytoplasm of J774A. 1 cells after LPS treatment. Nuclear migration of NF-?B occurs after degradation of I?B proteins following phosphorylation and ubiquitination. Using gain and loss of function studies in vitro, we are testing the hypothesis that cytoplasmic Xist can block or delay RNF139 mediated ubiquitination and proteolysis of I?B. Our readouts include changes in proinflammatory gene expression, ubiquitination of I?B, and NF-?B activity. We observed that siRNA knockdown of RNF139 resulted in increase in Il-6 expression similar to Xist knockdown. Our studies will elucidate a new role for RNF139 in female cells facilitated by XIST and how this lncRNA RNA-protein complex confer protection from acute inflammation in female cells.
101	Conor Rizzuto / Microbiology and Immunology	Carol Artlett, PhD	Ben Haslund-Gourley, Carol Artlett	**Elucidating the Mechanism of Type 1 Procollagen Export from the ER in the Fibrotic Pathway:** The synthesis of collagens starts with the production of multiple procollagens that move to the ER and undergo a folding process. After folding, they exit the ER in coat protein II (COPII) vesicles that travel to the Golgi for further modification. These vesicles are spherical and 60-70 nm in diameter. Procollagens, at 300-450 nm, are too large to fit into standard COPII vesicles, but procollagen transport from the ER to the Golgi is still COPII dependent. This size paradox was recently elucidated in a study done in Drosophila, where it was found that the export of procollagen VII involved TANGO1 and cTAGE5 acting together with other export proteins to construct a mega-COPII transport carrier that accommodated the large procollagen. Currently, however, the export of type I procollagen from the ER remains uncharacterized in mammals and unstudied in fibrosis. This review seeks to summarize research thus far to characterize the process and highlight avenues for future research. There are currently three hypotheses as to how this process occurs in mammals. It is thought to 1) occur via enlarged coat protein II (COPII) vesicles as noted above, 2) via COPI processing, or 3) in the absence of large carriers. COPI is largely involved in the recycling of proteins back to the ER and yet there is evidence that there is COPI dependent pre-Golgi procollagen sorting. In 2002, mammalian cell COPI coat function was inhibited which led to the inhibition of procollagen export from the ER6. More recent studies have found that procollagen is exported from the ER in the absence of large carriers. For instance, fibroblasts are prolific exporters of collagen, yet they lack COPII vesicles. ERGIC may play a role in membrane formation of either vesicles or tunnels, but McCaughey et. al. indicate that their GFP-linked procollagen transport did not require an intact microtubule network. Instead, they suggest a short-loop pathway which ferries large cargo from the ER to the Golgi.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
102	Amanda Platt / Microbiology and Immunology	Joris Beld, PhD	Amy Ma	**Exploiting small synthetases to overcome challenges of natural product engineering:** Approximately two thirds of clinically useful drugs are natural products or semi-synthetic derivatives. An important class of natural products are the non-ribosomal peptides, which are synthesized by non-ribosomal peptide synthetases (NRPSs) and include antibiotics like vancomycin. NRPSs are molecular machines with a multi-modular architecture. They synthesize products in an assembly line manner where the domains in each module activate and incorporate one monomer into the final product. Engineering synthetases by replacing or re-ordering domains and/or modules is an attractive strategy to generate new "unnatural natural products". However, successful combinatorial engineering requires a better understanding of the function of individual domains and the interactions between them. We use Ebony, a small three-domain NRPS from Drosophila melanogaster, and two bacterial homologs as tools to address combinatorial engineering challenges from three angles. First, we used synthetase dissection to study the protein-protein interactions between Ebony's domains. We used liquid chromatography mass spectroscopy to show that nine percent of activity was preserved after Ebony was dissected into a di-domain and a detached C-terminal domain and used in silico modeling and docking to predict domain interfaces within the synthetase. We also cloned, heterologously expressed, and purified novel Ebony homologs from bacterial species and are characterizing these synthetases. Finally, we generated hybrid synthetases using domains from Ebony and bacterial homologs and will test their function and ability to generate novel natural products. We envision that the information gained from studying small synthetases, like Ebony and bacterial homologs, can be leveraged to engineer NRPSs for assembly of new products with new or enhanced bioactivities.
103	Alexa Cannon / Biochemistry and Molecular Biology Fox Chase Cancer Institute	Jonathan Chernoff, MD/PhD	Cristina Uribe-Alvarez, Jonathan Chernoff	**RAC1 P29S Expression in melanocytes is associated with increased DNA damage and altered cell cycle progression:** Melanoma is the fifth most common cancer in the United States that has less than a 25% 5-year survival rate once the cancer has metastasized beyond the lymph nodes. Recent exome studies of cutaneous melanoma have identified RAC1P29S as the third most prevalent hotspot mutation in 4-9% of sun-exposed melanoma. RAC1 alterations in cancer are correlated with poor prognosis, resistance to standard chemotherapy, and insensitivity to targeted inhibitors. Although RAC1P29S mutations in melanoma and RAC1 alterations in several other cancers are becoming increasingly evident, the RAC1-driven biological mechanisms contributing to melanomagenesis remain unclear. Lack of rigorous signaling analysis has prevented identification of alternative therapeutic targets for RAC1P29S-harboring melanomas. To investigate the RAC1P29S-driven effect on downstream molecular signaling pathways, we generated an inducible RAC1P29S expression melanocytic cell line and performed RNA-sequencing (RNA-seq) coupled with multiplexed kinase inhibitor beads and mass spectrometry (MIBs/MS) and reverse phase protein arrays (RPPA) to establish enriched pathways from the genomic to proteomic level. Our proteogenomic analysis has identified the G2-M cell cycle phase transition as a hyperactive pathway in RAC1P29S-expressing melanocytes. RAC1P29S expression promotes increased kinase activity of the PAK-PLK1-AURORA A axis and increased transition into M-phase as indicated by FACS analysis. Interestingly, RAC1P29S-expressing melanocytes also possess increased DNA damage via ?H2AX foci, suggesting a compromise in G2-M checkpoint integrity and an altered DNA damage response. Furthermore, RAC1P29S-expressing melanocytes show increased sensitivity to chemotherapeutic drugs specific to the G2-M checkpoint. Collectively, these results suggest novel therapeutic strategies to target RAC1P29S-driven melanoma.
105	Mitchell Parker / Biochemistry and Molecular Biology Fox Chase Cancer Institute	Erica Golemis, PhD	Simon Kelow, Vivek Modi, Qifang Xu, Bulat Faezov, Joshua Meyer, Erica Golemis, Roland Dunbrack	**Developing RasCore: A Biological Resource for Modeling Mutated RAS Protein Structures:** RAS proteins (KRAS, NRAS, and HRAS) are the most common mutationally activated oncogenes in human cancers. Over the past three decades, scientists have searched for mutation-specific RAS inhibitors, however, these efforts only produced compounds effective in treating the 35% of non-small cell lung cancers with a KRAS G12C mutation. While computational drug screens have demonstrated promise in identifying additional RAS inhibitors, not all RAS mutations have available structural models for screening candidates. Consequently, we have begun developing RasCore, a biological resource for modeling mutated RAS protein structures. The goal of our work is to classify the 372 experimentally solved (i. e. X-ray crystal and NMR) RAS structures in the Protein Data Bank (PDB) based on their biological representation (i. e. mutation status, bound ligand, protein in co-complex, and conformational state) and use this information to model RAS mutations that do not have an available structure. In preliminary work, we analyzed the mutational patterns of RAS proteins in a cohort of 100,707 sequenced human tumors, to identify the most common RAS mutations with no available structures in the PDB. Simultaneously, we classified the RAS structures in the PDB based on mutation status, bound ligand, protein in co-complex, and conformational state. Our RAS conformational classification is based on the backbone orientation of the RAS switch 1 (SW1) and 2 (SW2) regions, which provide binding interfaces for regulatory and signaling effector proteins. In ongoing work, we will use our RAS structural classification to create a library of mutated RAS proteins structures for screening candidate compounds.
106	Serly Tomas / Analytical Chemistry	Veronica Jaramillo, PhD		**Analyzing the Effectiveness of Phytoremediation, with the Brassica Juncea plant, in extracting heavy metal pollutants from contaminated soils:** The development of urbanization has led to the contamination of soil with a variety of heavy metals. Several techniques have been adapted to attempt to minimize the concentration of heavy metals from soil as they pose danger to plants, the ecosystem, and human health, as humans intake plants as a part of their daily diet. The focus of this study was to determine the effectiveness of utilizing phytoremediation plants as a method for decreasing the concentration of heavy metals in polluted soils. The most common heavy metal pollutants are Zn, Mn, Cu and Cr, based on which, five model soil systems were created. One being a standard soil system, the other four containing soil watered with a different 30ppm heavy metal solution. These soil systems were then used for growing a phytoremediation plant called Brassica juncea, commonly known as the Indian Mustard plant. Samples from the soil systems were then collected weekly and tested with a handheld X-Ray Fluorescence machine to analyze the effectiveness of the Indian Mustard plant in extracting metal pollutants from it.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
107	Jessica Pacheco / Cell and Molecular Biology	Stanley Lo, PhD	Chyenne Mercer, Austin Zuckermann	**Transfer student experiences and identity formation in STEM:** Transfer student experiences and identity formation in STEMAuthors: Jessica Pacheco, Cheyenne Mercer, Austin Zuckerman, Stanley LoStudies have shown that transfer students have a high interest in majoring in science, technology, engineering, and math (STEM) disciplines. However, due to limited opportunities, transfer students tend to have decreased academic involvement and continuation within STEM majors in comparison to non-transfer students. Academic experiences may allow for students to have a positive or negative perspective in their persistence in STEM, thus potentially changing their science identity. Through this study, we have identified academic experiences, outcomes, and identity trajectories within nine transfer students to understand the possibilities that lead to positive science identities. STEM transfer students were interviewed on meaningful academic experiences. Interviews were transcribed and were qualitatively coded (Saldana, 2009). Compared to previous coded data, new codes were identified to capture different experiences that students had. The science identity model by Carlone and Johnson is used to classify what students' priorities are for persistence in a major. (Carlone & Johnson, 2007). The results found in the data thus far have indicated that students have had both positive and negative experiences within their time as STEM majors. Experiences that were positive helped further provide tenacity in students' education and continuation in STEM. The experiences that were negative had provided some students a peripheral trajectory that did not increase nor decrease their trajectory in their majors. Further coding and findings need to be made in order to help guide faculty and staff to provide support for transfer students in their success and persistence in STEM.
108	Claudia Guzik / Biochemistry and Molecular Biology	Patrick Loll, PhD		**Characterizing ATP Binding to VanS, the Vancomycin Sensing Protein of Vancomycin Resistant Enterococci:** Vancomycin resistant enterococci (VRE) sense vancomycin using VanS, a transmembrane histidine kinase that, upon sensing the presence of vancomycin, phosphorylates and activates VanR, a transcription factor for the resistance operon. Despite the clinical importance of VRE, the mechanistic details of this two-component detection system remain largely unknown. The crystal structures for isolated catalytic and ATP-binding (CA) domains of VanS have previously been determined, however these proteins were not observed to be complexed with the nucleotide. In order to further investigate VanS activity, we have characterized the binding of ATP to these purified VanS CA domains for both A-type and C-type VRE. Our assay uses TNP-ATP, a fluorescent ATP analog that displays increased emission intensity upon binding to VanS. Using fluorescence spectroscopy, we have generated a binding curve for this interaction and calculated binding affinity. We found that for TNP-ATP: VanS-A Kd = 499μM, and for TNP-ATP: VanS-C Kd = 148μM. We subsequently used this TNP-ATP model to determine the affinity of ATP: VanS by competition. From the competition curve, we determined that for ATP: VanS-A Kd = 10. 3mM, and for ATP: VanS-C Kd = 5. 7mM. These data have characterized for the first time the ATP: VanS interaction, which contributes to our understanding of the VanS/VanR mechanism as the CA domain is central to VanS activity. Understanding its function has important clinical implications, as antibiotic adjuvants that block the VanS CA domain have the potential to provide resistance evasion.
109	Brett LaBier / Microbiology and Immunology Institute for Biotechnology and Virology Research	Sonia Navas-Martin, PhD	Elijah Davis	**TLR3-TLR4 Crosstalk:** Investigation of LPS-EB Response in Murine Microglia: Lipopolysaccharide (LPS) is a potent endotoxin secreted by gram-negative bacteria and a strong stimulant of the immune system. LPS has been shown to contribute to neurodegenerative diseases such as Parkinson's, Alzheimer's, amyotrophic lateral sclerosis, as well as diabetes and cardiovascular disease. Increased levels of serum LPS have been shown to be present in these various diseases, resulting in increased levels of inflammation and even causing cognitive impairment in mice. Depending on the type of LPS, recognition of LPS may occur via the pattern recognition receptors (PPR) Toll-like Receptors (TLRs) 2 and 4. TLR4 is unique in that it is the only TLR that is capable of signaling both the myeloid differentiation primary response 88 (MyD88) and TIR-domain containing adaptor inducing interferon- ß (TRIF) pathways. TLR3 is another unique TLR in that it is the only TLR that does not utilize MyD88, signaling solely via the TRIF pathway. TLR3 is responsible for recognition of viral infection via the detection of double-stranded RNA. Activation of this TLR leads to phosphorylation of IRF3 and production of type I interferons. Previous data has shown that LPS induces the expression of TLR3 and that MyD88 is a negative regulator of TLR3-dependent IRF3 activation. Despite various interactions of this nature existing between the signaling pathways of TLR3 and TLR4, the exact mechanism of the crosstalk between these TLRs has yet to be defined. We believe that a crosstalk axis exists between TLR3 and TLR4 where LPS stimulation indirectly activates TLR3 and this is mediated by the activation of TLR4 in murine microglia.
110	Prajakta Mehetre / Biochemistry and Molecular Biology	Shae Padrick, PhD	Meagan Tomasso	**Identification of the Cdc42EP3/Borg2 Actin binding element:** Identification of the Cdc42EP3/Borg2 Actin binding elementCdc42 effector protein family consists of five members (Cdc42EP1-5), also known as Borg (Binder of Rho GTPase). Each member in this family are defined by CRIB (Cdc42/Rac Interactive Binding motif) and Borg Homology domains, BH1-3. They are known to be the first regulators of Septin cytoskeleton in mammals. Recent studies in Cancer Associated Fibroblasts (CAFs) have found that Cdc42EP3 works with the septin cytoskeleton to stabilize actin filaments in stress fibers. Although it is established that BH3 of Cdc42EP3 interacts with septin complexes, the region responsible for interaction with actin is not clearly established. I have designed two series of Cdc42EP3 N-terminal and C- terminal truncations based on the conserved regions in the sequence. By employing tetramethylrhodamine (TMR) labelling at a unique site, I have developed a Fluorescence Anisotropy assay for binding to actin. Using this assay, I have established the Cdc42EP3 region important for acting binding. Notably, this region differs from that previously reported and exists in other Cdc42EP/BORG proteins, suggesting that actin interaction maybe a widespread and unrecognized feature of the protein family.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
111	Meagan Tomasso / Biochemistry and Molecular Biology	Shae Padrick, PhD	Shae Padrick, Elias Spiliotis	**SEPT9 is a novel actin nucleation factor:** The septins are a group of GTP-binding cytoskeletal proteins that were originally identified for their role in yeast cytokinesis. In mammals, they are implicated in cytokinesis and many other cellular processes. Septins self-associate to form hexameric and octameric complexes, which then polymerize into filaments. Septins co-localize with actin structures and one, SEPT9, binds actin directly through a unique N-terminal domain. SEPT9 also is linked to many diseases, most notably breast cancer where it is upregulated and correlates with more aggressive and invasive phenotypes. The exact role of SEPT9 in cancer is understood, and the impact of SEPT9 on actin dynamics is an open question. Using in vitro reconstituted actin polymerization assays we show that SEPT9 filaments can nucleate actin filaments. Septin octamer filaments containing SEPT9 slow actin polymerization. While the current dogma is that septins only exist in complexes with other septin family members, using a sucrose gradient centrifugation assay, we show that a free pool of SEPT9 exists outside of the octamer in a biologically relevant breast cancer cell line. We have shown that SEPT9 exists outside of the typical octameric complex and that this free pool of SEPT9 is able to act as an actin nucleation factor in vitro, shedding new light on its role in actin dynamics and potentially uncovering a role for upregulated SEPT9 in breast cancer.
114	Sarah Lee / MD Student	Madhura Tamhankar, MD	Vivian Lee, Devin Cohen	**Clinicopathologic significance of presence of adipose tissue in resected muscles from strabismus surgery:** INTRODUCTION: Histopathology of extra-ocular muscles (EOMs) of both healthy and strabismic eyes reveal presence of lipid-like droplets, collagen proliferation, and abnormal arrangements and sizes of contractile elements. 1-7 The significance of these changes is unknown and phenotypic correlation is lacking in the literature. Our objective was to study the significance of fatty infiltration in resected muscles of patients with strabismus. METHODS: Histopathology of resected muscles in those with esotropia and exotropia were examined from adult patients between September, 2013 and May, 2019. Those with prior surgery on the muscle of interest, scleral buckle and extra-ocular device placement were excluded. Muscle specimens were fixed in 10% formalin, grossed, processed, and stained per standard protocol. RESULTS: Of the 90 patients there were 40 with exotropia and 50 with esotropia who underwent surgery. Exotropic subjects had an average misalignment of 41 prism diopters (PDs) (SD, 15. 4) compared to 26 PDs (SD, 11. 2) for those with esotropia. In 88% (35/40) of subjects with exotropia and 30% (15/50) of subjects with esotropia, some degree of fatty infiltration in the resected medial rectus muscle and lateral rectus muscle was identified (OR=10. 88, 95% CI: 3. 25 to 36. 4, p<0. 001). CONCLUSION: The significance of fatty infiltration in EOMs resected from strabismic eyes is unknown. A higher percentage of subjects with exotropia were found to have fatty infiltration compared to esotropia. Larger studies are necessary to explore the significance of histopathological changes in EOMs in those with other types of strabismus.
115	Ian Lamb / Microbiology and Immunology	Drexel University College of Medicine	Ian Lamb*, Joanne Morrisey, Thomas Daly, Bethany Jenkins, Michael Mather, Lawrence Bergman	**Phenotypic Characterization of an Essential Myzozoan-specific Mitochondrial Protein with Unknown Function in Plasmodium falciparum:** Mitochondrial functions are essential throughout the life cycle of malaria parasites and have been validated as targets of antimalarial drugs. We are exploring the possibility that essential mitochondrial functions may provide additional targets for the discovery of novel antimalarial drugs. Here, we seek to characterize a* Plasmodium* protein encoded by the gene PF3D7_0105500 with unknown function. This gene is highly conserved and limited only to the Myzozoan superphylum. Using a conditional gene knockdown, we derived a transgenic parasite line in which the PF3D7_0105500 gene product is endogenously tagged in a manner that expression is dependent on the presence of anhydrotetracycline (aTc). Withdrawal of aTc caused parasite demise, showing essential function of this gene for parasite survival. We have successfully expressed this protein recombinantly in E. coli to direct antibody production as well as to assess its potential function. We also generated a parasite line in which this gene is overexpressed from an ectopic site and tagged with 3HA, which allowed us to detect the protein by Western blotting and to localize it to the parasite mitochondrion by immunofluorescence. Lastly, we conducted experiments to look for hypersensitivity to antimalarials with known mitochondrial targets after PF3D7_0105500 knockdown including atovaquone, proguanil, and DSM-1 as judged by tritiated hypoxanthine incorporation. However, no hypersensitivity phenotypes were observed, and thus the pathway(s) in which this protein is involved remains elusive at this point. Additional studies are underway to demonstrate potentially Myzozoan-specific function of this mitochondrial protein.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
200	Jason Wickman / Pharmacology and Physiology	Seena Ajit, PhD	Xuan Luo, Renee Jean-Toussaint, Peyman Sahbaie, Tian-Zhi Guo, David Clark, Ahmet Sacan	**Clinical translatability of miRNA signature in small extracellular vesicles from mouse tibia fracture model of Complex Regional Pain Syndrome:** Complex regional pain syndrome (CRPS) is a debilitating chronic disease that occurs after trauma to the periphery and is intimately associated with nerve injury and neuropathic pain. Owing in part to our poor understanding of disease etiology, current treatments for CRPS are insufficient and there is a lack of quantitative diagnostic markers. Exosomes are small extracellular vesicles (sEVs) 30-150 nM in size which provide a means of cellular communication via cargo molecules (protein, miRNA, mRNA, lipids), and have demonstrated promise identifying potential diagnostic markers and mechanistic targets. We have shown previously that CRPS patients have differential expression of several miRNAs in serum derived sEVs as compared to healthy controls, but it is unknown if these changes are shared in animal models. Rodent tibia fracture model (TFM) is the most widely used model for CRPS and duplicates distal limb fractures, the most common etiology of CRPS. Determining commonly dysregulated miRNA in CRPS patients and TFM could identify mechanistic targets for translational studies. After establishment of pain hypersensitivity, serum samples were collected from TFM and control mice three weeks post injury. sEVs were isolated by differential centrifugation and characterized using nanoparticle tracking analysis (NTA), transmission electron microscopy and western blotting. NTA showed no significant difference in number or size of sEVs in serum from TFM and control mice. Cytokine analysis of sEVs from TFM and control mice did not indicate significant differences. HTG EdgeSeq analysis identified significant differential expression of 50 miRNAs in sEVs from TFM compared to control mice, 11 of which were previously observed in CRPS patients including miR-939 and miR-25. These observations highlight the potential utility of miRNAs as both disease biomarkers and feasibility for guiding translational mechanistic studies in rodent tibia fracture model of CRPS.
201	Benjamin Haslund-Gourley / Microbiology and Immunology	Mary Ann Comunale, PhD		**A Novel Glycomic Approach to Lyme Disease Diagnosis:** Lyme Disease is an inflammatory disease transmitted by the bite of an Ixodes tick carrying the Borrelia burgdorferi spirochete. Diagnosis is challenging and some patients continue to report symptoms more than six months after completing the recommended antibiotic treatment. Currently, it is unknown why some patients suffer Post-treatment Lyme Disease Syndrome (PTLDS). Current diagnostics have poor sensitivity and specificity, cannot determine disease resolution post-treatment. Additionally, testing fails to differentiate current and past infections. Glycomic and glycoproteomic approaches have linked aberrant protein glycosylation to various inflammatory diseases but there are few studies that have examined Lyme disease. Thus, this is an exploratory study that examines the potential of glycobiomarkers in the serum of acute Lyme disease (ALD) patients and post-treatment convalescent draws (CD). ALD and CD serum were found to contain statistically significant differences in multiple glycan-species as compared to age-matched healthy controls. These data are encouraging and represents a promising first step towards developing novel diagnostic tools to improve diagnosis and resolution of disease, and understanding PTLDS.
202	Jenyth Sullivan / Anesthesiology	Samuel McLean, MD	Jeffrey Ho, Gordon Reed, Melissa Platt, Ralph Riviello, Cathy Rossi, Patricia Nouhan, Carolyn Phillips, Sandra Mardtin, Israel Liberzon, Sheila Rauch, Nicole Short, Ronald Kessler, Samuel McLean, Andrew Tungate, Kenneth Bollen, Megan Lechner, Kathy Bell, Jenny Black, Jennie Buchanan, Rhiannon Reese	**Posttraumatic stress symptoms mediate the transition from acute to persistent pain among women sexual assault survivors:** Acute and persistent pain are common, yet often overlooked, sequelae of sexual assault, and little is known about mechanisms underlying the transition from acute to persistent pain in this population. The current study used structural equation modeling to examine whether early posttraumatic stress symptoms, particularly alterations in arousal and reactivity, mediate the transition from acute to persistent pain six weeks after sexual assault among a large sample of women presenting for emergency care after sexual assault. Women > 18 years of age presenting for emergency care after sexual assault to twelve sites were approached and 706 were enrolled in the study. Women completed assessments of pain at the emergency care visit, one week, and six weeks post-assault and posttraumatic stress one week post-assault. Structural equation modeling was used to test hypotheses. Over half of women reported clinically significant acute new or worsening pain, which persisted to six weeks in nearly half of survivors. One week acute posttraumatic stress symptoms, specifically alterations in arousal and reactivity, mediated the transition from acute to persistent pain, even after covarying for age, race, lifetime and childhood trauma exposures, and pre-assault pain. A significant portion (41%) of women sexual assault survivors reported clinically significant new or worsening pain up to six weeks post-assault. The development of persistent pain may be mediated by posttraumatic stress, potentially via maintaining stress system activation post-assault. Results point to the possibility that intervening to mitigate posttraumatic stress symptoms could prevent the development of persistent pain after sexual assault.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
203	Anuj Vaid Camran / Nezhat Institute-Center for Special Minimally Invasive and Robotic Surgery	Camran Nezhat, MD	Janelle Jackman, Camran Nezhat	**Endometriosis screening by Nezhat Endometriosis Advisor Mobile Application during the COVID-19 pandemic:** ObjectiveEndometriosis is ectopic uterine lining growing outside the uterus which causes pain and infertility. Currently, definitive diagnosis is with pelvic laparoscopic surgery, as no screening test is widely available or accepted. During the COVID-19 pandemic, Nezhat Endometriosis Advisor (NEA) Mobile Application was utilized to determine the likelihood of endometriosis based on self-answered questionnaires about experienced symptoms. The purpose of this study is to determine the positive predictive value (PPV) of diagnosis for endometriosis by NEA mobile application. MethodsA retrospective cohort study was conducted at a university-affiliated private practice. Inclusion criteria were women with no previous surgical diagnosis of endometriosis who also completed an endometriosis assessment using the application. Patients with symptoms desiring definitive diagnosis and treatment of endometriosis then underwent laparoscopic surgery. The diagnosis of endometriosis was confirmed through biopsy sent to pathology. The primary outcome measured was the PPV of NEA mobile application questionnaire to the surgical diagnoses of endometriosis. ResultsA total of 30 patients have met the inclusion criteria for this on-going study. 95% of the patients whose score on the app was 90% or above, had a surgical pathology confirmed diagnosis of endometriosis (PPV 95%). DiscussionThe mobile application seems to be a possible alternative method to assess risk of endometriosis while avoiding risk of COVID-19 exposure. Patients can be medically treated based on symptoms and application results until surgery can be performed. Additional research is needed to fully evaluate the application in different patient populations.
204	Wilson Ho / College of Medicine	Susana Ortiz, MD/ PhD	Valentin Fe-ichtenschlager, Emily Chen, Jean-Philippe Coppe, Susana Ortiz	**Two lncRNAs Targets in NRAS Mutant Melanoma: L1 and L2:** Cutaneous malignant melanoma treatment has improved significantly over the past decade, but there continues to be nearly 40% of patients who do not respond to therapy. In addition, there are fewer treatment options for melanomas with a mutation in NRAS. By analyzing the long noncoding RNA (lncRNA) that are differentially expressed in NRAS mutant melanoma, and the kinases with which they interact, we found novel targets that can be developed into personalized therapy. In comparing the lncRNA expression levels of NRAS mutant cells (melanomas from The Cancer Genome Atlas [TCGA], 2 melanoma cell lines, and melanocytes transfected with a plasmid containing the NRAS mutation) to those of melanocytes transfected with an empty plasmid, we identified 23 consistently up-regulated lncRNA. Knockdown of two lncRNA, L1 and L2, via antisense oligonucleotides (ASO) led to the greatest decrease in viability across 22 melanoma cell lines, but no decreased cell viability in 7 NRAS wild-type cell lines. We found that the substantial decrease in cell viability is at least in part due to induction of apoptosis. Gene ontology term enrichment of RNA sequencing data showed that knockdown of L1 and L2 led to major changes in expression of genes related to signal transduction. Since some long noncoding RNA mediate their effects via RNA binding proteins and both lncRNA lead to changes involved in signal transduction, we evaluated changes in kinase activity using the High-Throughput Kinase Activity Mapping (HT-KAM) platform. HT-KAM analysis found that a number of kinases have altered activity following knockdown of L1 or L2. Knockdown of L1 or L2 via ASO or inhibition of the kinases that the lncRNA depend on may represent new treatment modalities for melanoma that were previously unresponsive or that have become resistant to current therapies.
205	Granit Mavraj / Medicine	Edward Schulman, MD	Brian Patchett, Bede Nriagu, Edward Schulman	**Reliability of Blood Eosinophil Counts in Guiding Severe Asthma Treatment for Inner City Adults:** Since 2015, clinicians have recognized a high T-helper cell 2 (Th2)" asthma subtype targeted with new classes of expensive biologics: anti-Interleukin-5 or anti-Interleukin-4a receptor antibodies. The peripheral blood eosinophil (PBEC) count (>150/ul) is the major marker of high Th2 asthma (HTh2). The reliability and consistency of a single PBEC, on which treatment is based, has never been validated. The consistency of a single PBEC accurately classifying patients as HTh2 or Low Th2 (LTh2, <150 cells/ul) was examined in a retrospective chart review of 134 inner city patients seen in the Drexel Severe Asthma Clinic. Cohorts were assigned based on number of PBEC replicates (2x to 10x) drawn over 2 to 10 years. Measurements to evaluate the validity of true LTh2 and true HTh2 included: sensitivity, specificity, predictive value, false negative, false discovery and false omission rate. Repeated PBEC consistently classified high Th2 89. 77% of the time, and low Th2 75. 65%. The false discovery rate for high Th2 was 18. 78% and the false omission rate was 13. 67%. Cohort "2x" showed the highest consistency, 78. 38%. Cohort "9x" showed the lowest consistency, 14. 29%. When a single CBC indicates a patient is "high Th2" asthma, it is accurate 89. 77%; "low Th2" only 75. 65% of the time. These results suggest a single PBEC cannot be relied upon as a basis to commit patients to expensive ($32,000 to $37,000/year) biologic asthma treatments.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
206	Stephanie Jinno / Biochemistry and Molecular Biology	Christian Sell, PhD	Mauricio Ahumada, Michael Howley, Michael Weingarten, Christian Sell	**Repurposing mTOR inhibitors to prevent age-related disease: from the lab to the finances:** While the approval process for a novel drug is well established, the procedure to repurpose an approved drug for a new indication is less well defined. This project examines rapamycin, an mTOR inhibitor originally approved by the FDA as an immunosuppressant and recently found to be involved in slowing integumentary cell senescence through topical administration. This finding marks an opportunity for the repositioning of rapamycin in the treatment of aging-related disorders. Specific indications being considered for FDA approval include inhibition of the progression of precancerous lesions and actinic keratoses to squamous cell carcinoma. As the drug repurposing operation continues, the financial and commercialization processes must also be considered. The alignment of the drug that would reach a large number of patients and have a market sufficient for continued funding of research was in the over-the-counter (OTC) arena. This finding led to a business analysis of an OTC cream featuring repurposed rapamycin as the active ingredient. Production hubs in the West and Mid-Atlantic regions were defined, and a positioning plan to match the drug effects with user preferences in these regions was created. Financial indicators have been determined to assess the product feasibility, and a commercialization strategy was constructed to attract investor funding and allow for enhanced patient accessibility to this drug. As a whole, this project will help define the path of this high-potential drug from the laboratory to an OTC product, requiring interdisciplinary collaboration between the medical, basic science, and business communities.
207	Rosanna Kiplagatother / College of Medicine	Simeon Taylor, MD/ PhD	Merna Beshara	**Pharmacogenomic of Canagliflozin:** Canagliflozin belongs to the glucose cotransporter-2 (SGLT2) inhibitors class of anti-diabetic drugs. SGLT2 inhibitors have favorable metabolic and cardiovascular risk profiles, but also have safety concerns, including diabetic ketoacidosis and bone loss. The proposed research seeks to investigate the interindividual variation in pharmacodynamic responses and the correlation among the various responses. This project seeks to conduct a genome-wide association study (GWAS) in non-diabetic Amish research subjects to identify genetic variants that predict an individual's response to canagliflozin. We will administer canagliflozin (300mg/d) for 5 days to 525 healthy Amish research subjects over the course of 5 years and we will and measure the clinical efficacy and safety-related pharmacodynamic responses. Based on preliminary data from a funded pilot study on healthy Amish research subjects, we hypothesize that genetic variants in this study are very likely to be predictive of clinical responses to SGLT2 inhibitors in diabetic patients. For the initial 110 participants, canagliflozin-induced 24-hour glucose excretion varied over a 3. 9-fold range (14. 05-54. 25 g/d). Canagliflozin also triggered changes in the bone-related biomarkers such as FGF23 and 1,25-dihydroxyvitamin D. The observed increase in plasma FGF23 was correlated with a decrease in plasma 1,25-dihydroxyvitamin D (r=-0. 24, P<0. 05). There was also a trend toward correlation between the 24-hour glucosuria and change in 1,25-dihydroxyvitamin D (r=0. 18, p=0. 054). This study will add to our understanding of predictive biomarkers and will guide individualized therapy based on genetic variants for more favorable outcomes. Supported by the Summer Program in Obesity, Diabetes and Nutrition Research Training under NIG award number T35DK095737 and R01DK118942
300	Xuan Luo / Pharmacology and Physiology	Seena Ajit, PhD	Xuan Luo, Renée Jean-Toussaint, Ahmet Sacan, Seena Ajit	**Differential RNA packaging into small extracellular vesicles by neurons and astrocytes:** Small extracellular vesicles (sEVs) mediate intercellular communication by transferring RNA, proteins, and lipids to recipient cells. These cargo molecules are selectively loaded into sEVs and mirror the physiological state of the donor cells. Given that sEVs can cross the blood-brain barrier and their composition can change in neurological disorders, the molecular signatures of sEVs in circulation can be a disease biomarker. Characterizing the molecular composition of sEVs from different cell types is an important first step in determining which donor cells contribute to the circulating sEVs. We investigated the RNA composition of sEVs released by primary mouse cortical neurons and astrocytes to determine differential expression and loading patterns of miRNAs in these cell types. Sequencing total cellular RNA, and miRNAs from sEVs isolated from culture media of postnatal mouse cortical neurons and astrocytes revealed a distinct profile between sEVs and their corresponding cells. Though the total number of detected miRNAs in astrocytes was greater than neurons, neurons expressed more sEV-associated miRNAs than astrocytes, suggesting differences in the cellular sorting mechanisms. We identified short RNA sequence motifs, or EXOmotifs, on the miRNAs that are differentially loaded or excluded from sEVs. A sequence motif GUAC was enriched in astrocytic sEVs and may regulate the loading of RNA into sEVs. miRNAs that were preferably retained in neurons or astrocytes had a similar RNA motif CACACA, suggesting a cell-type-independent mechanism to maintain cellular miRNAs. mRNAs of five RNA-binding proteins associated with passive or active RNA sorting into sEVs were differentially expressed between neurons and astrocytes. Our studies suggest differences in RNA sorting into sEVs. These differences in miRNA signatures can be used for determining the cellular sources of sEVs altered in neurological disorders.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
301	Haley Majer / Microbiology and Immunology	Joris Beld, PhD		**Whole Genome Sequencing of Streptomyces Bacterial Isolates Facilitates Natural Product Drug Discovery and Development:** The antibiotic resistance crisis has led to the urgent need for new antimicrobials. Natural product producers, including bacteria, are an abundant source for new antibiotics. A novel approach to identify natural product antibiotics begins with whole genome sequencing (WGS) followed by bioinformatic analyses. Streptomyces species are a good source for new antibiotics as these bacteria maintain large genomes of 8-12 mega-base pairs that contain many secondary metabolite gene clusters. In house, we completed WGS of Streptomyces actuosus ISP-5337, Streptomyces cyaneus B-2296, and Streptomyces sioyaensis B-5408 using PacBio RSII technology. S. actuosus and S. sioyaensis are known producers of the antibiotics nosiheptide and siomycin, respectively, and S. cyaneus is a close relative to the antibiotic-producing S. azureus. Each genome was sequenced using one SMRTcell per genome then assembled and annotated using PacBio Hierarchical Genome Assembly Process version 2 and Prokka. Bioinformatic analyses of each genome identified 31 putative secondary metabolite antibiotic gene clusters in S. sioyaensis, 17 clusters in S. cyaneus, and 23 clusters in S. actuosus. Fractionation of each bacterial crude extract and subsequent antibacterial challenge against Staphylococcus aureus verified the presence of potent antibiotic compounds. In parallel, each strain extract was analyzed by liquid chromatography mass spectrometry (LCMS) to characterize these compounds. WGS and bioinformatic mining of these genomes predicted the presence of many compounds that maintain activities broadly beneficial to human health not previously observed from these species. These results will facilitate engineering of novel antibiotics with improved chemical properties to address the need for new antibiotics.
302	Jacqueline Truong / Biochemistry and Molecular Biology	Karen Berkowitz, MD	Jessica Kim, Deanna Brasile, Will Dampier, Joshua Mell, Karen Berkowitz	**Investigation of 38 genes as potential biomarkers of ovarian reserve in Caucasian and Asian women:** Diminished ovarian reserve (DOR), a major cause of oocyte-related infertility, is defined as decreased fecundity or response to ovarian stimulation in women of reproductive age with regular menses compared to women of comparable age. DOR status is usually assessed by serum Anti-Mullerian hormone (AMH), a hormonal biomarker that declines with age; however, it is an unreliable marker of fecundity. Our aim is to identify specific genetic variants associated with DOR to earlier detect women at risk. Using the Human Meiosis Reactome Database, we identified 33 genes that may be associated with DOR in 254 women. Women were placed into control or DOR groups based on AMH value. Each value was then converted to an age-adjusted percentile. 180 women with AMH values below the 50th percentile were identified and 88 of those fell within the bottom 10th percentile. Medical and infertility histories were reviewed for confounding variables including ovarian surgery, smoking, and male factor. The data are being analyzed with PLINK, a GWAS tool, to assess the association between SNP variants and phenotype. Five additional gene targets were chosen for investigation based on reported variants that are associated with primary ovarian insufficiency: NOBOX, SMC1ß, REC8, STAG3, and BMP15. Primers were designed to specific variants within these genes and tested in control genomic DNA by PCR amplification. Genomic DNA from women with the lowest age-adjusted AMH percentiles will be amplified for these variants, then analyzed by Sanger sequencing to investigate possible associations with DOR. Analyses of all 38 genes are underway.
303	Sapana Gupta / College of Medicine	Ariana Chao, PhD	Yingjie Zhou, Thomas Wadden, Robert Berkowitz, Ariana Chao	**A Systematic Review of Genetic Predictors of Weight Loss after Bariatric Surgery:** Background: Obesity is a leading global health issue which may be treated with bariatric surgery. However, not all surgery candidates experience the same amount of weight loss. This heterogenous response may be better understood using genetic predictors. Objective: This systematic review provides a comprehensive summary of the literature evaluating the relationship between genetic predictors and weight loss seen after bariatric surgery. Methods: A systematic review was performed following PRISMA guidelines using PubMed, Embase, Web of Science, PsychInfo, and Cochrane Library. Results: Variations in the uncoupling protein (UCP) and FK506 binding protein (FKBP) genes demonstrated positive correlations with excess weight loss after surgery. Several genetic risk scores were also shown to significantly predict weigh loss outcomes after surgery. Conclusion: The current evidence supports the potential of using genetic variants in the UCP and FKBP genes as well as genetic risk score to predict the amount of weight loss patients may anticipate after bariatric surgery and those who may be at risk for suboptimal weight loss outcomes. Further research is warranted to explore the genetic, environmental, and lifestyle factors that affect weight loss after bariatric surgery.
304	Robert Link / Biomedical Engineering	Will Dampier, PhD	Michael Nonnemacher, Brian Wigdahl, Will Dampier	**Investigating how HIV-1 Tat variability alters Tat-miRNA interactions through deep learning:** Long-term human immunodeficiency virus type 1 (HIV-1) infection is associated with accelerated neurocognitive impairment and neuroinflammation. This is in part due to HIV-1 Tat protein modulation of host neuroinflammation pathways involving interactions with miRNAs. Tat variation influences HAND severity, including variants that do not lead to HAND development. However, understanding how variation influences Tat-miRNA interactions is too complex through observation alone, necessitating the use of deep learning (DL) to recognize these patterns. While there are few Tat variant-miRNA interaction data, investigators can train DL models on a related problem with large amounts of data to assist in performing another task with fewer data. Based on this approach, the need for large quantities of Tat-miRNA interaction data can be circumvented by understanding how other RNA-protein interactions (RPIs) occur. This data is acquired from RNAInter, which contains 10,609,936 RPIs (34 HIV-1-specific) from 180,442 and 19,996 unique RNAs and proteins respectively after quality filtering. Negative samples are generated by pairing each protein in RNAInter and measuring their sequence, functional, and domain similarity. Pairs with the largest difference have their corresponding RNAs swapped to maximize negative sample quality. Protein and RNA sequences are then embedded using normalized 3-mer and 4-mer counts, respectively. These are used to train RPITER, a DL model designed to predict RPIs, using 5-fold cross validation. Further directions involve using RPITER to investigate how single residue and motif variation within Tat influences Tat-miRNA interactions and how changes in these interactions influence the expression of proteins participating in neuroinflammation pathways.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
305	Armaan Ahmed / Microbiology and Immunology	Will Dampier, PhD	Robert Link, Michael Nonnemacher, Brian Wigdahl, Will Dampier	**Design of low resource screening technology for HIV drug resistance using SHERLOCK:** Recent developments in antiretroviral therapy (ART) have turned human immunodeficiency virus type 1 (HIV-1) infection from a potent killer to a chronic illness. However, HIV-1 drug resistance mutations (DRMs) hamper the efficacy of ART. When prescribing a treatment regimen, clinicians often do not check for DRMs, which hampers treatment efficacy. This is especially problematic in low-income areas, where there is a lack of routine drug resistance testing due to poor infrastructure. We propose the use of specific high-sensitivity enzymatic reporter unlocking (SHERLOCK) paired with CRISPR-Cas12b as a quick and inexpensive assay to detect HIV-1 DRMs. A guide RNA (gRNA) package development pipeline was generated to target HIV-1 protease DRMs. All protease DRMs and sequences were collected from the 2019 IAS-USA drug resistance mutations list and LANL HIV-1 Sequence Database, respectively. Synthetic protease sequences with artificial DRMs were also added as supplementary data. DRM-specific gRNAs were derived from all observed sequences containing that DRM. gRNAs were ranked according to F5-score and the top 128 gRNAs for each DRM were considered for packaging. gRNA packages would initially only contain the gRNA with the widest coverage. gRNAs would then be incrementally added based on the additional sensitivity (AS) they would provide and individual specificity (>85%). gRNAs would stop being added when the next best performing gRNA provides an AS of <1%. 316 gRNAs were used across all packages and 23/24 packages had >90% sensitivity. Further directions involve generalizing the pipeline for other HIV-1 gene targets and validating gRNA package performance in vitro.
306	Jocelyn Hammond / Microbiology and Immunology Center for Genomic Science (CGS)	Garth Ehrlich, PhD	Rachel Ehrlich, Sergey Balashov, Joshua Mell, Garth Ehrlich	**Hypermutable Haemophilus influenzae in Patients with Cystic Fibrosis:** Patients with cystic fibrosis (CF) are prone to recurrent bacterial infections. Many strains of Haemophilus influenzae (Hflu) and other bacteria isolated from CF are hypermutators (i. e., strains having high mutation rates). We phenotypically and genomically characterized 24 Hflu strains isolated from CF. Mutation rates were determined at two loci (rpoB, gyrB) by measuring spontaneous resistance to rifampicin and novobiocin, respectively. The mutation rates of the 13 hypermutators were variable, implying no clear hypermutability cutoff and perhaps multiple reasons for hypermutability. Rates for many strains were distinct at the two loci, suggesting different mutation mechanisms. A phylogenetic tree built from the strains' genomes showed the hypermutators had multiple recent independent origins. Several hypermutators were in the deep-branching clade of "tweeners" (Hflu-H. haemolyticus hybrids), but only 1 of 7 additional tweeners we tested was a hypermutator. Hypermutability mostly results from defects in DNA repair genes, particularly mutS. Seven hypermutators have polymorphisms in mutS, and mutS from 4 of these failed to restore the MutS function in a mutS-deleted mutant. Comparison of mutS sequences found 24 of 32 strains had 2-3 potentially fragmented copies and some large indels. Most other DNA repair genes were found at single copy, although one tweener had >1 copy of 3 genes. Functional analysis of the amino acid sequences is ongoing. Taken together, these data show Hflu hypermutability repeatedly arises in CF due to mutations affecting DNA repair, likely because of a short-term benefit within the host (e. g., spontaneous antibiotic resistance), even if this ultimately leads to extinction.
307	Yih-Ping Su / Microbiology and Immunology Center for Genomic Science (CGS)	Garth Ehrlich, PhD	Garth Ehrlich, Yu-Lan Su, Shih-Chun Shen, Hung-Wen Tsai, Ih-Jen Su, Selena Lin, Ying-Hsiu Su, Azad Ahmed, Joshua Earl	**The Integration of HBV DNA in Ground Glass Hepatocytes and Its Contribution to HCC Development:** Chronic hepatitis B virus (HBV) infection is a major etiological factor in the development of hepatocellular carcinoma (HCC), which has the sixth highest incidence rate of all malignancies worldwide. Of the HBV-related HCC (HBV-HCC) cases, more than 85% contains integrated HBV DNA in the host genome. Although HBV DNA integration is not required for the completion of viral replication, it often occurs early during infection. Integrated HBV DNA is found more frequently in HBV-HCC (85%) cases than in the HBV-related hepatitis and cirrhosis (30-40%) cases, suggesting a significant role for HBV integration in HCC carcinogenesis. With the knowledge of the preS mutant protein's oncogenicity, its expression in type II ground glass hepatocytes (GGH) of HBV-HCC patients receiving long term antiviral treatment has led to the hypothesis that GGH is a premalignant state, and that the integrated HBV DNA in GGH carries a mutated preS gene. In this study we used an HBV-primer extension enrichment technique followed by Next-Generation Sequencing (NGS) and a custom bioinformatics pipeline to identify and characterize HBV integration sites in HCC, adjacent GGH, and non-HCC HBV surface antigen negative (HBsAg-) micro-dissected FFPE sections. The detected integration sites include recurrent integration sites reported by others including TERT and CCNE1 but we also identified novel integration sites. Pacific Bioscience (PacBio) long-read sequencing technology was used to further investigate the integrated HBV DNAs between tumor and non-tumor frozen tissues, including GGH. These analyses were designed to identify any correlations among HBV integrations, HBV genotypes, and HCC-associated HBV variants such as preS mutations with carcinogenesis. Further identification of key HBV DNA integration features in HCC could potentially serve as markers for the development of an HBV-HCC risk prediction tool which could be used for early detection and personalized disease management.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
308	Clare Lipscombe / Microbiology and Immunology	Hangjun Ke, PhD		**The Functionalities, Applications, and Characteristics of CRISPR Systems and Their Roles in Malaria Research:** The discovery of the CRISPR/Cas9 system transformed genome-editing capabilities, revolutionizing research in topics spanning from single-celled organisms to complex human disease models. Although the CRISPR/Cas9 system is the most well-known and frequently used editing system, numerous CRISPR models from bacterial organisms, each with their own unique functionality and characteristics, have been identified and characterized in recent years. The development of these less-well-known CRISPR classes for genome editing enhances a large array of tools that could expand current research abilities, as these systems offer the same precise genome editing but with altered target sites, effector molecules, and cleavage proficiencies. This literature review highlights the importance of valuable CRISPR classes and their implications for future research, especially in the field of malaria. Malaria is caused by Plasmodium spp., single-celled eukaryotic protozoan, and transmitted by Anopheles mosquitoes. It causes over 200 million clinical cases worldwide and kills half a million people every year. Two thirds of victims are children under five years old. Harnessing the bacterial CRISPR/Cas9 system for genome editing was a major breakthrough that advanced the study of Plasmodium parasites, which otherwise remain refractory to conventional genetic tools. The development of additional CRISPR systems will continue to expand research to understand, treat, and prevent malaria infections.
309	Danielle Piazza / Microbiology and Immunology Center for Genomic Science (CGS)	Joshua Mell, PhD	Heba Abid, Lahari Uppuluri, Garth Ehrlich, Ming Xiao, Joshua Mell	**Bigger Snacks, Bigger Tracts: The Extent and Limits of Natural Transformation in Haemophilus influenzae:** Naturally competent bacteria can take up intact DNA molecules from their surroundings and incorporate them into their own chromosomes by homologous recombination – called natural transformation. Analogous to sex in eukaryotes, natural competence allows bacterial pathogens to rapidly adapt to host immune responses and therapeutic interventions, like antibiotic treatments. One such naturally transformable bacterium is the human pathogen Haemophilus influenzae. We can induce natural competence in the lab by putting cells in a starvation media and adding purified DNA from marked donor strains. In H. influenzae and others, the longest recombination tracts seen have been about 50 kb (~3% of chromosome), but this is also about the size of fragments in traditional DNA preps. To test whether providing competent cells with larger DNA would lead to more extensive natural transformation, we provided competent cells with ultra-long DNA fragments – 100 kb to 1 MB – from a strain carrying antibiotic resistance markers. With ultra-long DNA fragments, not only did single markers transform at higher rates and linkage between nearby markers (within 20 kb) become elevated, remarkably, we also see linkage between markers 250 kb apart, or ~15% of the chromosome. Therefore, competent cells must be capable of taking up and recombining much longer DNA fragments than previously suspected, suggesting that the upper limit on how much of a chromosome can be replaced in a single round of natural transformation remains unknown. This may be particularly important in bacterial biofilms, whose matrix is largely composed of high molecular weight bacterial DNA.
310	Rachel Ehrlich / Microbiology and Immunology Center for Genomic Science (CGS)	Josh Mell, PhD		**An analysis of methods for determining bacterial clonal lineages:** INTRODUCTION: Bacteria can be classified based on species, but there is enormous genotypic and phenotypic variation within even a single species. Further classification can be useful for tasks like identifying reference strains and calling variants. This additional level of classification is called an isolate's clonal lineage. METHODS: We used several publicly available tools to determine the clonal lineages of a genetically diverse collection of ~250 strains of Haemophilus influenzae. Lineages can be determined using the sequences of several genes with MLST. They can also be estimated by looking at common kmers in reads or assemblies using Mash. Mash distances can also be used to build a model of core and accessory genome distances that PopPUNK uses to assign clonal lineages. The agreement between different methods was calculated using the Adjusted Rand Index as well as the Adjusted Mutual Information metric. DISCUSSION: The lineages produced by the different methods were fairly similar despite the different approaches to the problem. This suggests that they are estimating the underlying biology rather than noise in the data. Sometimes, one method places two strains in the same lineage but another puts them in different lineages. This can be because parts of the genomes are closely related while other parts are more divergent. This is a sign of horizontal gene transfer which plays a critical role in bacterial evolution and can be responsible for everything from antibiotic resistance to serotype switching. These lineages will also be useful for understanding the variants that cause different phenotypes.
311	Elizabeth Henry / ICO	Michael Nonnemacher, PhD	Michael Nonnemcaher, Kara Ward	**Effect of Temperature on DNA Yield of Teeth Using QIAamp DNA Blood Mini Kit:** Often in arson cases or mass disasters involving fire, teeth are some of the only remains left behind to identify the victims, due to their tough mineralized enamel, making them resistant to decomposition and degradation. Identifying the extent of which heat exposure and temperature teeth can be exposed to while still yielding testable amounts of DNA is crucial to human identification. This study aims to determine the amount of DNA that can be extracted in thirty human teeth using the QIAamp DNA Blood Mini Kit (QIAamp DNA Mini Kit, QIAGEN, Hilden, Germany) and TB Green Advantage qPCR Premix (Takara Bio, Shiga, Japan). Of these thirty samples, eighteen teeth were subjected to elevated temperatures for 5, 10 and 20 minutes, with nine samples burned at 150?, nine burned at 315?, and twelve left unburned. Histological and osteological changes were noted in teeth burned at 315?, with the samples exposed to 315? for 20 minutes turning black. DNA extraction and quantification will be presented in the future, though it is hypothesized that the unburned negative control teeth will have the highest DNA yield and those exposed to 315? will have the lowest DNA yield due to DNA denaturation and destruction. Key osteological changes that may be noted when extracting DNA from unidentified fire victims are examined, specifically looking at the discoloration of the teeth and the ease of root powdering.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
312	Ron Perets / Biomedical Engineering	Kara Spiller, PhD	Lyssa Buissereth, Jessica Eager	**Profiling the genetic changes associated with transitions in macrophage polarization:** Macrophages are an integral part of the host immune system and play a key role in modulating the tissue repair process. Macrophages have been historically categorized into M1 (classically activated) and M2 (alternatively activated) polarization states, but research has demonstrated that macrophages exhibit greater phenotypic variation than initially perceived. Our study utilized two publicly available single-cell RNA (scRNA) sequencing datasets of murine wound environments (cardiac and skeletal muscle tissue) to identify novel macrophage phenotypes. Data analysis was conducted using Scanpy for Python and macrophages were identified based on the expression of canonical gene markers (Itgam, Adgre1, Cd68, Ccr2, Csf1r, Cd14) obtained from a literature search. We identified seven distinct macrophage populations in the cardiac dataset and ten populations in the skeletal muscle dataset. Gene ontology (GO) enrichment analysis of differentially expressed genes was performed for each population to evaluate which biological processes were upregulated. Immune response related genes were well conserved across the different populations while genes involved with extracellular environment interactions varied significantly. GO terms for extracellular matrix binding, integrin binding, and collagen binding were among the most variable across populations. Transcriptional variation in genes related to interactions with the extracellular environment appear to regulate the role macrophages play in the tissue repair process. A comprehensive understanding of repair related macrophages may provide new avenues for modulating and improving the tissue repair process.
313	Andrew Atkins / Microbiology and Immunology	Brian Wigdahl, PhD	Zsofia Szep, Michael Nonnemacher, Will Dampier, Neil Sullivan, Cheng-Han Chung, Shendra Passic, Joshua Mell, Greg Homan, Steven Lang, Vanessa Pirrone	**Validation of in silico specificity predictions for gRNAs targeting HIV-1 proviral DNA sequences using a modified high-throughput GUIDE-Seq assay:** HIV-1 persistence has been attributed to integrated proviral DNA in latent tissue reservoirs including the peripheral blood, lymphoid tissue, brain, and gut. Recent studies have removed the integrated HIV-1 provirus from individual cells and HIV-1-infected humanized mice using the CRISPR/Cas9 system. One of the challenges of a CRISPR/Cas9-based treatment has been evaluation of the specificity of the therapy across a wide range of patients. A successful excision-based therapy would require a set of gRNAs which recognize all viral quasispecies while minimizing off-target cleavage. In silico predictions indicate that gRNAs can be designed to fulfill both criteria. The current study validated these predictions. A high sensitivity DNA cleavage assay was used to measure the cleavage efficiency of gRNAs. Results showed a strong correlation between in silico predictions and in vitro performance for the set of broad-spectrum gRNAs tested. Validation of off-target efficiency predictions was performed by high-throughput adaptation of the genome-wide unbiased identification of DSBs enabled by sequencing (HT-GUIDE-Seq) method with next-generation sequencing. The GUIDE-Seq assay has been shown to identify the sequence locations of double-strand breaks (DSBs) in living cells including those generated by CRISPR/Cas9. This enabled high throughput quantification of off-target CRISPR/Cas9 activity with an increase in depth of coverage compared to the original GUIDE-Seq method in order to validate in silico predictions of gRNA specificity by detection of off-target cleavage events. Preliminary results indicate that the broad-spectrum gRNAs had high specificity with respect to HIV-1 with no detectable off-target hits.
314	Abigail Richard / Microbiology and Immunology Center for Genomic Science (CGS)	Ming Xiao, PhD	Wesley Jong	**Whole genome structural variant detection in clinical samples:** A structural variant is a region of DNA that refers to a large scale (greater than or equal to 1kb in size) structural difference in genomic sequence. These structural variants can include changes such as deletions, insertions, copy number variants, duplications, inversions and translocations. The purpose of this comprehensive study is to use Optical Mapping to detect novel large structural variants that contribute to disease phenotypes. Optical Mapping aims to detect both large SVs over 2kb as well as small SVs under 2kb. This project investigates the sensitivity of optical mapping with the aim of identifying medical relevance of the SVs identified. A sample of 85 subjects from the Children's Hospital of Philadelphia (CHOP) was analyzed, where both large (over 2kb) and small (under 2kb) SVs consisting of insertions and deletions were identified. Python was used to create data formats that were analyzed with a multi-intersect function. Samples with similar SVs were analyzed using a ratio of the size of the SV to the boundary of the SV. These similarities demonstrated areas where specific structural changes were more likely to have occurred. From preliminary data, certain clinical samples from CHOP have a higher frequency of overlapping SVs. As this is an ongoing study, no concrete results have been obtained. Future directions for study include comparing the data analyzed from CHOP to those from a sample of healthy subjects in order to further elucidate the role of structural variants in medical outcomes.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
315	Wesley Jong / Microbiology and Immunology Center for Genomic Science (CGS)	Ming Xiao, PhD	Wesley Jong	**Whole genome structural variants detection in clinical samples:** A structural variant is a region of DNA that refers to a large scale (greater than or equal to 1kb in size) structural difference in genomic sequence. These structural variants can include changes such as deletions, insertions, copy number variants, duplications, inversions and translocations. The purpose of this comprehensive study is to use Optical Mapping to detect novel large structural variants that contribute to disease phenotypes. Optical Mapping aims to detect both large SVs over 2kb as well as small SVs under 2kb. This project investigates the sensitivity of optical mapping with the aim of identifying medical relevance of the SVs identified. A sample of 85 subjects from the Children's Hospital of Philadelphia (CHOP) was analyzed, where both large (over 2kb) and small (under 2kb) SVs consisting of insertions and deletions were identified. Python was used to create data formats that were analyzed with a multi-intersect function. Samples with similar SVs were analyzed using a ratio of the size of the SV to the boundary of the SV. These similarities demonstrated areas where specific structural changes were more likely to have occurred. From preliminary data, certain clinical samples from CHOP have a higher frequency of overlapping SVs. As this is an ongoing study, no concrete results have been obtained. Future directions for study include comparing the data analyzed from CHOP to those from a sample of healthy subjects in order to further elucidate the role of structural variants in medical outcomes.
400	Zhucheng Lin / Pharmacology and Physiology	Seena Ajit, PhD	Renee Toussaint, Yuzhen Tian, Ahmet Sacan	**The role of small extracellular vesicles in chronic pain:** Exosomes are 30-150 nm extracellular vesicles that can transport RNAs, proteins, and lipid mediators to recipient cells via circulation. Exosomes can be beneficial or harmful depending on their source and contents. We hypothesized exosome content would be altered following nerve injury and these alterations can provide insight into signaling mechanisms involved in neuropathic pain. To characterize exosome composition following nerve injury, small extracellular vesicles (sEVs) were purified from mouse serum four weeks after spared nerve injury (SNI) or sham surgery. Our miRNA profiling showed a distinct miRNA signature in SNI model compared to sham control. Proteomic analysis detected the presence of multiple members of serpin and complement family in sEVs. Cytokine profiling showed significant upregulation of complement component 5a (C5a) in sEVs from SNI model. Intercellular adhesion molecule 1 (ICAM-1), required for the leukocyte recruitment, adhesion and homing of exosomes was also upregulated in sEVs from SNI model compared to control. There was differential distribution of C5a and ICAM-1 within serum and sEVs between sham and SNI, indicating changes from local or paracrine to long distance signaling under neuropathic pain. These studies suggest critical roles for cargo sorting of vesicular proteins in mediating neuropathic pain. Our in vivo studies showed that intrathecal injection of sEVs can increase the basal mechanical threshold in naïve recipient mice and accelerate recovery from inflammatory pain. Studies are ongoing to elucidate the mechanistic basis of these changes and how sEVs mediate pain.
401	Ankita Patil / Neurobiology and Anatomy	Peter Baas, PhD	Ilgin Isiltan, Arzu Karabay, Erin Craig, Peter Baas	**Motor-driven sliding and static crosslinking regulate the organization of axonal microtubules:** Previous studies from our lab have implicated cytoplasmic dynein as the molecular motor protein chiefly responsible for the sliding of microtubules in the axon, with this sliding serving to rid the axon of misoriented microtubules. Most of the sliding occurs amongst microtubules that are quite short, and the trajectory of the sliding is often accompanied by tugs or reversals. Computational modelling suggests two hypothetical participants to explain these results: static microtubule crosslinkers that limit movement to only short microtubules, and an opposing motor that creates the observed tugs and reversals. Insufficient crosslinking and/or too much activity of an opposing kinesin motor would obstruct normal "polarity sorting" of microtubules by cytoplasmic dynein and thereby lead to microtubule polarity flaws. Consistent with these predictions, we report here (in primary cultures of rat hippocampal and sympathetic neurons) that experimental depletion of TRIM46 or PRC1, two different microtubule-crosslinking proteins, results in greater mobility within the axonal microtubule array. Interestingly, microtubule polarity flaws arise in hippocampal but not sympathetic axons, possibly due to greater activity of the dynein-opposing motor in hippocampal neurons. Consistent with that motor being kinesin-1, pharmacologic hyperactivation of kinesin-1-based transport of microtubules (in the axons of both types of neurons) creates microtubule polarity flaws and aberrant sliding of even long microtubules. These data support our computational model and implicate TRIM46, PRC1 and kinesin-1 as participants. Moreover, these observations suggest potential targets of pathological mechanisms that result in microtubule polarity flaws that underlie defects in axonal transport in a variety of neurodegenerative diseases.
403	Emanuela Piermarini / Neurobiology and Anatomy	Peter W. Baas, PhD /	Seyma Akarsu, Arzu Karabay, Liang Qiang, Peter W. Baas	**Spastin dosage affects the vitality of vertebrate axons:** Spastin, the protein encoded by the SPAST gene, is a microtubule-severing protein with membrane-related properties. Mutations of SPAST are the chief cause of hereditary spastic paraplegia (HSP), a neurodegenerative disorder characterized by gait deficiencies resulting from corticospinal dieback degeneration. While recent work illuminates the importance of gain-of-function toxicity of mutant spastins to the dieback degeneration, there may be a contribution of diminished spastin function as well. Previous studies on Drosophila showed a dose-dependent detriment in the ability of severed axons to regenerate under conditions of reduced spastin expression. Here, we sought to determine if these observations extend to vertebrate axons, positing that regenerative capacity may be a useful readout for axonal vitality relevant to HSP. SiRNA-based depletion of spastin from cultured rat cortical neurons significantly reduced the regenerative capacity of severed axons in a manner that was restored in dose-dependent fashion by re-expression of spastin. We conclude that reduced spastin functionality renders vertebrate axons more vulnerable to a second insult, whether it be a challenge to regenerate after injury or from the presence of toxic mutant proteins. On this basis, we posit that rectifying the ill effects of reduced spastin may have therapeutic benefit to HSP patients. Interestingly, if we overexpressed spastin to a certain level, axons regenerated even better than they normally do, indicating that the same therapies our results suggest for enhancing nerve regeneration after injury may also have therapeutic benefit for HSP.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
404	Shrobona Guha / Neurobiology and Anatomy	Peter Baas, PhD	Hemalatha Muralidharan, Kiran Madugula	**KIFC1, a microtubule-associated motor protein, provides a novel avenue toward ameliorating synapse loss during neurodegenerative disease:** Microtubules are dynamic cytoskeletal elements assisting the growth of neurons, providing structural integrity and serving as tracks along which cellular cargoes such as vesicles and organelles are transported by molecular motor proteins. Microtubules themselves are organized by motor proteins, including cytoplasmic dynein and various kinesins. We are studying one such kinesin, namely KIFC1, which is a member of the kinesin-14 family. KIFC1 has been studied extensively as a potential oncotarget due to its upregulation of expression in various cancers. However, inhibition of KIFC1 as a cancer therapy comes with deleterious side-effects due to its role in germ cell development and, as shown by our previous work, axonal microtubule organization. Here we show that KIFC1 is also necessary for the maintenance of synaptic connections. Specifically, we show that pharmacological inhibition of KIFC1 leads to a reduction in the number of synapses and dendritic spines. Given that synapse loss is a hallmark of many neurodegenerative diseases resulting in cognitive as well as sensory and motor impairments, we wondered if KIFC1 dysregulation may be a common downstream effector of synapse loss during such diseases. Oxidative stress often serves as a prelude to synaptic loss brought on by the release of molecules such as NO (nitric oxide) and ROS (reactive oxygen species) by surrounding cells. Our data show that in conditions of oxidative stress, KIFC1 expression is indeed downregulated at the synapse. We are now working on ways to fortify KIFC1 as a novel strategy to stave off synapse loss during disease.
405	Philip Yates / Neurobiology and Anatomy	Peter Baas, PhD	Ankita Patil, Alessia Niceforo, Ramnik Gill, Alvin Terry Jr, Kimberly Sullivan, Peter Baas, Liang Qiang	**A cellular approach to understanding and treating Gulf War Illness:** Gulf War Illness (GWI), a chronic multisystem disorder suffered by 30% of veterans of the 1991 Gulf War, is characterized by memory deficits, reduced information processing speeds, and chronic fatigue. GWI is caused by exposure to organophosphate pesticides and nerve agents combined with the stress of the battlefield. A disease relevant human model is urgently needed to identify the cellular and molecular susceptibilities that lead to these symptoms. Here, we established human induced pluripotent stem cells derived from GW veterans, 4 without and 5 with GWI, differentiated them into glutamatergic neurons or forebrain cerebral organoids, and then exposed them to a toxicant regimen of cortisol (to mimic battlefield stress) combined with Diisopropylfluorophosphate, a sarin surrogate. In common with many neurodegenerative diseases with cognitive deficits, this regimen resulted in heightened levels of total tau and phosphorylated tau. Moreover, these alterations were more prominent and consistent in neurons from veterans with GWI than without, suggesting a predisposition to the disease. In addition, the GW toxicant regimen resulted in lower microtubule acetylation/stability, spontaneous neuronal activity and neurogenesis, but greater astrocyte reactivity. Rats exposed to a similar regimen displayed a mild memory deficit and many of these same cellular defects. In all, these experimental models illuminate early, highly sensitive cellular changes that we posit give rise to the major neurological symptoms of GWI. Now, we are using these models to test whether therapies that modulate tau expression and phosphorylation, or that restore microtubule acetylation, can ameliorate the cellular and behavioral defects of GWI.
406	Kathleen Bryant / Pharmacology and Physiology	Jacqueline Barker, PhD	Jacqueline Barker	**Effects of low dose ethanol exposure on reward seeking and motivation in mice:** Alcohol use disorders involve inflexible drug and reward seeking that is in part characterized by habitual behavior and changes in reward motivation. Habits are behaviors that are insensitive to changes in the rewarding value of the outcome or in the contingent relationship between an action and its outcome. Chronic ethanol exposure can drive an overreliance on habits, but the exact conditions under which this occurs, and which aspects of habitual behavior are impacted, remain unclear. In particular, the effects of ethanol exposure in general as compared to exposure during consolidation of a task may have differential impacts on the acquisition or expression of reward seeking. The present study seeks to determine whether daily low dose ethanol exposure differentially impacts the formation of value- and contingency-insensitive reward seeking and whether these effects are exposure time dependent. We demonstrate that ethanol exposure significantly escalates responding for sucrose as compared to saline controls regardless of time of exposure. Though we found no impacts of ethanol exposure on the expression of value- or contingency-insensitive habits, a history of ethanol exposure during consolidation increases motivation for sucrose as indicated by increased progressive ratio break points. These results suggest that while low dose ethanol exposure increases sucrose seeking behavior regardless of exposure time, ethanol exposure specifically during consolidation may increase motivation to obtain sucrose reward in a way that is distinct from the effects of ethanol exposure in general. Ongoing studies are investigating whether these effects are driven by differences in accumbens neural circuit engagement.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
407	Yue Lu / Pharmacology and Physiology	Jacqueline Barker, PhD	Kathleen Bryant, Jacqueline Barker	**Engagement of basolateral amygdala projection neurons to the nucleus accumbens during the performance of habitual versus goal-directed behavior:** Habit learning serves as an efficient way to process information, but can be pathological when habit control becomes dominant, especially in substance use and behavioral addiction. To gain a better understanding of the neural substrates of habits, we investigated how basolateral amygdala (BLA) projections to the nucleus accumbens (NAc) shell are engaged during the expression of goal-directed, action-outcome behavior versus habitual stimulus-response behavior. Adult male C57BL / 6J mice (9 weeks old) were used in this experiment. Prior to starting behavior, mice were microinjected with retrograde tracer in the NAc allowing for neuronal projections from structures including the BLA, prefrontal cortex and ventral hippocampus to the NAc to be visualized. After recovery, mice were trained to self-administer sucrose using a paradigm that enables assessment of both goal-directed and habitual response strategies in a within-subjects manner. Outcome devaluation (OD) and contingency degradation (CD) tests were carried out at specific time points of the training to determine whether mice were using outcome value and action-outcome contingencies to guide behavior. To detect the neuronal activity state induced by either goal-directed or habitual behavior, mice brain slices were collected for analysis of c-Fos positive neurons that project to the NAc. By comparing the response rate through active lever pressing between goal-directed and habit promoting paradigm and disentangle these behavior types by OD and CD tests, we found male mice were insensitive to outcome value but not action-outcome contingency at early stage but acquired insensitivity to outcome value and contingency and after extended training. Ongoing studies are quantifying c-Fos positive cells in BLA neurons that project to the NAc following performance of actions versus habits.
408	Breanne Pirino / Neurobiology and Anatomy	Jessica Barson, PhD	Mary Spodnick, Andrew Gargiulo, Genevieve Curtis, Zachary Merkle, Anushree Karkhanis, Jessica Barson	**Kappa-opioid receptor stimulation in the nucleus accumbens shell differentially impacts approach-avoidance behaviors and dopamine transmission along a rostro-caudal axis:** The nucleus accumbens (NAc) shell is implicated in the regulation of negative and positive affect. Classically, the kappa-opioid receptor (KOR) and its ligand, dynorphin, are understood to produce negative affect, while dopamine interacts with reward behavior. Activating KORs in the NAc inhibits the release of dopamine, thereby suppressing reward behavior. Emerging evidence, however, demonstrates that the KOR and dopamine systems of the NAc shell can exert differential effects on hedonic responses, depending on the location along the rostro-caudal axis. We sought to determine whether this occurs via an interaction of the KOR and dopamine release and whether the effects extend to approach-avoidance behaviors. First, we examined the relationship between KORs and dopamine in the rostral and caudal NAc shell, using ex vivo fast scan cyclic voltammetry. While baseline release was not different between subregions, activation of KORs inhibited dopamine release more in the caudal compared to rostral shell, due to an increase in efficacy and potency. Next, we determined the influence on approach-avoidance behavior of KOR stimulation in the rostral versus caudal shell. Compared to vehicle, KOR stimulation in the rostral shell increased entries into the center of an open field. Conversely, KOR stimulation in the caudal shell increased rearing in a novel activity chamber, decreased time in the light chamber of a light-dark box, and decreased ambulatory distance in an open field. These results demonstrate that KOR stimulation at distinct points in the NAc shell induces opposing effects on affective behavior, possibly due to differences in KOR mediated regulation of dopamine release.
409	Genevieve Curtis / Neurobiology and Anatomy	Jessica Barson, PhD	Andrew Gargiulo, Anuranita Gupta, Kate Riccardino, Breanne Pirino, Jessica Barson	**Sex Differences in Binge Eating Behavior and Expression of Pituitary Adenylate Cyclase-Activating Polypeptide in the Thalamic Paraventricular Nucleus in Rodents:** Binge eating disorder, characterized by the overconsumption of food in a discrete time period, is the most common eating disorder in the United States and affects more women than men. Pituitary adenylate cyclase-activating polypeptide (PACAP), a neuropeptide implicated in feeding, is independently processed into PACAP-27 and PACAP-38. We have recently identified high levels of PACAP-27 (more than PACAP-38) in cells of the thalamic paraventricular nucleus (PVT), a limbic brain region involved in feeding. To better understand the sex difference in the rate of binge eating disorder, we used a limited access home cage model with Milk Chocolate Ensure Plus to induce binge eating behavior in male and female mice. Under this 6-week paradigm, females (n = 7) demonstrated greater binge eating than males (n = 5), consuming more Ensure both as a function of bodyweight and as a percent of total daily calories consumed. Next, using quantitative real-time PCR (qRT-PCR) to examine PVT PACAP mRNA in male and female mice (n = 5/group) with no history of binge eating, we found that females had higher levels of PVT PACAP mRNA than males. In rats, both qRT-PCR and immunohistochemistry further supported this finding. Females demonstrated higher levels of PACAP mRNA and protein (both PACAP-27 and PACAP-38) in the PVT as compared to males (n = 5-6/group). In summary, our results indicate that females have higher levels of PACAP in the PVT and are more prone to binge eating, suggesting that PACAP in the PVT could drive binge eating behavior.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
410	Kathleen Oakes / Neurobiology and Anatomy	Jessica Barson, PhD	Genevieve Curtis	**Expression and Distribution of Neuropeptides in the Paraventricular Nucleus of the Thalamus:** The paraventricular nucleus of the thalamus (PVT) is a key node of the limbic system of the brain, critically involved in affective and motivated behavior. This region is anatomically divided into the anterior PVT, middle PVT, and posterior PVT, with each region speculated to play distinct roles in behavior. Very recent research suggests that, rather than being confined to a distinct subregion, cell types in the PVT may be distributed along antero-posterior gradients. Importantly, while the PVT has been shown to be densely innervated with neuropeptides, no studies to date have characterized the anatomical distribution of neuropeptides in cells of the PVT. In the present study, we used in situ hybridization data from the Allen Brain Atlas to determine which neuropeptides are present in cells of the mouse PVT and to determine their distribution throughout the PVT. In total, we found 43 neuropeptide genes in the PVT, with most following distinct patterns of expression across the antero-posterior axis. Many of these neuropeptides have known functions in reward, stress, homeostasis, feeding, and drug intake behavior. Some of the most densely-expressed neuropeptides in the PVT included tachykinin 2, galanin, adenylate cyclase activating polypeptide, dynorphin, CART, corticotrophin releasing hormone, and enkephalin. Based on their distribution through the PVT, we can speculate on their role in this region. This research was supported by NIH Grant R01 AA029218 (JRB) and the Drexel University College of Medicine Medical Student Summer Research Fellowship
411	Shyle Mehta / Neurological Surgery	Evgenii Belykh, MD/PhD	Evgenii Belykh	**"Needle Parking Technique" during Interrupted Suturing for Microvascular Anastomosis:** a Technical Note: Background: End-to-side anastomosis is one of the most common anastomotic configurations in cerebrovascular surgery and is commonly performed with interrupted sutures. One of the technical complexities of interrupted suturing includes the risk of losing the needle in between the interrupted sutures during the knot tying, which may result in unnecessary movements and wasted time. Objective: To report a new "needle parking" technique for interrupted suturing during microvascular anastomosis that addresses needle control problem during interrupted suturing. Methods: Time of anastomosis completion using conventional interrupted suturing, new interrupted suturing technique using "needle parking" and continuous suturing techniques were measured in 4 participants during ex vitro study. We also reviewed surgical video archive to provide illustrative cases where the novel technique was applied. Results: In vitro study demonstrated that the needle parking technique is significantly faster than the conventional technique and may be as fast as continuous suturing. This technique was used successfully for various end-to-side anastomoses in patients with Moyamoya disease. Conclusion: Needle parking technique is a modification of the interrupted suturing that solves the problem of losing the needle during the knot tying. This technique is simple, prevents unnecessary movements and may result in a faster anastomosis time.
414	Andrew Tawfik / Neurobiology and Anatomy	Simon Danner, PhD	Quynh Tran	**Effects of developmental dystonia and autism on the development of the locomotor function in mice:** Neurodevelopmental disorders are often accompanied by motor deficits. Yet, their impact on the development of the locomotor circuitry is not well understood. Here, we study swimming behavior in genetic mouse models of dystonia and autism spectrum disorder (ASD). By examining inter-limb coordination and other locomotor characteristics in animals between post-natal day (P) 4 and 20, we aim to probe the functionality of the spinal and brainstem circuits across development. Using python data analysis software, previously recorded swimming behaviors were analyzed in Tor1a mice (dystonia model), 16p11. 2 mice (ASD model) and their wild type (WT) litter mates. Our exploratory analysis showed that in WT mice, as developmental age increased, the frequency of limb movements increased, and the quality of inter-limb coordination increased, as measured by the phase-locking value. There was also a shift from using all four limbs for swimming in early stages to using only the hindlimbs as the animals matured. In comparison with WT mice, both Tor1a and 16p11. 2 mice exhibited a lower frequency of movement, decreased coordination of movement, and prolonged use of the forelimbs. These changes were more pronounced in the Tor1a model. Periods of disturbed interlimb coordination give insight into the development and impairments of the spinal and brainstem circuitry. In the future, we intend to use computer modeling to generate specific hypotheses that will guide further experiments aiming to disentangle the structural and functional impacts of neurodevelopmental disorders on motor function.
415	Meredith Singer / Microbiology and Immunology	Megan Detloff, PhD	Meredith Singer, Steven Singer, John Walker, Megan Detloff	**Development of An Unbiased, Automated Image Analysis Program for Assessment of Axonal Plasticity:** Development of an Unbiased, Automated Image Analysis Program for Axonal Plasticity AssessmentMeredith A. Singer, Steven M. Singer, John R. Walker, Megan Ryan DetloffDepartment of Neurobiology & Anatomy, Marion Murray Spinal Cord Research Center, College of Medicine, Drexel University, Philadelphia, PA 19129Microscope image examination is a standard laboratory procedure not often standardized across or within labs. Manual analyses are tedious, inconsistent, and biased. We developed a program applying MATLAB and associated toolboxes that automate image-level adjustments providing axon location and type in greater detail than manual tracing techniques. The program analyzes colocalization characteristics, axon density, projection distance, and regional axons projections within the dorsal horn (DH) laminae. This involves image restoration, individual clustering of CGRP+ and IB4+, line detection, line modeling, and cluster analysis. Several analytical methods eliminating unwanted background immunofluorescence and enhancing features of dorsal horn laminae were evaluated using: K Means, Fuzzy C Means, statistical edge detection followed by parsing the image to locate the regions of interest, and image pattern recognition utilizing the Artificial Neural Network, Fuzzy Adaptive Resonance Theory (Fuzzy ART). Our work provided an approach evaluating axon fibers sharing identical spatial parameters within colored images following ImageJ's statistical data. Ongoing work will exact fiber lengths and present further insight into nociceptor behaviors between DH layers 1 and 2 using polynomial curve fit. Several algorithms are being assessed to improve the curve fitting accuracy, such as Least Mean Squared, Principal Component Analysis (PCA), and Genetic Algorithm used to adjust coefficients. Hough Transform will evaluate the outcomes.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
416	John Walker / Neurobiology and Anatomy	Megan Detloff, PhD	Amy Ong, Megan Detloff	**FORELIMB MOTOR RECOVERY FOLLOWING SPINAL CORD INJURY AND REHABILITATVE STRENGTH TRAINING MAY BE IMPEDED BY NOCICEPTIVE AFFERENT INPUT:** Spinal cord injury (SCI) significantly impairs motor and sensory function. Individuals with SCI generally participate in physical therapy focused on range of motion, aerobic, and strength training (ST) to alleviate pain and improve voluntary movement. Our lab has begun a series of studies focused on the intersection of pain and movement which is generally ignored in the literature. This study uses a unilateral C5 contusion model in Sprague-Dawley rats to determine the treatment effects of early and delayed ST on forelimb and paw motor function. For ST, the rats were trained to reach through a narrow slot in a test cage to repeatedly pull a lever with 50g of force to receive a food reward. Their recovery of fine motor control was observed and quantified using a single pellet retrieval task. Post-injury recovery of sensation was examined by von Frey and mechanical conflict avoidance paradigms. Anatomical plasticity of the primary afferent fibers was stained for using antibodies against CTB, CGRP, and isolectin-B4 to identify large diameter, myelinated afferents, peptidergic nociceptive afferents, and non-peptidergic nociceptive afferents, respectively. Principal component analysis was used to determine the impact of different injury, anatomical, and behavioral variables in separating treatment effects. This study has led into further research regarding nociceptive input as possibly reducing the beneficial effects of ST. Understanding how the interplay between sensory and motor systems plasticity impact recovery will guide future research and rehabilitative strategies to yield better functional outcomes.
417	Jonathan Richards / Neurobiology and Anatomy	Megan Detloff, PhD	Soha Chhaya, Megan Detloff	**INTRAGANGLIONIC CCL2 INITIATES ALLODYNIA AND M2 MACROPHAGE ACTIVATION:** Inflammation in the nervous system can mediate the development and persistence of many pathological pain states. The lack of effective pain relief through current therapies may be due to our limited understanding of the reciprocal relationship between neuronal dysfunction and the immune response to nerve injury in the development and maintenance of pain. Our lab has previously reported that chronic neuropathic pain is preceded by an acute and transient upregulation of CCL2 protein in the dorsal root ganglia (DRG). To better understand the relationship between this transient increase in DRG CCL2 and pain development by recruitment of macrophages, a unilateral injection of recombinant rat CCL2 or vehicle was administered to the C7-8 DRG of the uninjured Sprague Dawley rat. Neuropathic pain was assessed using von Frey and mechanical conflict avoidance paradigm. Rats that received CCL2 injections exhibited persistent ipsilateral forepaw hypersensitivity starting at 3-days post-injection that did not resolve compared to naïve and vehicle-treated rats (p<. 05). Surprisingly, rats also exhibited contralateral forepaw hypersensitivity starting at 5-days post-injection that did not resolve when compared to naïve or vehicle treated rats (p<. 05). Immunocytochemistry and qPCR revealed that animals treated with CCL2 displayed increased macrophage presence in the DRG compared to naïve and vehicle-treated animals. However, analysis of macrophage phenotype suggests a pro-reparative rather than pro-inflammatory phenotype. This data suggests that CCL2 may have serve opposing functions—acting directly on nociceptors to initiate pain development and working to reduce nociceptor excitability and pain by recruiting M2 macrophages in pain maintenance.
418	Joseph Arena / Neurobiology and Anatomy	Megan Detloff, PhD	Shayna Singh, Megan Detloff	**Regulatory T-Cell Dysfunction Following Spinal Cord Injury in Mice :** Inflammation and immune cell activation have been strongly correlated to an increase risk in chronic complications of spinal cord injury including the development of neuropathic pain. Dampening of the immune response is largely orchestrated through a subgroup of CD4+ T-cells called Regulatory T cells. These cells secrete specific cytokines and express surface proteins such as IL-10, TGF-ß, and CTLA-4. These regulatory factors coordinate immune suppression through activating anti-inflammatory processes or blocking pro-inflammatory receptor activation. Although it has been demonstrated that there is aberrant function and activation of pro-inflammatory M1 monocyte derived macrophages and CD4+ T-cells following spinal cord injury, changes in the function of T-Regulatory cells have not been established. In this project we will utilize moderate contusion or complete transection of the spinal cords of mice to observe the differences in immune cell function. Immunohistochemical techniques and fluorescent staining with antibodies such as (IBA-1, Tomato Lectin, Fox-P3, etc.) will allow for the observation and measurement of immune cells in the spinal cord near the injury epicenter. An understanding of what immune cell types are activated and localized to sites of spinal cord injury can lead us to find more direct therapeutic targets for preventing both inflammation and secondary complications of spinal cord injury.
419	Ellen Armour / Biology	Felice Elefant, PhD	Haolin Zhang, Felice Elefant	**Elucidating the Importance of Tip60 Nuclear/Cytoplasmic Distribution in Alzheimer's Disease:** Neurodegenerative diseases such as Alzheimer's disease (AD), Parkinson's disease (PD), and Amyotrophic Lateral Sclerosis (ALS) are becoming increasingly common in our aging population, with minimal treatment options available for managing symptoms and slowing disease progression. In an attempt to develop better treatment options, our lab has pinpointed the histone acetyltransferase (HAT) Tip60 as a potential therapeutic target. Previous work in our lab has shown Tip60 has critical neuroprotective roles in apoptosis, axonal transport, sleep, and learning and memory. Not only is the presence of Tip60 important for neuroprotection, but subcellular localization may be important as well. Previous findings in our lab have shown Tip60 is largely excluded from the nucleus of the human AD hippocampus, made plausible by Tip60's ability to shuttle between the nucleus and the cytoplasm in stimulated neurons. Here, we examine the importance of Tip60 nuclear/cytoplasmic distribution using a Drosophila model of AD to determine if and how Tip60 localization changes at different stages of disease progression. By elucidating Tip60 nuclear/cytoplasmic distribution in AD at both early and late developmental stages, we can further manipulate Tip60 localization in an attempt to rescue deficits observed in AD.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
420	Akanksha Bhatnagar / Biology	Felice Elefant, PhD	Bhanu Karisetty, Felice Elefant	**Investigating Tip60 HAT's bi-level gene regulation at the chromatin and the RNA level:** Recent studies have elucidated the importance of epigenetic gene control in neurodegenerative diseases such as Alzheimer's Disease (AD). Our previous studies have shown that the histone acetyltransferase Tip60 is downregulated in human AD hippocampus and Drosophila AD brain resulting in reduced chromatin acetylation, repression of critical synaptic genes and cognitive decline. Remarkably, these phenotypes are restored by increasing Tip60 HAT levels in the Drosophila AD brain, supporting a neuroprotective role for Tip60 in AD. Although Tip60's role in chromatin dynamics has been well established, alternative Tip60 cellular mechanisms remain unexplored. Our results support a novel RNA binding function for Tip60 in addition to its well-established histone binding function. We carried out genome-wide sequencing of the RNA molecules bound with Tip60 in the Drosophila brain that led to identification of an array of Tip60's RNA targets involved in critical neuronal processes and AD. Remarkably, 77% of these Tip60 RNA targets overlap with Tip60's chromatin gene targets, suggesting that Tip60 regulates identical sets of genes at both the chromatin and RNA level and binds to a unique set of RNAs only. Therefore, this study elucidates how HATs like Tip60 orchestrate bi-level neural gene regulation that may underly AD neurodegeneration.
421	Awinita Barpujari / College of Medicine	Michael Erdek, MD	Michael Erdek	**Retrospective Analysis on the Effect of Spinal Cord Stimulation on Opioid Consumption:** BackgroundSpinal cord stimulation (SCS) is used to clinically manage myriad chronic pain etiologies. The impact of SCS on patients' use of opioid pain medication is not well understood. This retrospective analysis evaluated SCS effect on opioid consumption in patients presenting with chronic pain conditions. MethodsSixty-seven patients underwent a temporary trial device, permanent implant or both. Patients were divided for assessment based on the nature of their procedure(s). Primary outcome was change in morphine equivalent dose (MED), ascertained from preoperative and postoperative medication reports. ResultsPost-operative MED was significantly lower in patients who received some form of neuromodulation therapy. Pre-trial patients reported an average MED of 41. 01 ± 10. 23mg/ day while post-trial patients reported an average of 13. 30 ± 5. 34mg/day (p<0. 001). Pre-implant patients reported an average MED of 39. 14 ± 13. 52mg/day while post-implant patients reported an average MED of 20. 23 ± 9. 01mg/day (p<0. 001). There were no significant differences between pre-trial and pre-implant MED, nor between post-trial and post-implant MED. Of the 42 study subjects who reported some amount of pre-intervention opioid use, 78. 57% indicated a lower MED (N=33, p<0. 001), 16. 67% indicated no change (N=7) and 4. 76% (N=2) indicated a higher MED, following intervention. Moreover, SCS therapy resulted in a 26. 83% reduction (p<0. 001) in the number of patients with MED >50mg/day. **Conclusions **Spinal cord stimulation may reduce opioid use when implemented appropriately. Neuromodulation may represent an alternate form of pain management that is devoid of deleterious side effects, such as psychotropic liability, commonly associated with opioids.
423	Kyle Samson / Neurobiology and Anatomy	Rodrigo España, PhD		**Oxycodone Modulates Dopamine Transporter Function in the Nucleus Accumbens:** Opioid use disorder is a pervasive health problem in the United States. Prescription opioids play a critical role underlying this issue due to both their abuse potential and prevalence in the clinical setting. The mesolimbic pathway, consisting of the ventral tegmental area dopaminergic neurons, has been extensively studied in opioid use disorder. The mechanism underlying the rewarding properties of opioids has focused primarily on regulation at dopamine cell bodies in the ventral tegmental area. Interestingly, how opioids impact dopamine transmission locally in the nucleus accumbens (NAc) has not been well studied. We sought to determine how the commonly abused prescription opioid, oxycodone, impacts dopamine transmission in the NAc. Using fast scan cyclic voltammetry in a slice preparation, in male and female rats, we found that oxycodone significantly decreases the maximal rate of uptake of the dopamine transporter. Furthermore, how opioids affect the dopamine transporter and subsequent dopamine transmission in the NAc is unclear. In ongoing experiments, we seek to determine how opioid receptor subtypes can modulate dopamine transmission, and how interneurons in the NAc contribute to oxycodone's influence on dopamine transmission. Understanding how opioids work locally in the NAc will expand our knowledge of the overall mechanism of opioid's immense addictive potential, which may contribute to successful future treatment of opioid use disorder.
424	Shasha Yang / Neurobiology and Anatomy	Wen-Jun Gao, MD/ PhD		**Thalamocortical inputs regulate the development of inhibitory circuitry in the mPFC:** The precise performance of these functions relies on the gating of inputs to mPFC by local GABAergic interneurons (INs). Somatostatin-expressing (SST-) and parvalbumin-expressing (PV-) INs are the two most abundant subtypes in the mPFC. As a major source of upstream input to the PFC, the mediodorsal thalamus (MD) primarily forms feedforward inhibition to PNs in the mPFC. However, a fundamental question remained to be determined is how the local inhibitory circuitry in the mPFC is formed and regulated by MD inputs during development, especially as the maturation of prefrontal inhibitory GABAergic interneurons (INs) is prolonged until adolescence. We used inhibitory DREADDs to subchronically inhibit MD activity during adolescence and examine the response of mPFC. We found that subchronic inhibition of MD during adolescence not only induced long-term impairment of the excitability of MD neurons, but also dramatically disrupted the E/I balance in prefrontal PNs. In addition, properties of excitatory inputs to both SST- and PV- INs in the mPFC were altered by adolescence-inhibition of MD in different magnitudes. This study will improve our understanding of how the MD regulates prefrontal GABAergic signaling throughout development and, ultimately, mPFC-associate behaviors.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
425	Andrey Borisyuk / Neurobiology and Anatomy	Simon Giszter, PhD		**Locomotor recovery after broad versus more local current spread methods of spinal epidural stimulation in a combination treatment with viral BDNF and robot-assisted treadmill training in rats with complete T9/10 SCI:** Spinal cord injury (SCI) is a debilitating condition without a cure. Our lab has previously demonstrated enhancement in locomotor outcomes in rats with complete T9/10 SCI after combining viral BDNF treatment and ankle-based robot training. Combining epidural stimulation (ES) with ankle-based rehabilitation further enhanced these outcomes. Interestingly, the combined rehabilitation at the ankle didn't result in outcomes to levels as high as viral BDNF treatment with pelvic-based weight-supported treadmill training alone (no ES). Relative to the viral BDNF effects, our prior work has demonstrated the possibility of a critical period in the initial two weeks of training where ES likely has its effects on preventing some spasticity viral side effects on motor function in the experiments using pelvic centered rehab. These side effects can result in the eventual collapse of gained motor function in 40% of rats. This collapse was completely prevented when broad current spread ES centered at L2 and S1 was combined with viral BDNF and pelvic-based training. We hypothesized that the combined treatment with local ES would result in improvement in weight-supported stepping throughout therapy due to better selectivity. The current study aims to compare the improvement in functional outcomes in rats with complete SCI through rehab combining viral BDNF, pelvic-based training, and broad versus local ES. However, our data so far show that the more focused ES does not prevent collapse if used alone. In contrast to the broad current spread ES, more focused current delivery at L2 and S1 did not mitigate spastic collapse. While our best combination treatment utilized broad ES (broad but centered on L2 and S1 spinal segments), we aim to improve the therapy with the use of intense but more local ES in parallel to the broad current delivery (only focusing intense current locally to L2 and S1), most intensely stimulating only segments containing central pattern generators for locomotion.
426	Trevor Smith / Neurobiology and Anatomy	Simon Giszter, PhD	TaeGyo Kim, Maryam Abolfath-Beygi, Terence Sanger, Simon Giszter	**New tools and refinements to interpret the role of spinal interneurons in motor modularity:** Novel motor plans are translated through the common spinal apparatus, which must quickly and efficiently control the redundant joints and musculature. One model explaining motor pattern diversity despite network convergence is motor modularity. Here, dynamic 'building blocks' are combined in sequence or parallel to compactly construct most motor commands. We define a motor 'module' as a neural element evoking stereotyped muscle groups during motor activity, extracted from kinetic or biological features. To study the intrinsic properties of spinal motor modules without influence from higher centers, we use the spinal bullfrog model. Here, one variant of the wiping reflex serves as an inducible behavior composed of three motor modules. Control of motor rhythm and pattern circuits within the motor plan determine 'when' modules are recruited and 'how' each module activates groups of motoneurons, respectively. Spinal recordings to elucidate the precise role of spinal interneurons in generating these modular behaviors may be obscured by recording noise and hidden spinal states. To better interpret the role of interneurons from multielectrode spinal recordings, we have developed novel software and hardware tools refine our electrophysiological data. Our new intramuscular electromyography (EMG) electrodes are sensitive enough to capture the activity of single motor units within a muscle, serving as proxies for single motor neurons. Concurrently, we extracellularly record from populations of spinal interneurons associated with synergy activation and module onset, and bulk EMG activity across all major muscles in the leg. To refine our data processing, we utilize the stochastic dynamic operator to evaluate the role of a spiking signal, while compensating for current spinal state. We have now recorded stable units over several days in spinal frogs. This advancement will generate large datasets with significant power to attack the circuitry of modules in more detail.
427	Carlo Coladonato / Neurobiology and Anatomy	Simon Giszter, PhD	Joseph Jessee, Cassandra Alexandropoulos, Tatiana Bezdudnaya, Taegyo Kim, Lyandysha Zholudeva, Michael Lane, Paul Reier, Simon Giszter	**Engineering braided probes for intraparenchymal stimulation to promote function after spinal cord injury:** Among potential approaches for recovering lost function after spinal cord injury (SCI), intra-spinal microstimulation (ISMS) is an attractive option given its potential for precise activation of spinal circuitry. However, clinical translation of ISMS entails risk due to several factors preventing the safe implantation of chronic stimulating electrodes. Of note, shear-stress between the dura and pia mater layers can cause mechanical stress on the microelectrode implants, resulting in both electrode drift and increased inflammation at the site of implantation, which may aggravate functional deficits after SCI. The innovation of braided multi-electrode probes (BMEP) begins to mitigate these difficulties by increasing probe flexibility and tolerance to mechanical strain, while attenuating the immune response due to the decreased irritation of tissue. Nonetheless, shear forces at the dura-pia interface remain a challenge for ISMS technology. With current practice for implantation of electrodes being perpendicular implantation into the spinal cord, we hypothesized that oblique implantation will decrease the shear stress and result in long-term stability of the microelectrodes. To test this hypothesis, we used our second-generation braiding machine for engineering BMEPs and SCI model. The implants were inserted at oblique and perpendicular angles in the lumbar region, prior to a complete transection at the thoracic level 9-10. Responses were assessed using immunohistochemistry of sectioned tissue, marking microglia, astrocytes, neurons, cell nuclei, and myelin. Ongoing work involves translating our BMEPs for implantation into the cervical region for stimulation and recording of transplanted cells in a contusion model of SCI.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
428	Cameron Trueblood / Neurobiology and Anatomy	Shaoping Hou, PhD	Cameron Trueblood, Silvia Fernandes, Emily Oatman, Jacyln DeFinis	**Evaluation of transplanting embryonic 5-HT neuronal progenitors into the rat crushed spinal cord lesion for cardiovascular functional improvement:** Spinal cord injury (SCI) at high levels often results in the loss of supraspinal regulation over cardiovascular function. This manifests as abnormal resting hemodynamics and the development of orthostatic hypotension and autonomic dysreflexia (AD). Presently, there is no effective treatment to cure these disorders. We recently showed that transplanting embryonic serotonergic neurons into the lesion site is a promising strategy to reestablish supraspinal vasomotor pathways for cardiovascular functional improvement. However, the harsh environment of the transected spinal cord lesion restricted graft integration and survival. To better evaluate the efficacy of this transplantation strategy, in the present study we grafted embryonic raphe nuclei-derived neuronal progenitors/stem cells (RN-NPCs) into a crush SCI model at the 4th thoracic level (T4) which is more advantageous for cell growth. After 8-10 weeks, cardiovascular function was examined using a radio-telemetric recording system, including resting heart rate and mean arterial pressure, colorectal distention (CRD)-induced AD episodes, and spontaneous AD episodes. The results demonstrated that, compared to the injury controls, RN-NPC grafting decreases injury-associated bradycardia, causes a trending decrease in CRD-induced AD severity, and reduces events of spontaneous AD. Histological analysis indicated that grafted RN-NPCs survived, integrated with the host tissue, and projected to the caudal autonomic regions. Additionally, intrathecal administration of Ketanserin, a 5HT2A antagonist, blocked this recovery of resting HR, however the drug had no effect on AD severity. Thus, grafting RN-NPCs after a T4 crush injury alleviates cardiovascular dysfunction partially through central serotonergic mechanisms.
429	Jaclyn DeFinis / Neurobiology and Anatomy	Shaoping Hou, PhD	Cameron Trueblood	**Spinal tyrosine hydroxylase (TH)+ cells are involved in micturition reflex circuitry after spinal cord injury in rats:** Spinal cord injury (SCI) often leads to urinary dysfunction. Although an involuntary micturition reflex can be established to elicit voiding, complications arise in the form of bladder hyperreflexia and detrusor-sphincter dyssynergia that cause incontinence and inefficient expulsion of urine. To date, the mechanisms that underlie the regulation of micturition after SCI are not well understood. We recently observed an increase of a population of TH+ cells in the rat lumbosacral cord following SCI, which could contribute to the sustention of a low level of dopamine that modulates the bladder reflex. To determine if newly formed TH+ cells are a result of neurogenesis, Bromodeoxyuridine (BrdU, 50 mg/kg) was injected daily intraperitoneally (i. p.) for 2 weeks to label dividing cells after T10 spinal cord transection. However, histological assessment showed that no TH+ cells incorporated BrdU 3 weeks after injury. This suggests that TH+ cells may arise from another process, such as phenotypic transition. To elucidate whether TH+ cells project to parasympathetic and motoneurons of the micturition reflex, we injected two isoforms of the transsynaptic retrograde tracer, pseudorabies virus (PRV), into the bladder (PRV-512, encoding GFP) and the external urethral sphincter (PRV-614, encoding RFP) 3 weeks post-SCI. Immunohistochemistry was performed to examine infected TH+ cells in the lumbosacral spinal cord at both 48 and 72 hrs post-injection. Quantitative analysis revealed that there were significantly more triple labeled TH+/GFP+/RFP+ and double labeled GFP+/TH+ cells in the superficial dorsal horn at 72 versus 48 hrs. Thus, following SCI, TH+ cells form synapses with both autonomic and somatic motoneurons controlling the bladder and sphincter, respectively.
430	Emily Schramm / Public Health Department	Jina Huh-Yoo, PhD	Kristine Mulhorn, Shushi Yoshinaga, Christopher Yang, Jina Huh-Yoo	**Ageism On Twitter:** Ageism cultivated by our everyday language promotes stigmas against older generations, in addition to enhancing internalized ageism amongst older individuals. Internalized ageism is associated with lower life expectancy, high blood pressure, reduced self-esteem, diminished risk taking, and decreased motivation. In this project, we examine the prevalence of ageism on Twitter, a social media network service, using a 14-itemed code book we constructed to analyze tweets based on attitude and content related to ageism. The codebook was based on the Fraboni Scale of Ageism (FSA) and the book Ageism: Negative and Positive. For 150 randomly selected tweets, 43. 5% of the tweets were coded as against ageism, 18. 67% were coded as devaluing the lives of older individuals, 18% were coded as linking physical disability of older individuals to negative health outcomes, 7. 3% were coded as suggesting older individuals cannot make good decisions, and 6. 6% were coded as suggesting older individuals are a burden on society. 65% of adults now use social media networking sites, and this increase in usage has further led to increases in tension between generations. Furthermore, the Covid19 pandemic continues to heighten ageism, in addition to its negative implications. We need to ensure ageism from spreading and protect older individuals who benefit not only our economy but also our communities through volunteering, activism, and advocacy.
431	Julia Farnan / Pharmacology and Physiology	Joshua Jackson, PhD	Joshua Jackson, Edward Hartsough, Kayla Green, Maria Cavallo	**Investigating Co-opted Astrocytic Metabolism in Melanoma Brain Metastasis:** Melanoma, an aggressive form of skin cancer, frequently metastasizes to the brain. While peripheral melanoma is largely treatable, MBM fail to respond to current therapeutics and is a clear unmet clinical need. Initial clinical symptoms of Melanoma Brain Metastases (MBM) typically include headaches, seizures and other neurological deficits, suggesting that MBM disrupt normal brain functions. One of the major cell types that melanoma encounter and interact with during brain metastasis are astrocytes. Astrocytes, the most abundant cell in the brain, interact with neurons and the vasculature, provide trophic and energetic support to neurons, and regulate local blood flow. Metabolic pathways in astrocytes, particularly the glutamate-glutamine cycle, are essential for the recycling and resupply of neurotransmitters needed to maintain the excitation/inhibition balance. We propose that MBM co-opt astrocytic metabolism, fueling MBM growth, and deplete metabolic intermediates crucial for neuronal activity leading to altered neurologic function. We begin to unravel the metabolic interactions between astrocytes and MBM using novel modeling platforms with genetic and pharmacological tools to manipulate the tumor microenvironment. This project investigates the contribution of astrocytic metabolism to MBM growth. We intend on dissecting the distinct metabolic needs of metastatic brain melanoma in the CNS microenvironment and the subsequent neurological consequences. Completion of this project will provide a platform to study MBM and interaction with the local brain microenvironment. Inhibiting metabolic interactions between melanoma and glial cells may provide new avenue for therapeutic targeting of MBM.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
432	Kayla Green / Pharmacology and Physiology	Joshua Jackson, PhD	Julia Farnan	**Calcium Clearance in Reactive Astrocytes Post-Stroke:** Stroke affects more than 795,000 people per year, and is a leading cause of long-term disability. Stroke occurs when there is a lack of blood flow to an area of the brain that results in a loss of oxygen supply. Neurons and neurovasculature must communicate for proper blood flow, and astrocytes mediate this crosstalk via Ca2+ signaling. Astrocytes respond to tissue injury through a process called reactive astrocytosis, part of the brain inflammatory response. Previously, we observed that reactive astrocytes post-stroke display dysregulated, prolonged Ca2+ signaling; consistent with altered Ca2+clearance. We hypothesize that the prolonged Ca2+ increases are due to loss of Ca2+clearance mechanisms in astrocytes. The goal of this project is to characterize mechanisms of Ca2+ clearance in astrocytic processes and to determine whether altered Ca2+ signaling contributes to prolonged, exaggerated astrocyte reactivity. We used oxygen-glucose deprivation (OGD) in organotypic hippocampal slice cultures (OHSC), as well as primary astrocyte cultures as a model for ischemia. We examined Ca2+signals in astrocyte processes using confocal imaging of genetic Ca2+indicators. In addition, we used pharmacological methods to define pathways involved in Ca2+clearance. We examined changes in Ca2+clearance-related channels (PMCA, NCX, SERCA) as well as changes in the expression of downstream effectors (Calcineurin, CamKII) and Ca2+activated transcription factors (NFAT, NFkB) implicated in astrocyte reactivity using western blots, and IHC. Improving our understanding of these proteins in stroke-induced astrocytosis has potential to narrow our search for novel therapeutic targets.
433	Katherine Locke / Neurobiology and Anatomy	Michael Lane, PhD	Victoria Spruance, Margo Randelman, Giles Plant	**Transplantation of Human Induced Pluripotent Stem Cells in a Rat Cervical Spinal Cord Injury Model:** Each year there are almost 18,000 new cases of spinal cord injury in the United States alone. Spinal cord injury (SCI) is a devastating neurological event resulting in death of spinal neurons and glia, and the disruption of motor, sensory, and autonomic networks resulting in paresis and paraplegia. Several decades of research have shown that transplanting immature neural cells into damaged central nervous system tissue promotes significant tissue repair and promotes functional improvement. Building on a long history of transplantation research, and in collaboration with investigators at Stanford University, the present project now explores the use of a more translationally relevant source of donor cells: human induced pluripotent stem cells. Taken from human skin cell fibroblasts, these cells are reprogrammed to become neuronal and glial precursor cells which are then transplanted into the injured adult rat cervical spinal cord to test their capacity for repair and restoration of injured respiratory pathways. Ongoing work is assessing the morphology of the transplanted donor tissue and adjacent host spinal tissues to determine the extent of repair associated with human cell transplantation in the rat SCI model. We predict that providing a pro-regenerative cellular bridge at the injury site will promote axonal growth across the lesion and reconnect denervated neurons
434	John Fletcher / Neurology	Christina Maxwell, PhD	W. Geoffrey Wright, Gregory Teodoro, Christina Maxwell, Jill Farmer	**UprightVR as an Objective Assessment of Balance in Patients with Parkinson's Disease:** Background: Falls are a significant issue for patients with Parkinson's disease (PD) with 70% of patients with PD who experience falls falling regularly. Assessment of fall risk is often a subjective assessment that may fail to properly identify risk to prevent future falls. UprightVR is a sensitive posturography system consisting of a virtual reality headset, a control tablet and a series of proprietary algorithms that is capable of objectively quantifying changes in balance. The aim of this study was to assess UprightVR's viability in detecting balance defects in patient with PD. Methodology: 9 participants with PD underwent UprightVR assessment. Participants' degree of PD progression was compared to performance on UprightVR. Results: Patients with more progressive disease were found to perform worse on UprightVR assessments. Discussion: Subjects with more progressed PD were found to perform more poorly on UprightVR assessment. UprightVR shows promise in predicting fall risk in patients with PD. Future research should explore UprightVR's ability to predict fall likelihood in a longitudinal cohort compared to standard assessments of fall risk.
435	Sophie Gonzalez / Pharmacology and Physiology	Olimpia Meucci, MD/PhD	Elena Irollo	**Comparison of Image Analysis Software for Examining Synaptic Injury in HAND:** HIV associated neurocognitive disorder (HAND) is a persistent complication of HIV infection despite the development of effective antiretroviral therapy. Current understanding of the underlying mechanism of HAND includes subtle synaptodendritic injury localized to brain areas essential to executive functions and affecting dendritic spines, dynamic postsynaptic structures involved in excitatory neurotransmission. The chemokine CXCL12 is able to increase thin spines density in cortical neurons and restore lost cognitive flexibility in HAND models, suggesting that therapeutic interventions can reverse anatomical and functional changes leading to HIV-induced cognitive impairment. Sophisticated software programs are used to accurately study dendritic spines changes in experimental settings; however, there are limitations with speed, hardware compatibility, image exportation. Neurolucida 360 (NL360) is known as the superior analytical software for dendritic spine analysis, but the recent release of modules in Imaris software warranted a reevaluation of software capabilities. Here we compared the quality/ efficiency of NL360 vs Imaris 9. 5, when performing spine analysis in the same HIV-transgenic rat neurons. A survey of both image analysis software was also conducted. Using NL360, we confirmed previous results indicating that CXCL12 increases thin spine density in neurons of the prefrontal cortex. Imaris produced inconsistent data, required a longer learning curve, and was more time consuming. However, the experimenter had limited familiarity with this software, so additional work is required to establish the cause of the discrepancies between the two methods. Nevertheless, this study resolved that NL360 has greater capabilities to detect and analyze dendritic spines alterations and study HAND.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
436	Jared Luchetta / Pharmacology and Physiology	Olimpia Meucci, MD/PhD	Elena Irollo	**A multielectrode array study to investigate changes in neuronal networks induced by the chemokine CXCL12:** Previous studies indicate that the homeostatic chemokine CXCL12 exerts neuroprotective actions in the mature central nervous system and rescues both structural and functional deficits in experimental models of HIV-Associated Neurocognitive disorders (HAND). Specifically, we reported that deficits in medial prefrontal cortex dendritic spines and cognitive flexibility can be rescued by the chemokine CXCL12 in a murine model of HAND. Mechanistically, these effects are mediated by the activation of CXCL12's main signaling receptor, CXCR4, and the downstream stimulation of Rac1-dependent pathways, which results in actin polymerization and stabilization of neuronal dendritic spines - the primary site of excitatory neurotransmission. Data from our group and others also indicate that CXCR4 expression in the cortex is limited to a small population of neurons (18-20%), mainly inhibitory neurons. This suggests that the changes induced by CXCL12 in pyramidal neurons and the associated improvement in cognitive flexibility may result from the chemokine ability to regulate network connectivity via the inhibitory GABA system. In this study we utilize genetic and pharmacological manipulation combined with neuronal network electrophysiology and imaging studies to examine how CXCL12 shapes neuronal activity and regulates dendritic spine density. Initial MEA analyses were devoted to optimization of the experimental conditions for stable recording of neuronal activity over time (up to 7 weeks in cultures so far), which provided a key baseline for the CXCL12 studies. Ongoing experiments seems to suggest that the chemokine modulates both firing frequency of individual neurons and network activity.
437	Jill Lawrence / Microbiology and Immunology	Michael Nonnemacher, PhD	Jamie Marino, Monique Maubert, Vanessa Pirrone, Brian Wigdahl, Michael Nonnemacher	**Impact of morphine on a blood-brain barrier model:** The highly selective blood-brain barrier (BBB) mediates cellular and molecular passage between the central nervous system (CNS) and peripheral circulation. Densely-packed brain microvascular endothelial cells (BMECs) surrounding the capillary walls provide a semipermeable barrier between the bloodstream and brain parenchyma. Compromised BBB integrity has been linked to neurocognitive deficits that can arise from certain diseases and infections that target the CNS, including those associated with HIV-1 infection. Barrier function or regulation may also be negatively influenced by exposure to pharmaceuticals commonly used for pain management in patients suffering from CNS diseases. Morphine, a mu-opioid analgesic and metabolic product of heroin, is commonly prescribed for pain relief in a variety of conditions, including neuropathy associated with damage caused by HIV-1. Concerningly, opioid abuse occurs in nearly one third of HIV-1-infected patients and has been associated with increased severity of HIV-associated neurocognitive impairment; however, the underlying mechanism is unclear. Previous studies have demonstrated that exposure to morphine-modulated expression of cell adhesion molecules (CAMs), has resulted in increasing BBB permeability thereby enabling transmigration of immune cells. In these studies, the cerebral microvascular endothelial cell (hCMEC/D3) line as well as a primary human co-culture of BMECs and astrocytes were used in an in vitro BBB model. Morphine exposure did not significantly alter barrier permeability, influence chemokine gradients, or induce PBMC transmigration across the BBB. These results have suggested that opiate use may not be a major contributing factor in the chronic neuro-inflammation observed in patients suffering from HIV-associated cognitive impairment.
438	Andrew Jiang / Neurobiology and Anatomy	Liang Qiang, MD/PhD	Emanuela Piermarini, Seyma Akarsu, Arzu Karabay, Peter Baas, Liang Qiang	**Investigating the Etiology of Hereditary Spastic Paraplegia Using Transgenic Mouse Models:** Hereditary spastic paraplegia (HSP) is a heterogeneous neurodegenerative disorder characterized by spasticity in lower limbs, which is often associated with muscle weakness and gait deficiencies. Gene mutations in SPAST, which encodes spastin, a microtubule-severing enzyme, account for most HSP cases. Haploinsufficiency is the prevalent mechanistic hypothesis for the disease, and this has instructed some therapeutic attempts in the field. However, evidence from a new mouse model (termed SPAST-C448Y mouse) that expresses a clinically relevant human mutant spastin (C448Y) supports an alternative idea, namely that gain-of-toxicity derived from the mutations is the direct cause of this disease. For instance, SPAST-C448Y mice showed adult-onset gait deficiencies and die-back corticospinal degeneration, reminiscent of human patients, whereas SPAST-knockout mice showed only very mild motor deficits with no corticospinal degeneration. Interestingly, pathological axonal swellings were observed in spastin depleted neurons as well as human patients, but not in the SPAST-C448Y mouse. Here, we propose that haploinsufficiency and gain-of-toxicity both contribute to the pathology of HSP, as gain-of-toxicity is the direct cause, whereas haploinsufficiency renders the axon vulnerable to the disease-specific hits. To test this hypothesis, we crossbred SPAST-C448Y with SPAST knock-out mice and performed gait analyses. We found that the double transgenic mice display worsened gait deficiencies than SPAST-C448Y mice, whereas no overt defect was identified in SPAST knock-out mice. Complementary results were acquired in anatomical/histological analyses. Thus, our findings provide mechanistic guidelines for the pursuit of therapies as well as a suitable mouse model for preclinical testing of potential therapies.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
439	Taylor McCorkle / Neurobiology and Anatomy	Ramesh Raghupathi, PhD	Ramesh Raghupathi	**The nicotinic acetylcholine receptor modulator AVL-3288 decreases hippocampal-based cognitive deficits following repeated mild traumatic brain injury in adolescent male and female rats:** Sports-related concussions (SRC, a subset of mild Traumatic Brain Injury) in adolescents is a leading cause of long-term cognitive deficits. We have developed an age-appropriate and clinically-relevant model of SRC in adolescent (35-day old) male and female Sprague Dawley rats by subjecting them to 3 separate episodes over 7 days of an impact to the intact skull (2. 0mm depth at 5. 5m/s velocity). Rats were tested for hippocampal-dependent cognition at 4 weeks post-injury in the Morris Water Maze (MWM) and Novel Object Location (NOL) tasks. Male and female brain-injured animals exhibited significant deficits in locating the hidden platform in the MWM over the 5-day testing period compared to the uninjured (sham) rats. Similarly, both male and female brain-injured rats had significant difficulty recognizing the new location of an object they had been familiarized with in an earlier trial. Based on previous studies, we hypothesized that impaired cholinergic transmission may be a mechanistic basis for these cognitive deficits. Positive allosteric modulation of nicotinic acetylcholine receptors (nAChR) via AVL-3288 was reported to diminish spatial learning deficits in brain-injured adult male rats. Male and female rats underwent injury or sham surgery in adolescence and then were injected with AVL-3288 at 30 minutes prior to testing the animals in either the MWM or NOL tasks at 4 weeks post-injury. Preliminary data indicate that treatment with AVL-3288 attenuated injury-induced cognitive deficits in both tasks suggesting that reduced activity of the nAChR may underlie post-traumatic cognitive deficits.
440	Dana Lengel / Neurobiology and Anatomy	Ramesh Raghupathi, PhD	Jimmy Huh, Ramsh Raghupathi	**Traumatic Brain Injury in the Neonate Rat disrupts Hippocampal Glucocorticoid Receptor Function in Adolescence:** Children that sustain a Traumatic Brain Injury (TBI) during preschool-age (younger than 4 years old) are more likely to suffer from cognitive and psychosocial deficits that can emerge during adolescence/adulthood. We evaluated the effects of pediatric TBI in 11-day-old rats on cognitive and emotional behaviors between 4-6 weeks post-injury (adolescence). Brain-injured animals exhibited more open arm time in the elevated plus maze (EPM), and more active coping behavior in the forced swim test (FST) at 4-weeks post-injury. Pediatric TBI also resulted in impairments in spatial learning in the Morris water maze at 6-weeks post-injury along with deficits in long-term potentiation in the hippocampal CA1 field. Prior studies have demonstrated that suppression of glucocorticoid receptors (GR) within the hippocampus impairs spatial learning and hippocampal synaptic plasticity, and results in more active behaviors in the EPM and FST. Thus, we investigated whether pediatric TBI influences the expression and function of hippocampal GRs at 4-weeks post-injury by exposing sham and brain-injured animals to the EPM and measuring corticosterone, corticotropin-releasing hormone (CRH), and the mRNA expression of GRs and GR target gene, serum- and glucocorticoid-inducible kinase 1 (sgk1). Pediatric TBI did not influence corticosterone reactivity to the EPM, but resulted in an impairment in the transcriptional activity of GRs within the dorsal and ventral hippocampus at 4 weeks post-injury, as evidenced by an attenuation of the stress-induced increase in skg1. These results demonstrate that pediatric TBI results in long-term deficits in GR function within the hippocampus, which may underlie the cognitive and behavioral deficits observed following injury. Future directions include investigating whether GR overexpression in the hippocampus can reverse these cognitive and behavioral deficits following TBI.
441	Cruz Sevilla / Neurobiology and Anatomy	Ramesh Raghupathi, PhD	Zoe Romm, Taylor McCorkle, Ramesh Raghupathi	**Repeated mild traumatic brain injury in adolescent male and female rats results in depression-like behavior which is associated with minimal evidence of cellular pathology:** Sports-related concussions (SRC, a subset of mild Traumatic Brain Injury - TBI) in adolescents is a leading cause of long-term cognitive deficits. We have developed an age-appropriate and clinically-relevant model of SRC in adolescent (35-day old) male and female Sprague Dawley rats by subjecting them to 3 separate episodes over 7 days of an impact to the intact skull (2. 0mm depth at 5. 5m/s velocity). In a separate study, we observed that male and female brain-injured animals exhibited significant deficits in hippocampus-mediated cognitive tasks compared to uninjured (sham) rats. In addition, we tested these animals for anxiety behavior using the Light-Dark box and for depression-like behavior using the sucrose preference test and the forced swin test. Repeated mild brain trauma resulted in depression-like behavior, but not anxiety behavior, in both male and female rats when tested at 5-6 weeks after injury. Following testing, brains were harvested and evaluated for evidence of neurodegeneration and gliosis in the nucleus accumbens (associated with anxiety and depression) and the dorsal hippocampus (cognition). Nissl-stained sections revealed reduced cellular staining in the pyramidal layer of the hippocampus and an atrophy of the corpus callosum; degenerating axons were visible in the corpus callosum. There was no evidence of any cellular alterations (degeneration, astrocyte and microglial reactivity) within either the nucleus accumbens or the dorsal hippocampus. Together these data suggest that behavioral deficits following repeated mild TBI may likely be a consequence of neuronal dysfunction rather than overt neurodegeneration and/or inflammation.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
442	Justin Burnett / Neurobiology and Anatomy	Ramesh Raghupathi, PhD	Alexander Hahn, Thomas Trojian, Ramesh Raghupathi	**A retrospective review of incidence of and recovery from sports-related concussions within Drexel University athletes:** A concussion is defined as a traumatically induced transient disturbance of brain function. The transient disturbance of brain function is described as measurable neurobehavioral changes in emotional function, cognitive function, physical symptoms, and sleep abnormalities. While these symptoms are regarded as transient, many individuals experience post-concussion syndrome (PCS) for months or years. This definition is congruent with modern characterizations, but a lack of consistency exists among researchers and clinicians regarding what fundamentally constitutes a concussion versus a mild traumatic brain injury (mTBI). Due to this inconsistency, the terms concussion and mTBI will be used interchangeably. Past studies have widely demonstrated the acute effects of a concussion, but few investigate the recovery differences based on sex. Furthermore, the limited high-quality research available is often contradictory. Studies demonstrate in animal models that females have better outcomes following a mTBI than their male counterparts. On the other hand, human clinical studies indicate that females have a significantly worse pattern of recovery than their male counterparts. It is our belief that sex and steroidal hormone differences in the individual play a crucial role in the inconclusive data currently published in the field of concussion research. The paucity of literature investigating sex as a concussion prognostic factor provides an opportunity to probe the relationship further via a retrospective chart review of Drexel University athletes seen by Dr. Thomas Trojian at Drexel Sports Medicine. Preliminary analyses indicate that females recover faster than males despite females initially demonstrating more severe symptomology than their male counterparts.
443	Alexander Hahn / Neurobiology and Anatomy	Ramesh Raghupathi, PhD	Justin Burnett, Michael Wolf, Ramesh Raghupathi	**Does sex matter:** A retrospective chart review of incidence of and recovery from concussions in children seen at St. Christopher's Hospital for Children: Concussions are one of the most complex injuries to diagnose, assess, and manage. Modern consensus clinically defines a concussion as a mild traumatic brain injury (TBI), which is caused by biomechanical forces applied directly or indirectly to the brain. Such forces typically lead to an array of symptoms, ranging from headaches and dizziness to loss of consciousness and amnesia. While the immediate toll of these symptoms impacts the patient acutely, it's the difference in recovery time based on sex that needs continued research. One study looked specifically at recovery time in adolescents age 13-18 years after experiencing a sport related concussion (SRC). Resulting data revealed clinical significance in recovery time differences between males and females based on the time it took to seek treatment, with females exhibiting a longer recovery time due to delayed treatment. This study has provided insight into SRCs and recovery time based on sex in the adolescent population. However, the effect of age on recovery time following a SRC is still relatively unclear. Specifically, there is still a large gap in the literature concerning the effects of concussions (both SRCs and non-sports related concussions) and recovery time based on sex in children (7-12 years). This lack of research provides an opportunity to investigate common symptomology and recovery time differences based on sex in the pediatric population at St. Christopher's Hospital for Children. Preliminary analysis suggests that females experience a longer recovery time following a concussion compared to their male counterparts.
444	Daniel Kim / Surgery	Asanthi Ratnasekera, DO	Josh Palmbach, Nicole Pantle, Alexandra Hanlon, Alicia Lozano, Ammar Humayun, Sirivan Seng, Alice Lee, Sandra Durgin, Alexander Papa, Danielle Lapoint, Zaheer Faizi, Adrian Lowenfeld	**Outcomes of Early Initiation of Venous Thromboembolism Prophylaxis in Isolated Traumatic Brain Injuries:** **Objectives: **The ideal timing for initiating chemical venous thromboembolism (VTE) prophylaxis in patients with isolated traumatic brain injury (TBI) is not clearly defined. We aimed to determine if early initiation of VTE prophylaxis was associated with lower rates of intracranial hemorrhage (ICH) expansion and VTE. **Methods: **A single center, retrospective cohort study was conducted in a Level II Trauma Center from 2012 to 2018. Patients with isolated TBI who had initiation of chemical VTE prophylaxis within 24 hours of stable head CT (early) were compared to those who had VTE prophylaxis initiated after 24 hours of stable head CT (late). The primary outcomes of the study were ICH expansion and VTE. Secondary outcomes were ICU length of stay (LOS), hospital LOS, and mortality. Statistical comparisons were accomplished using chi-square tests and non-parametric Kruskal-Wallis tests for categorical and continuous variables, respectively. **Results: **Among 631 patients with isolated TBI, 199 were started on VTE prophylaxis. 61 patients had early initiation of VTE prophylaxis, and 138 were initiated late. The rate of VTE was 1. 7% in the early group, 8. 7% in the late group (p<0. 0001), and 1. 2% in the group that did not received chemical VTE prophylaxis. The rate of ICH expansion was 6. 6% in the early group and 4. 3% in the late group (p=0. 5698). ICH expansion rate was 3. 7% (n=16) in the group who received no chemical VTE prophylaxis. Patients in the late VTE prophylaxis group had longer hospital LOS (p<0. 001) and ICU LOS (p<0. 001). **Conclusion: **The study shows early initiation of chemical VTE prophylaxis in TBI patients decreased VTE complications without an increased risk of ICH expansion.
445	Manali Potnis / Biochemistry and Molecular Biology	Christian Sell, PhD		**H19 is essential for the proliferation and survival of adult somatic cells:** The long non-coding RNA (lncRNA) H19 is a maternally imprinted gene transcript that is critical to the control of embryonic growth via transcriptional regulation of the neighboring gene Igf2. Loss of H19 results in fetal overgrowth associated with Beckwith Weidemann syndrome and H19 expression is correlated with poor prognosis in cancer. Although H19 is highly expressed throughout fetal development and controls embryonic growth, its role in adult tissues remains elusive. H19 promotes cell proliferation of cancer cells and stem cells where it promotes migration and differentiation, respectively. However, the function of H19 in primary somatic cells has not been defined. Previously, reduced H19 levels were associated with senescence in endothelial cells but the underlying role of H19 in cellular senescence seems to be far more complex than the quintessential G1 arrest. We examined the role of H19 in somatic cell growth using cardiac interstitial fibroblasts. Our results indicate that H19 is not only vital for somatic cell proliferation and survival but that depletion of H19 in leads to G2 arrest, and formation of multinucleate senescent cells. These results indicate an essential role for H19 in G2/M and proper mitotic division.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
446	Richard Giza / Medicine	Cyndya Shibao, MD	Maureen Farrell	**Clinical and Neurohormonal Characteristics of African Americans with Neurogenic Orthostatic Hypotension:** **Background: **Neurogenic orthostatic hypotension (nOH) can be secondary to autonomic failure from neurodegenerative diseases such as pure autonomic failure, multiple system atrophy and Parkinson's disease. Autonomic failure can manifest with dysregulation within the gastrointestinal, genitourinary, and cardiovascular systems. Studies have shown autonomic physiological differences in Africans Americans (AA) such as lower heart rate variability, enhanced blood pressure reactivity and blunted sympathetic neural response compared to non-Hispanic whites (NH-W). Prevalence, clinical characteristics and neurohormonal profile of autonomic failure in African Americans is unknown. Methods: AA (N=9) and NH-W (N=56) with nOH underwent standardized autonomic testing (sinus arrhythmia ratio, Valsalva maneuver ratio, cold pressor test and handgrip test) and had neurohormonal levels (norepinephrine, aldosterone, renin activity) measured at supine and upright positions. **Results: ** nOH was due to Parkinson's disease in 11% AA versus 0% in NH-W. There were no significant differences in clinical characteristics between groups. NH-W had a significant increase in upright renin activity (294. 8 +/- 88. 2%) and aldosterone (188 +/- 27. 1%) compared to AA (13. 3 +/- 13. 3% and 58. 5 +/- 38. 3%, respectively)Conclusion: Our findings are that AA with nOH demonstrated similar clinical and hemodynamic autonomic profiles, had increased prevalence of Parkinson's Disease, and had suppressed levels of upright renin activity and aldosterone compared to NH-W with nOH. This study helped characterized autonomic failure in AA and identified key physiological differences in AA and NH-W with nOH.
448	Annu Suresh / Neurobiology and Anatomy	Claudio Torres, PhD	Sinan Tuzer	**Interplay between O-GlcNAc and senescence in brain cells:** Alzheimer's disease (AD), a progressive brain disorder presenting with a continuous decline in memory, thinking, reasoning, and social skills, is the 6th leading cause of death in the United States. Age, the primary risk factor for AD, is typically associated with an increase in senescent cells, which have ceased to proliferate and are often dysfunctional. Higher numbers of senescent astrocytes, a glial cell responsible for controlling central nervous system metabolism, are seen in AD cases. In addition, AD and aging are both linked to changes in the level of glucose metabolism and the amount of O-linked ß-N-acetylglucosamine (O-GlcNAc) modified proteins in cells. In considering the relationship between senescence and level of O-GlcNAc, we hypothesize that O-GlcNAcylation is linked to senescence in AD. Our results from in vivo and in vitro experiments suggest that O-GlcNAc expression increases with the increased senescence seen in AD. A significantly higher number of O-GlcNAc+ cases were found in both the white and gray matter of AD cases compared to control brain tissue. Decreasing O-GlcNAcylation with an O-GlcNAc transferase inhibitor decreased senescence in astrocytes while increasing it with an O-GlcNAcase inhibitor increased senescence. In accordance, increased levels of O-GlcNAc expression were found in senescent astrocytes. One contradictory western blot result showed an increase in O-GlcNAc with increasing age in normal populations, but this increase disappeared in AD patients of corresponding ages, suggesting an age-discordant change in AD.
449	Xiaonan Liu / Pharmacology and Physiology	Kazuhito Toyooka, PhD	Sara Blazejewski, Sarah Bennison	**Myo1c regulates neurite formation in mouse cortical neuron:** Myosins are actin-binding proteins that are most notable for functioning as an actin motor protein. MYO1C belongs to the class 1 myosin, and it is encoded in the Miller-Dieker syndrome (MDS) critical region on human chromosome 17p13. 3. MDS is caused by microdeletion of the MDS critical region, including Myo1c which is commonly deleted in MDS patients. Lissencephaly, seizure, and neurodevelopmental defects including impaired neuronal migration and neurite formation are among the various clinical phenotypes displayed by MDS patients . MYO1C was first reported in 1993, and its functions are analyzed in a wide range of cell types, but Myo1c's functions are unclear, especially in neurodevelopment. We found mouse Myo1c is expressed in the cerebral cortex from embryonic to neonatal stages. This suggests myo1c is important for neurodevelopment. We knocked down Myo1c in layer 2/3 cortical pyramidal neurons using in utero electroporation and discovered defects in neuronal morphogenesis in Myo1c-depleted neurons. The defects include shorter apical dendrites at P3 and decreased neurite number at P12, suggesting Myo1c function is crucial for neurite initiation. Myosin class 1 has been shown to support actin organization around the plasma membrane. Myo1c can anchor to cell membrane in lipid rafts via binding to phospholipid Phosphatidylinositol 4,5 bisphophate (PIP2), suggesting Myo1c might serve as a linker between actin and lipid raft. Our future direction is to clarify the cellular and molecular mechanism of Myo1c functions in neurite formation.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
450	Sarah Bennison / Neurobiology and Anatomy	Kazuhito Toyo-oka, PhD	Sara Blazejewski, Xiaonan Liu, Trevor Smith	**Adnp is shuttled to the cytoplasm to promote neuronal morphogenesis and functional cortical connectivity:** Defective neuritogenesis is a contributing pathogenic mechanism behind a variety of neurodevelopmental disorders. Mutations in Activity-dependent neuroprotective protein (ADNP) are among the most frequent underlying Autism Spectrum Disorder. Adnp has a suggested role in neurite formation, but if defective neuritogenesis underlies the pathology of ADNP syndrome has yet to be explored. We found that Adnp knockdown using in utero electroporation of mouse layer 2/3 pyramidal neurons in the somatosensory cortex leads to neurite formation defects beginning at P0. We used ex vivo live imaging and found serious flaws in cellular dynamics in Adnp deficient neurons. These include failure of neurite retraction, slow growth speed, increased neurite stabilization, and intracellular swellings. These defects are sustained throughout development. At P15, we noted increased basal dendrite number, axon length, and interhemispheric axon innervation. Slight changes to neurite morphology can lead to large scale changes in brain connectivity and function, which can have behavioral consequences. To assess potential changes to neuronal function, we performed ex vivo calcium imaging which revealed that Adnp deficient neurons were hyperexcitable. To further probe changes to neuronal activity, we utilized GRAPHIC, a novel synaptic tracing technology, to assess cortico-cortical connectivity. We found increased interhemispheric connectivity between Adnp deficient layer 2/3 pyramidal neurons. To probe the molecular mechanism of changes to neuronal morphology, we performed localization analysis of Adnp. We found that Adnp is shuttled from the nucleus to the cytoplasm upon neurite formation, and this shuttling can be blocked by 14-3-3 inhibitor, difopein. We also found that Adnp binds nuclear-cytoplasmic shuttle 14-3-3e. We conclude that upon neuritogenesis, Adnp is shuttled to the cytoplasm by 14-3-3e, where it regulates neurite formation, maturation, and functional cortical connectivity.
452	Xiaohuan Sun / Neurobiology and Anatomy	Dong Wang, PhD	Xiaohuan Sun, Wenqiang Huang, Liang Qiang, Peter Baas, Dong Wang	**Investigating the retrosplenial cortex-to-anterior cingulate cortex pathway in memory formation:** Long-term memories are thought to be stored in distributed neural network of multiple neocortical regions, including the notable retrosplenial cortex (RSC) and anterior cingulate cortex (ACC). Whether and how the RSC and ACC may communicate with each other during the memory formation process is still unknown. Here, we investigated a potential RSC-to-ACC pathway and its role in formation of a long-term episodic memory. Initially, we injected a retrograde tracer, the Cholera toxin subunit B (CTB-555), into ACC, and confirmed that ACC mainly receives inputs from RSC layer 2/3. We also used another retrograde tracer, the AAV-retro virus, which reached a complementary conclusion. Next, in order to determine whether the RSC-to-ACC pathway is involved in acquisition of a memory, we aimed to employ a contextual fear conditioning procedure combining the optogenetic technique. Inhibition of the RSC-to-ACC neural circuit is performed via utilizing the AAV-Syn-halo-EGFP virus in a mouse model. The amount of time that the mice spend on freezing in the foot shock chamber at recent (1 day) or remote (14 days) time points can be used as an index to evaluate memory strength. We expect that the mice to have a deficit in remote memory but not recent memory, thus confirming the importance of the RSC-to-ACC communication in the formation of remote memories. My studies also indicated that these tools and techniques can also be applied to study memory deficits in Alzheimer's disease.
453	Jun Liu / Neurobiology and Anatomy	Dong Wang, PhD	Dong Wang	**Neural ensemble dynamics and oscillations of amygdala-prefrontal interaction during memory formation:** A fundamental gap that limits the development of therapeutic interventions for PTSD is lack of understanding the neural circuits underlying the formation of the long-lasting fear memories. Recent studies showed that basolateral amygdala (BLA) activity is essential for both memory acquisition and consolidation via its interaction with the medial prefrontal cortex (mPFC). However, it remains unknown how the neural ensembles and oscillations between the BLA and PFC communicate during memory acquisition and consolidation. Here, we focused on studying memory acquisition and consolidation by employing a contextual fear conditioning procedure. Our preliminary results showed that the activated BLA neurons can be divided into three major types: 1) general responses to environmental changes; 2) transient activation after footshocks; 3) sustained activation after footshocks. Since ~19% of the BLA neurons increased their spontaneous firing during post- vs. pre-shock sleeps, we propose that the increase in spontaneous firing of BLA neurons may facilitate the memory consolidation during post-training sleep via its interaction with mPFC. In addition, we observed three major types of neural oscillations, termed delta, low theta and gamma rhythms in the BLA. Our analysis revealed prominent low theta and gamma oscillations during acquisition. Also, the post-conditioning sleep was dominated by delta oscillations, which likely plays an important role during memory consolidation, similar to that shown in PFC. In our ongoing study, we are employing a multi-approach strategy that combines in vivo electrophysiology and closed-loop optogenetic control for circuit-level monitoring and manipulation of neural activity in the BLA and PFC network.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
454	Candace Rizzi-Wise / Neurobiology and Anatomy	Dong Wang, PhD		**Dorsal versus ventral Lateral Septum circuitry in the regulation of fear:** Appropriate fear responses, such as freezing in response to threat, are critical for survival. However, the underlying circuitry involved in the regulation of this affect has yet to be fully elucidated. While the lateral septum (LS) is a critical subcortical structure in the regulation of affect, its function within specific pathways that regulate fear remains unclear. It has been hypothesized that the LS integrates hippocampal input to regulate the expression of fear-dependent behaviors, but the current knowledge of hippocampal to LS pathways and further downstream LS efferents involved in this regulation are insufficient to conclude the existence of a comprehensive circuitry. Notably, the hypothalamus is a major downstream target of the LS that has only recently been implicated in the regulation of fear-induced behaviors. Our preliminary data suggests the presence of two parallel pathways that originate in the hippocampal dCA1 or vCA1 and project to the dorsal and ventral LS, respectively, to differentially regulate fear-associated memory. Further downstream, retrograde transsynaptic tracing studies revealed anatomical connections between the hippocampus, LS, and hypothalamus. The goal of this study is to determine whether the modulation of these dCA1 versus vCA1 pathways to the LS regulates the expression of fear-associated memory as well as any potential firing property differences between the dorsal and ventral subregions of the LS. This in-depth research will provide a novel understanding of LS circuitry involved in fear regulation, which is required for development of advanced treatment for those with dysregulated behaviors relating to fear.
455	Ashley Opalka / Neurobiology and Anatomy	Dong Wang, PhD		**The anterior thalamic nucleus activates retrosplenial cortical silent assemblies to initiate memory consolidation in mice:** Memory consolidation, the process that transforms newly acquired information into long-lasting memories, is a crucial process in everyday life. It is well-established that hippocampal-cortical communication is essential for this consolidation process, where cortical slow-wave delta oscillations (1-4 Hz) coordinate with hippocampal activity. These cortical delta oscillations have periods of almost complete silence with little neuronal firing, known as Down states. Interesting, our preliminary results showed that the retrosplenial cortex (RSC) exhibited a unique subpopulation of neurons that increased firing during these Down states, termed RSC silent assemblies. Since the activity of RSC silent assemblies preceded other RSC and hippocampal neuronal firing, this subpopulation of RSC neurons may initiate memory consolidation, which may indicate a novel mechanism where cortical activity leads hippocampal activity in memory processing. However, it remains unclear which brain region may activate these RSC silent assemblies to signal the initiation of memory consolidation. In particular, the thalamus is important for generating delta oscillations, while the anterior thalamic nucleus (ATN) projects to the RSC. Moreover, it has been recently shown that the ATN-to-RSC pathway is essential for memory formation, suggesting that this pathway may also be crucial for memory consolidation. We hypothesize that the ATN drives the firing of RSC silent assemblies and, thus, initiates memory consolidation. To this end, we utilized extracellular electrophysiology in freely behaving mice combined with a closed-loop optogenetic strategy in the ATN-to-RSC pathway. We revealed that photostimulation of ATN terminals during RSC Down states induced activity in RSC silent assemblies. Our results indicate that the ATN activates RSC silent assemblies and, thus, may illustrate a novel thalamo-cortico-hippocampal mechanism of the intricate process of memory consolidation.
456	Wenqiang Huang / Neurobiology and Anatomy	Dong Wang, PhD		**Median raphe neuronal responses to salient sensory stimuli:** The median raphe nucleus (MnR) has been suggested as the origin of a behavioral inhibition system that projects to the septum, hippocampus and some other cortex and nuclei closed to the midline. Previous study using electrical stimulation or lesion of this area causes behavioral and autonomic manifestations characteristic of fear such as, freezing, defecation and micturition. However, the immediate electrophysiology evidence about the function of MnR is absent. In this study we did electrophysiology recording from the MnR and para-MnR area to study neurons' responses to various sensory stimuli during awake and asleep states. We found that the majority of MnR neurons responded to vestibular stimulus, but few of them responded to auditory or visual stimuli in awake state. Interestingly, most MnR neurons had strong responses to auditory stimulus during sleep. Meanwhile, these MnR neurons were mostly silent during slow wave sleep but fired immediately after waking up. In contrast, Para-MnR neurons barely responded to any sensory stimuli, showing a different firing pattern. These results provided evidence that neurons in MnR may play a role in the function of arousal or alertness.
500	Evan Becker / Medicine	Hasan Ayaz, PhD	Rami Amer	**Medical Interviewing with a Robot instead of a Doctor:** Effective healthcare relies on transparency between the physician and patient. Evidence suggests that patients are uncomfortable with disclosing sensitive information to physicians during the medical interview due to fear of judgement, embarrassment, and bias, thus negatively impacting physician decisions. We believe using a humanoid robot as a proxy for the physician during the initial medical interview will decrease the judgement that patients feel and increase the quantity of sensitive information that is often critical for patient care. Humanoid robots are capable of acquiring trust in controlled environments and it has been shown that trust is directly associated with effective patient care. Our study aims to investigate the ability of a robot to gain patient trust and elicit sensitive information in the healthcare setting. Specifically, the robot's patient interview will be juxtaposed with a human patient interview. The experiment will consist of 10 participants that will perform four interviews in a randomized 2x2 design. Each participant will perform two interviews with a medical student (G1) and two interviews with a humanoid robot (G2) over Zoom. Within each group, participants will either act out a scenario with one sensitive chief complaint or a scenario with two sensitive conditions. If a medical robot can obtain more sensitive information from a patient and yield higher trust scores on MDMT questionnaires, then medical diagnoses can be more accurate and patient care can be improved.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
502	Jamison Beiriger / Anesthesiol-ogy	Stephen Frabitore, MD	Stephen Frabitore	**The Pitt AirWay Shield: a novel device for anesthesiologists during COVID-19 airway management:** Background: The COVID-19 pandemic has severely hampered most medical device development and authorization; however, novel devices designed to assuage the impact of the virus qualify for federal emergency use authorization (EUA). We took advantage of this pathway and developed our novel Pitt AirWay Shield (PAWS), which is a novel barrier precaution designed to reduce provider exposure to COVID-19 during airway management procedures. Through our innovation we established a proven process for future emergency device development. Methods: Developing medical devices for emergency use is a multistep process. The first step is recognizing a problem with a potential mechanical solution. In the case of the PAWS, we were concerned with exposure of anesthesiologists to aerosolized droplets during airway management procedures. The next and most important step is designing and testing the efficacy of the device. Our primary considerations were efficacy, airway access, comfort, and patient safety. We analyzed droplet exposure using labeled aerosolized liquid. Finally, after testing and design approval from providers, we filed an application for an EUA. Results: Our design received an EUA for the COVID-19 pandemic and is currently undergoing a quality improvement study. Quantitative and qualitative analyses have demonstrated our device effectively restricts provider exposure during airway management procedures. The PAWS development outlines the proper path to authorization for novel medical devices. Conclusion: The PAWS is a critical step towards mitigating the burden of clinical exposure during the COVID-19 pandemic. Furthermore, our device development process provides an excellent template for future device development.
503	Stephen Jaffee / Surgery	Stephen Jaffee, BS		**Cost Analysis of Robotic Guided v. Conventional Pedicle Screw Placement: Introduction:** Pedicle screws are utilized in spinal fusion and have seen a substantial amount of innovation surrounding their implantation through the use of advanced imaging (fluoroscopy) and more recently the implementation of robotic guidance. The introduction of robotic technology may be a costly investment but may confer significant advantages to both patients and physicians. We review to cost of conventional versus robotic pedicle screw instrumentation to determine the value of the technology. Methods: A literature review was conducted using queries in PubMed and Cochrane Library using terms such as "Robot", "Fluoroscopy", "Cost" and "Pedicle Screw". Results: Thoracolumbar fusion costs approximately $31,716 ± $18,124, robot assisted surgery conveys a reduction in length of inpatient stay and reduced intraoperative adverse events, there is no significant difference in OR time and need for revision surgery. There is a theoretical cost savings of ~$600,000 with the use of a surgical robot if ~600 spinal cases are preformed. Conclusion: The use of robotic assistance in surgery may provide some advantages; however, more long term clinical outcome data is required in order to definitively demonstrate value of expenditure on these surgical instruments.
504	Brandon Smith / Orthopedic Surgery	Bradford Jameson, PhD	Alex Hahn, Kyle DeStefano, John Corvi, John Corvi	**Implementation of 3D printing in preoperative and intraoperative Orthopaedic cases:** A literary review: Additive manufacturing, or commonly known as 3D printing, has become a rapidly evolving technology in the medical community. The umbrella term 3D printing, describes a repetitive process of layering to form a complete model. Using precise coordinates, 3D printers can accurately and efficiently take abstract concepts and produce a tangible item. The most common modality of 3D printing in the commercial space is fused deposition modeling (FDM). This technique utilizes a heated extruder to melt solid filament, usually Polylactic Acid (PLA) or Acrylonitrile Butadiene Styrene (ABS), in successive layers that are then rapidly cooled to create a final product. Both cost and customization have been attractive factors for utilizing 3D printing in the medical community, and more specifically its potential impact in surgical operations. Applications of 3D printing can play a pivotal role in both preoperative planning and intraoperative use. By preoperatively printing models of bone fractures, surgeons are able to preadapt fixation screws and plates which can ultimately reduce OR time. In contrast, intraoperative 3D printing can be utilized to produce customizable implants for patients that present with complex fractures or anatomical differences that inhibit the accommodation of a standardized implant. These patient-specific implants (PSI) allow for the reconstruction of proper anatomy and function. This can ultimately lower morbidity and ultimately surgical costs. This poster will explore the common uses of 3D printing in a preoperative and intraoperative setting to optimize surgical outcomes.
505	Nicholas Semenza / Orthopedic Surgery	Ian Kaye, MD	Jennifer Mao, Brian Karamian, Alec Massood, Ian Kaye	**Can Intervertebral Disc Height Ratios Be Used to Identify When to Extend Lumbar Spinal Fusion Surgery to the Sacrum?:** Background: Lumbar spinal fusion is a common procedure used to address degenerative lumbar disc disease most commonly affecting L4-L5 and L5-S1. Increased motion of the adjacent caudal segment in isolated L4-L5 fusion has led to concerns regarding increased incidence of revision surgery. The aim of this study is to evaluate degeneration at L5-S1 and to identify a threshold of degeneration in which a primary L4-S1 construct would be warranted. Methods: Adult patients undergoing isolated L4-L5 lumbar fusion surgery between 2014-2019 with at least one year of postoperative patient reported outcome measures (PROMs) were reviewed. Patient demographics, pre- and post-operative radiographs and baseline PROMs were collected. Patients were categorized based on whether or not they met minimally clinical important differences (MCID) at 10-24 months. Comparison of continuous variables were analyzed using independent t-test. Area under the curve analysis was conducted on PROMs compared to the ratio of L3-L4/L5-S1. A value of 0. 7 was used as a critical threshold. Results: 183 patients were included in the analysis. 68. 9% of patients met MCID on VAS back and 62% met MCID on ODI, which indicates surgical improvement on back pain and function. The majority of patients did not report improvement on VAS Leg (64%), MCS-12 (93. 6%), or PCS-12 (86. 5%). The median anterior, middle, and posterior disc heights for L3-L4: L5-S1 were 1. 04 mm, 1. 08 mm, and 0. 8 mm. There were no significant differences in disc height ratio between those who met MCID and those who did not for VAS back or leg, ODI, or SF-12. Conclusion: An optimal threshold of degeneration at the L5-S1 level was not able to be identified.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
506	Pooja Menon / College of Engineering	Michele Marcolongo, PhD	Ellen Bass, Amy Throckmorton, Michele Marcolongo	**AJFlex Face Shield Project: A Cross-Community Effort:** The COVI9-19 pandemic brought unprecedented challenges to the United States, among them, wreaking havoc on the medical supply chains that equip frontline workers with personal protective equipment, or PPE. A dire situation evolved in which N95 respirators, ventilators, face shields, and other materials became startlingly difficult to acquire as supply chains broke down and vendors began limiting purchases. Hospitals and other institutions were forced to turn to unconventional ways of both obtaining and making PPE, facing price gouging and, for some, turning to garbage bags as substitutes for gowns. Responding to these difficulties, community leaders began work on grassroots efforts of domestic production of masks, respirators, and other supplies to provide a stopgap measure for the break in supply chain. Colleges, universities, industry partners, and individuals at home joined various organizations and donated time and money to ensure the protection of frontline workers. One type of PPE is the face shield, which can be useful for the protection of healthcare workers against respiratory droplets, a method of transmission of SARS-CoV-2. Here, we detail the cross-campus and cross-community efforts originating at Drexel University in Philadelphia to produce over 22,000 3D-printed AJFlex Shields for local hospitals and the community.
507	Gabrielle Allred / Medicine	Camilo Restrepo, MD	Matthew Sherman, Mohammed Rasouli, Javad Parvizi	**Evaluating ASA and CCI as Predictors of Complications Post TJA:** Preoperative comorbidities are used in a variety of ways to predict morbidity and mortality after orthopedic joint surgery. Two of the most common methods are the well known American Society of Anesthesiologists' (ASA) physical status classification system and the Charlson Comorbidity Index (CCI). ASA is a simpler classification system describing the overall health of a patient and burden of comorbidities, and can vary with inter-observer assignment. CCI is more detailed, assigning weights to systemic diseases in order to predict long term survival, making it more useful for research purposes than risk stratification. The goal of this study was to evaluate the predictive value and ability of CCI and ASA on post operative complications following Total Joint Arthroplasty (TJA). A retrospective chart review of 30365 patients who underwent a primary Total Hip or Total Knee Arthroplasty between October 2005 and January 2020 at Rothman Orthopedic Institute was performed. Evaluating the area under the curve (AUC) values found there was no significant difference between ASA and CCI in predicting complications. While ASA and CCI are useful tools for predicting complications after TJA, there is an opportunity to create a better predictor of complications. Next steps are to develop a risk calculator specific to orthopedic surgery and TJA.
508	Brett Creon / Orthopedic Surgery	Scott Rodeo, MD	Camila Carballo, Susumu Wada, Tony Chen, Samuel Green	**Long-Term Pain, Functional, and Morphological Effects of a Ruptured Anterior Cruciate Ligament:** Evaluation in a Novel Murine Model: Studies suggest that 80% of anterior cruciate ligament deficient knees will develop post-traumatic osteoarthritis (PTOA) with in 5-15 years. Here we will demonstrate the long-term effects of a more clinically relevant closed rupture of the ACL and compare the results to the open surgical transection model. Evaluating these changes will be critical for the development and testing of possible therapies. Methods: 12 male C57BL/6 mice were assigned to either ACL surgical transection group (ACLt) (n=6) or ACL non-invasive rupture group (ACLni) (n=6) induced by a single axial compressive load of the tibia at a rate of 1 mm/s. Left knees were used as non-injured controls. Pain/Functional Analysis: Gait analysis was performed pre-operatively and 1, 2, 4, 8, and 12 weeks post-op using an optical touch sensor. Additionally, dorsal root ganglion from L4 and L5 were dissected and genes involved in nociception were measured using qPCR. Morphology: X-ray, micro-CT and routine histology (H&E) were performed. Results: Based on gait analysis it appears the injuries begin to cause PTOA-related pain behavior beginning at four weeks post-injury and severity increased up to week twelve. The high level of PTOA pain at twelve weeks was confirmed by DRG qPCR analysis. X-Ray, micro-CT, and histological analysis revealed marked anatomical changes in the patella and meniscus bone volume, femoral and tibial osteophyte formation, and ectopic ossification with an almost complete loss of the medial tibial epiphysis in the ACL ruptured groups. Discussion: This study demonstrated that it is possible to quantitatively assess the progression of changes that develop from post-traumatic osteoarthritis brought on by ACL rupture. Elucidating the role of joint function and pain behavior changes may allow us to establish parallels with human injuries and ultimately develop new therapeutic strategies that could ameliorate the symptoms related to the progression of PTOA.
509	Patricia Melvin / Orthopedic Surgery	Edward Westrick, MD	Mark Miller, Michael Maher, Daniel Altman	**A Study of 3D Printed Models of Acetabular Fractures:** Introduction: 3D-printing has been shown to be helpful in various fields of medical education & surgical planning. Classifying fractures of the acetabulum are clinically challenging & can be a a difficult concept for residents to comprehend. 3D models (3DM) have been shown to promote active learning & improve resident classification of complex fractures when compared to traditional methods. This study investigated whether 3DM of acetabular fractures improved resident classification & surgical decision-making when compared to traditional radiographic images. Methods: Previously 3DM, computed-tomography (CT) & radiographs (XR) of acetabular fractures. Fellowship trained orthopaedic trauma attendings, trauma fellows & residents were asked to complete 3 quizzes to classify acetabular fractures according to the Judet–Letournel classification & select which surgical approach would be used. The "correct" responses were the classification & surgical approach documented in the operative note. Calculations were done using Fleiss' ? statistics & ANOVA to evaluate for interobserver reliability (P>0. 05). Results: Twenty participants, broken down into 2 groups ("seniors": PGY4 & above, "juniors": PGY-3 & below). There was no statistical significance in answers among the individuals. However, seniors scored higher regardless of modality. Overall, both groups had more correct responses with CT & 3DM compared to XR. There is a significant difference between modality & number of correct assessments (p>0. 0001). XR compared to both CT & 3DM but there was no difference found between CT v. the 3D. Conclusion: Both CT & 3DM were superior to XR when classifying acetabular fractures however there was no significant difference between CT & 3DM. 3DM may have more utility in educating the junior residents however they were not shown to be superior to CT studies in any group.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
600	Rebecca Holton / Biochemistry and Molecular Biology	Karen Berkowitz, MD	Abigail Harris	**Establishing a role for CHTF18 in cohesin regulation in mouse oocytes:** As women age, a decline in oocyte quality leads to infertility, miscarriage, and birth defects. A leading cause of decreased quality in oocytes is age-related aneuploidy, which can arise from errors in meiotic processes and often leads to chromosome mis-segregation. However, the underlying mechanisms of these errors are incompletely understood. Proteins involved in DNA replication have been shown to play crucial roles in meiosis. CHTF18 is a subunit of the conserved Replication Factor C-Like complex, RLC-CHTF18. In addition to its canonical role as an alternative clamp loader of PCNA during DNA replication, CHTF18 is essential for sister chromatid cohesion in yeast and fertility in the fruit fly. Recently, we revealed that CHTF18 ensures the quality and quantity of the ovarian reserve, and may delay ovarian aging in mammals. Our data suggest that CHTF18 protects the ovarian reserve by stabilizing cohesion proteins, called cohesins, to facilitate meiotic recombination and crossover formation. DNA double-strand breaks persist and crossovers are decreased in Chtf18-/- oocytes. Consistent with a role for CHTF18 in chromosome cohesion, cohesins REC8 and STAG3 are also decreased in Chtf18-/- oocytes during prophase I. Currently, we are analyzing crossover formation and cohesin regulator proteins during prophase I, as well as chiasmata (mature crossovers) for position and structural defects during metaphase I in oocytes. Optimization of these experiments is underway. Taken together, our data suggest that CHTF18 plays a role in regulating cohesins to promote crossover formation in mammalian oocytes.
601	Katherine Valles / Medicine	Tejal Brahmbhatt, MD	Elisa Caron, Miriam Neufeld, Sabrina Sanchez	**COVID-19 Pandemic and the Cholecystitis Experience at an Urban Safety-Net Hospital:** Benign gallbladder disease (BGD) is one of the most common reasons for emergency general surgery admission. The World Health Organization declared COVID-19 a pandemic on March 11, 2020. In April 2020, 7 out of every 10 patients admitted to Boston Medical Center (BMC) tested positive for COVID-19. The purpose of our study is to analyze the impact of the COVID-19 pandemic on the acute cholecystitis experience at BMC. We performed a retrospective review of BGD admissions from January 1 - May 31 in 2018, 2019, and 2020 and stratified by severity using the Tokyo Guidelines for cholecystitis grading. Difference-in-differences (DID) analysis was used to determine change in trends in two-week intervals of BGD admissions post-pandemic. There was a significant DID of BGD admission rates between 2020 and previous years (DID: -1. 00, p=0. 0168), decreasing from 5. 2 to 2. 67 cases compared to a historic increase from 4. 3 to 6. 0. Tokyo I (mild) admissions decreased significantly after the pandemic (DID: 1. 28, p=0. 0218) whereas Tokyo II and III (severe) did not (DID: -0. 63, p=0. 3263). There was no significant difference in the odds of presenting with severe disease after the pandemic declaration (OR: 1. 00, p=0. 9982). In conclusion, between the declaration of the COVID-19 pandemic on March 11, 2020 and May 31, 2020 there was a significant decrease in BGD admissions at our hospital. The pandemic impacted healthcare seeking behaviors for patients with milder disease while patients with severe disease continued to present to BMC. This change in health seeking behavior did not lead to significantly worse disease among those admitted. These findings challenge the assumption that acute cholecystitis requires surgical treatment, but most importantly, raise the question of whether it requires treatment at all. Further research on the natural history of BGD, including the disease progression and potential to manage mild cholecystitis medically with minimal risk is warranted.
602	Nicole Maurer / Emergency Medicine	Tina Chen, MD		**Simulation Based Training for Central Venous Line Insertion; a Deconstructed and Low Cost Approach:** Central venous line insertion can be a difficult and dangerous procedure, especially for inexperienced medical trainees, who may lack the technical expertise and self-confidence to successfully complete this task. However, this procedure must be done correctly, as mistakes can lead to patient discomfort, vascular injury, or lung injury. Therefore, an effective training plan is needed to properly develop this skill. Many simulation labs use high-fidelity task trainers to educate novice trainees on central venous line insertion. However, these task trainers are costly. Also, traditionally, trainees are instructed to practice the full procedure from beginning to end, which can be overwhelming to novice trainees. This study focuses on the improvement of simulation-based training in central venous line insertion. The process of inserting a central line was deconstructed into eight stations, placing an emphasis on mastery learning of individual steps before moving on to complete all steps at once. Station materials were designed to be reproducible and low cost, such that other programs could recreate the training without requiring many additional resources. This novel teaching process will be implemented with fourth-year medical students during their Emergency Medicine Capstone Elective. At the conclusion of training, participants will complete surveys which evaluate their confidence in completing the procedure and their satisfaction with the training method, specifically on its effectiveness and the use of mastery learning. Future implications of this study would be improved training for students, resulting in fewer complications and better quality of care for patients.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
604	Nosayaba Enofe / Surgery	Charles Geller, MD	Sirivan Seng	**"An Ounce of Prevention...": A Simple Method to Eliminate Hospital Acquired Pressure Injuries in Cardiac Surgery Patients:** OBJECTIVE: Hospital Acquired Pressure Injury (HAPI) is a common and costly complication during hospitalization with incidence as high as 25-30% in cardiac surgery patients. It was estimated in 2007 that each HAPI adds $43,180 in costs to a single hospital stay. Due to the significant burden HAPI places on both patients and healthcare organizations, prevention is critical. We aimed to determine the effectiveness of a preoperative silicone foam intervention in preventing HAPI and improve outcomes in cardiac surgery patients. METHODS: Utilizing a prospective study design from October 2017 to September 2019, 287 consecutive patients at a suburban community health system cardiac surgery program underwent sacral placement of a silicone foam dressing immediately prior to surgery. All major cardiac procedures were included without exception. Exclusion criteria was reported allergy to the dressing material. The dressing remained in place until the time of the patient's first shower, which was typically on the morning of POD 3. Sacral skin integrity was formally assessed pre-operatively, following dressing removal, prior to discharge and 30 days post-operatively. Secondary cost and outcome analysis were performed. RESULTS: 1 of 287 patients (0. 35%) developed a suspected deep tissue injury of the buttocks without sequelae. We used the current cost of a silicone foam dressing which varies depending on size, shape and manufacturer, from approximately $2. 50 to $10. 75. Our HAPI prevention intervention resulted in a significant potential cost savings and reduction in length of stay on secondary outcome and cost analysis, in addition to improved patient, family, and staff satisfaction. CONCLUSIONS: In our study, a HAPI incidence of 0. 35% was achieved. This extremely low cost intervention, in conjunction with other standard prevention methods should be considered the new standard of care
606	Silvia Fernandes / Neurobiology and Anatomy	Shaoping Hou, PhD		**The susceptibility of cardiac disorders after spinal cord crush injury in rats:** High-level spinal cord injury (SCI) often interrupts supraspinal regulation of sympathetic activity in the heart. The loss of balance between autonomic components increases the risk of cardiac disorders. However, few animal experiments have successfully been investigated to model the disease for potential therapeutic interventions. In the present study, we employed a complete spinal cord crush injury at the T2/3 level in rats. Those received injury at T9/10 level or naïve rats served as two controls. Using a radio-telemeter to record electrocardiogram (ECG) and blood pressure, we analyzed heart rate variability (HRV) in the basal recording, and cardiac arrhythmias in colorectal distension (CRD)-induced autonomic dysreflexia or intravenous infusion of dobutamine, a ß1-receptor agonist, to mimic exercise-induced heart burden, 4 weeks after SCI. With 24-h recording, total HRV was reduced in rats with T2/3 but not T9/10 injury. Ensuing analysis in frequency domains showed decreased low frequency and increased high frequency while standard deviation of R-R intervals and its derivations significantly declined in time domains in rats with T2/3 injury, indicating reduced sympathetic and unopposed parasympathetic activity for the heart. During CRD-induced autonomic dysreflexia, more arrhythmia events were triggered in rats receiving T2/3 injury than those with T9/10 injury. In addition, administration of dobutamine induced greater incidence of arrhythmia in rats with T2/3 injury. Thus, the results illustrate that susceptibility of cardiac dysfunction is prevalent following SCI at high levels due to compromised autonomic homeostasis; rats with T2/3 spinal cord crush is a reliable model to study cardiac abnormalities following SCI.
607	Hui Chong Lau / Medicine	Michael Lashner, MD	Kumar Ashish, Rahul Gaiba, Michael Lashner	**An uncommon cause of non-ST elevation myocardial infarction (NSTEMI) in a patient with atrial fibrillation:** Background: Thromboembolism in the setting of atrial fibrillation to one of the coronary arteries is a rare culprit causing NSTEMI. Case: Eighty-three years old female with a history of atrial fibrillation and aortic stenosis presented with acute chest tightness and shortness of breath. She was not on anti-coagulation because of recent lower gastrointestinal bleeding. She was awaiting for left atrial appendage occlusion device placement and evaluation for transcutaneous aortic valve replacement. Apixaban was stopped one month before presentation while aspirin was continued. Physical examination was remarkable for irregularly irregular heart sounds with systolic murmur at the aortic area. Electrocardiogram showed Q-waves in leads V1 and V2, diffuse T-wave inversions. Troponin level was elevated to 22 ng/ml and we initiated intravenous heparin. Cardiac catheterization revealed a dominant right coronary artery with calcifications and minor luminal irregularities. The right posterior descending artery (RPDA) was large, wrapping around the apex of the left ventricle. A tubular-length filling defect lesion narrowing the vessel by approximately 70% in the distal third of the RPDA was seen. The filling defect in the RPDA was consistent with intravascular thrombus. The patient was started on apixaban considering thromboembolism to distal right PDA, which was presumed to have caused the NSTEMI. Conclusion: Our case represents a rare cause of NSTEMI. The case also demonstrates the challenge with anti-coagulating patients with atrial fibrillation and recent gastrointestinal bleeding. Continued elevations in troponin made anti-coagulation inevitable in our patient to prevent potentially catastrophic outcomes.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
608	Vivek Mohan / MD Program	Vicki Mahan, MD	Inga Strelow, Christopher Pennell, Maxwell Kilcoyne, Brandon Katz, Autumn Nanassy, Amit Misra, Vicki Mahan	**Applicability of Vasoactive-Ventilation-Renal Score as Predictor of Mortality in Pediatric Trauma Patients Requiring Endotracheal Intubation:** Pediatric trauma remains a significant source of global mortality and morbidity. Current severity of illness scores, used for quality of care assessment and outcome prediction, have limited real time clinical utility due to their complexity. The vasoactive ventilation renal (VVR) score has been specifically created and validated for the postoperative pediatric cardiac surgery population. This study aims to assess the applicability of the VVR score for mortality prediction in intubated pediatric trauma patients as well as its performance in comparison to currently established severity of illness scores (Pediatric Index of Mortality - PIM2, and Pediatric Risk of Mortality - PRISM III). A retrospective review of all intubated pediatric trauma patients admitted to our level I pediatric trauma center was conducted. Of over 4600 patients, 50 met inclusion criteria. Median age of patients was 3. 5 years. A predominance of male sex and African American race was noted. Blunt trauma was most the common trauma mechanism. VVR scores at both 6 and 12 hours were significantly higher for non-survivors. Upon comparison of 6-hour-VVR with PIM2 and PRISM III, it was found that VVR score was outperformed by both. Our results show reliable differentiation between pediatric survivors and non-survivors of trauma by VVR score. However, its predictive power in its current form is inferior to PIM2 and PRISM III score. The findings of this study unlock potential for future studies to build upon the VVR score to develop an easy to use prognostic and monitoring tool for pediatric trauma patients.
609	Inga Friederike Strelow / Pediatrics	Vicki Mahan, MD	Christopher Pennell, Autumn Nanassy, Amit Misra, Stephen Aranoff, Vicki Mahan	**A Predictor of Mortality in Pediatric Trauma Patients: Lactate Plus the Novel VVR Score:** The Vasoactive-Ventilation-Renal (VVR) score, a robust outcome predictor for pediatric cardiac surgery, accurately differentiates survivors and non-survivors of pediatric trauma. In its current form, however, it is inferior to Pediatric Index of Mortality and Pediatric Risk of Mortality scores. This study investigates additional parameters to improve VVR's predictive power. Children ages 0-18 years intubated upon admission to a level I pediatric trauma center between January 1, 2014 and December 31, 2018 were included in analyses. Of 4663 trauma patients, 50 met inclusion criteria. Correlation of hemoglobin (Hgb), lactate, Glasgow Coma Scale (GCS) as well as alanine (ALT) and aspartate (AST) transaminases with mortality was assessed via logistic regression model. Area under the receiver-operator curves was planned to be compared using the non-parametric method of DeLong. P-values =0. 05 were considered significant. Median age was 3. 5 years (IQR 1. 75-11. 25). Blunt trauma was most common (68%). Fourteen patients did not survive to hospital discharge. Admission parameters for Hgb, GCS, ALT and AST were used for analyses. Significant correlation with mortality was found only for lactate (n=32, p=0. 01). Odds ratio for death was higher for patients with higher admission lactate (OR=0. 54, 95% CI 0. 28-0. 78). Dual model of lactate and 6-hour as well 24-hour VVR suggests demarcated distribution for survivors vs. non-survivors in scatterplot. Limited availability of data points due to retrospective study design did however not allow for further analyses. Admission lactate strongly correlates with mortality in our pediatric trauma patients. Results infer an enhanced predictive capacity of VVR score by inclusion of lactate. Study population size however did not allow further, meaningful assessment in this retrospective study. Prospective studies are needed to further assess this promising severity of illness score.
610	Ishan Satwah / Vascular Surgery	Peter Pappas, MD	Levan Sulakvelidze, Maxwell Tran, Sanjiv Lakhanpal, Peter Pappas, Richard Kennedy, Arpitha Parthasarathy, Gaurav Lakhanpal, Vinay Satwah	**Iliac Vein Stenting is Safe when performed in an Office Based Lab (OBL) Setting:** Background: Venous stenting for iliac vein outflow obstruction is associated with excellent long-term stent patency and symptom resolution. However, the safety of iliac vein interventions performed in an office-based laboratory (OBL) setting is not well defined. The purpose of this investigation is to determine the safety profile of iliac vein stenting performed in an OBL setting. Methods: Data was prospectively collected in the Center for Vascular Medicine's (CVM) electronic medical record system (NextGen Healthcare Information System, Irvine, CA) and retrospectively analyzed. Patient consultations, interventions, and follow-ups at 1-6 weeks were included in this analysis. All patients received moderate sedation during their procedures. Complications requiring hospitalization were classified as major complications. Minor complications consisted of bleeding, hematoma, vasovagal response, thrombosis, allergic reaction, hematemesis, hypotension, nodule formation, pelvic discomfort and pseudoaneurysm. Results: Between January 2015 and January 2019, 1,223 iliac vein stents were placed in 1104 patients (23. 7% male, 76. 3% female). There was a total of 90 minor complications (7. 36%) and 5 major complications (0. 41%). Major complications included the following: one allergic reaction, one episode of atrial fibrillation, one episode of supraventricular tachycardia, one episode of chest pain, one vasovagal episode and one acute stent occlusion. No complications were related to sedation or acute renal failure and there were no mortalities. Minor complications were primarily related to insertion site hematomas. Conclusions: Major complications are extremely rare after iliac vein stenting in an OBL setting. Minor complications are primarily related to insertion site hematomas which did not require in-patient hospitalization. Based on these data, iliac vein stenting in an OBL setting is an extremely safe and well-tolerated procedure.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
611	Emma Byrne / Medicine	Vilmaris Quiñones Cardona, MD	Novisi Arthur, Folasade Kehinde, Vilmaris Quinones Cardona	**Peri-procedural events in neonates with retinopathy of prematurity (ROP) requiring laser photocoagulation in a level IV NICU:** Introduction: Retinopathy of Prematurity (ROP) is a serious ophthalmologic condition that threatens blindness and laser photocoagulation is standard of care for threshold ROP. This procedure often requires intubation due to the risk of life-threatening complications and respiratory depression from anesthetic agents. Objective: To describe peri-procedural events of infants requiring laser photocoagulation for ROP in a level IV NICU. Methods: Retrospective chart review of neonates requiring ROP exam from 1/2017-8/2020. Baseline maternal and neonatal characteristics, ROP exam findings, treatment, cardiorespiratory index (CRI) scores, pain scores, and respiratory support were collected. Statistical analysis and group comparisons were performed using SPSS. Results: 200 patients were included (Figure 1). Neonatal and maternal characteristics in the laser and non-laser groups were assessed (Table 1). Twenty-eight patients (14%) required laser treatment; one was performed prior to admission. Of the 81. 5% (22/27) that required re-intubation for laser, 36% had >1 intubation attempts and 16% had >1 extubation attempts (Table 2). Average duration of intubation following laser was 2. 48 days, with 40% needing steroids and 16% needing racemic epinephrine to facilitate extubation. Mean total respiratory support time post-laser was 9 days. Mean NPASS pain scores after laser were 0. 038 on Day 0, 0. 096 on Day 1, and 0. 12 on Day 2. Mean CRI scores were unchanged from baseline. Conclusion: Nearly all infants undergoing laser photocoagulation for ROP required intubation and continued respiratory support. All had minimal peri-procedural pain and stable CRI scores. Next steps include implementing a moderate sedation protocol to reduce need for intubation and associated complications.
612	Priyanka Shah / Otolaryngology /Head and Neck Surgery	Robert Sataloff, MD, DMA., FACS	Dylan Vance, Ghiath Alnouri, Ashley O'Connell Ferster, Karen Lyons, Justin Ross	**The Validity and Reliability of the Reflux Finding Score:** Background: Laryngopharyngeal reflux disease (LPR) is common. The incidence of new diagnosed cases has increased due to awareness and new diagnostic measurements. The reflux finding score (RFS) and reflux symptom index (RSI) are believed to be useful assessments, especially after therapy initiation. Many have recently suggested concerns about the reliability and validity of the RFS. Therefore, this study aims to evaluate both. Method: 92 patients diagnosed with LPR who had undergone 24-hour pH-Impedance tests were included. All patients underwent stroboscopy and 24-Hour pH-Impedance monitoring within 30 days. 59 patients filled out a reflux symptoms index (RSI) prior to stroboscopic exam. The RFS was determined by four blinded otolaryngology/laryngology physicians. Stroboscopic images were reviewed one year apart to assess intra-rater reliability. RFS and RSI were correlated with 24-hour pH Impedance testing. Results: The Kappa value between reviewers was 0. 479. The percent agreement of the four observers for total RFS was 74. 04%. The intra-rater reliability of the four observers for total RFS was 68. 5%. There was no correlation between RFS and any parameter of the 24-Hr pH-Impedance Test. RSI had a significant correlation with number of upright events, total symptoms experienced, and symptom correlate score. Conclusion: The RFS scoring system needs to be updated due to increasing knowledge of LPR. The subjective parameters of the RFS need to be updated (vocal fold edema, laryngeal edema, posterior commissure hypertrophy) while continuing to routinely use the more objective parameters.
613	Vishnu Kumar / Pharmacology and Physiology	Priscila Sato, PhD	Ajay Rao, Sunil Karhadkar, Antonio DiCarlo	**GRK2 alterations in human diabetic and non-diabetic pancreatic islets and adult cardiomyocytes:** Patients with type 2 diabetes (T2D) are two to four times more likely to develop cardiovascular diseases. In fact, more than 50% of T2D patients have cardiac diseases as a comorbidity factor. However, how dysfunctional pancreatic islets lead to alterations in myocardial signaling remain not fully understood. Moreover, treatment strategies for T2D patients with heart failure (HF) are complex as some diabetic treatments promote HF signaling. G-protein coupled receptor (GPCR) kinase 2 (GRK2) is a known regulator of GPCR function and has been implicated in the development of HF. Nevertheless, little is known about GRK2 in the pancreatic islet. Here we provide the initial framework for GRK2 characterization in the pancreata of diabetic patients correlating to signaling alterations in adult myocytes. Due to the specialized nature of both cell types, we hypothesize that GRK2 signaling in the heart and pancreas are very distinct and not superimposable. We will explore these differences to develop new strategies that promote myocyte and/or islet function. Our preliminary data suggest that T2D leads to an upregulation in cardiac GRK2 and a downregulation of GRK2 in pancreatic islets. Utilizing cardiac and pancreatic tissue from the same human subject, we will evaluate biochemical and metabolic signaling alterations that are relevant to disease progression. Non-identified clinical data will be correlated with signaling alterations. We expect that our findings will promote personalized treatment strategies for the care of diabetic patients with HF.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
614	Ruxu Zhai / Pharmacology and Physiology	Priscila Sato, PhD	Nathaniel Snyder, Priscila Sato, Erika Varner	**GRK2 participates in myocardial fatty acid metabolic responses and ß-adrenergic receptor-mediated mitochondrial respiration:** Heart disease is the leading cause of death worldwide. Cardiac metabolism plays an essential role in maintaining cardiac function hence understanding how unbalanced metabolic substrate utilization promotes cardiac dysfunction is vital for the development of novel heart failure (HF) treatment strategies. The ß-adrenergic receptor (ß-AR) is an important regulator of cardiac contraction that belongs to the G-protein coupled receptor (GPCR) superfamily. GPCR kinases 2 (GRK2) is an important regulator of GPCRs and has been implicated in the progression of various cardiac pathologies. We hypothesized that GRK2 plays a role in substrate-specific cardiac metabolic responses and subsequent cardiac remodeling. We tested our hypothesis on isolated adult cardiomyocytes (ACMs) from GRK2 cardiac-specific overexpressing mice (GRK2Tg) compared to non-littermate controls (NLC). Cell viability assays under specific-substrate culturing conditions revealed a trend towards decrease in cell survival in GRK2Tg ACMs restricted to fatty acid oxidation. Carbon-13 palmitate tracing suggested that upregulation of GRK2 impairs fatty acid utilization, leading to an overall decrease in fatty acid metabolites Lastly, we tested whether isoproterenol (ISO; ?AR-agonist) stimulation alters mitochondrial function in ACMs. Our data shows that ISO-stimulated mitochondrial electron transport chain function is reduced in GRK2Tg ACMs, which may contribute to cardiac contractile dysfunction (basal respiration in pmolO2/min/mg protein: NLC Saline 255. 4+/-57. 0, NLC-ISO 597. 9+/-44. 2 p = 0. 0039, GRK2Tg ISO: 292. 9+/-28. 1 n = 114-144 recordings in 3 hearts/group). In conclusion, our studies show that in addition to GPCR regulation, cardiac GRK2 is detrimental to cardiac function by reducing substrate-specific metabolic pathways and impairs mitochondrial responses.
615	Jonathan Snyder / Pharmacology and Physiology	Priscila Sato, PhD	Atreju Lackey, Gregory Brown, Tian Yuzhen, Ruxu Zhai, Priscila Sato	**GRK2 expression regulates glucose sensing in beta-cells impacting glucose tolerance relevant to Type 2 Diabetes:** Type 2 diabetes (T2D) impacts the function of pancreatic islets, where ß-cells produce and release the main blood glucose-regulating peptide hormone insulin. Insulin secretion from ß-cells is primarily determined by two factors: ATP production from glucose metabolism and G-protein coupled receptor (GPCRs) signaling. GPCR kinase 2 (GRK2), a key regulator of GPCRs, is downregulated in the pancreas of spontaneously obesogenic/diabetogenic (ob/ob) mice and human T2D patients. Additionally, in the heart, GRK2 expression has been shown to regulate mitochondrial function. Thus, islet GRK2 may impact insulin secretion via either primary secretory mechanism. We hypothesized that downregulation of GRK2 plays a maladaptive role in the islet contributing to development and progression of T2D by promoting a2-AR signaling. In order to test this hypothesis, we developed a conditional GRK2 knockout mouse model wherein GRK2 is ablated from the pancreas. This mouse develops glucose intolerance (Glucose exposure expressed as mg/dl*min+/-SEM: Control 24215+/-1866, GRK2KO 32471+/-2350, p<0. 01 n=22/group) with diminished insulin secretion. These differences are due to diminished insulin release rather than insulin content or differential architecture of the pancreatic islet. In order to determine potential mechanisms of regulation, we utilized a cell model for ß-cells (Min6) and knocked down GRK2 to less than 50% of control cells. Silencing of GRK2 led to attenuated glucose-mediated calcium responses that were rescued by pertussis toxin pre-treatment, suggesting a Gai-dependent mechanism. This project suggests an important novel role for GRK2 expression in insulin secretion and T2D development which could be explored for the development of new pharmacological T2D therapies.
616	Jahnavi Meka / Biomedical Engineering	Kara Spiller, PhD	Jessica Eager	**Investigation of post-MI macrophage gene expression demonstrates immunomodulatory, cardiac contraction, and tissue remodeling activity:** Cardiac macrophages, both resident and recruited, play distinct and key roles in the heart after a myocardial infarction (MI). Initially, pro-inflammatory macrophages infiltrate the area. Overtime, the population transitions to anti-inflammatory macrophages involved with wound resolution. To better understand these changes in behavior over time, macrophages were isolated from three regions of the heart (ischemic, border, remote) at four time points (Day 3, 7, 14,28) following an induction of MI in a porcine model. Microarray analysis was performed to evaluate differences in gene expression and the top 100 most variable genes for each region were identified. Then, clustering analysis was performed to identify trends in gene expression among these genes. Gene ontology enrichment was performed for each cluster to evaluate which biological processes were upregulated. In the ischemic zone, cardiac contraction and remodeling were upregulated at Days 7 and 14. At the same time points, genes related to immune activity like white blood cell chemotaxis and activation were downregulated. In the border zone, genes related to angiogenesis, cell proliferation, and cell migration were most highly expressed at Day 7. Genes related to immune activity decreased in expression over time. Similarly, gene expression related to immune activity decreased over time in the remote zone, whereas cardiac contraction and tissue remodeling gene expression increased. Overall, these trends in gene expression confirmed previous research on post-MI cardiac macrophages as well as opened up new areas of research, such as investigating the role of macrophages in post-MI cardiac contraction.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
617	Justin Meinert / Cardiothoracic Surgery	Parthasarathy Thirumala, MD	Eyad Saca, Jeffrey Balzer, Donald Crammond	**Intraoperative Changes in Somatosensory Evoked Potentials as Predictors of Perioperative Stroke in Carotid Endarterectomy:** Intro: Perioperative stroke is a known but severe neurological complication that can occur after carotid endarterectomy (CEA). Intraoperative neurophysiological monitoring with somatosensory evoked potentials (SSEPs) is utilized to warn the surgical team of impending neurological deficits. Our goal for this study is to quantitatively evaluate the diagnostic value of SSEP changes in predicting perioperative stroke during CEA. Method: We identified all perioperative strokes during the hospital stay. We further classified them into major and minor strokes. To quantitatively assess SSEP changes, amplitudes and latencies of the cortical SSEP responses were measured during various critical and consistent times during CEA. Results: There is a significant difference in amplitude between controls and perioperative strokes at all time points after pre-incision, not including the end of the surgery. Patients with perioperative strokes had significantly decreased amplitude from all four baselines. The area under the curve for ROC curve analysis of pre-incision amplitude change was greater than incision, heparin, and pre-clamp. A decrease greater than 50% of amplitude was predictive of perioperative stroke and major strokes alone from all baselines. Discussion: It should be recommended that a pre-incision baseline is used during CEA. The current alarm criteria predict stroke, so it should be moved to provide an appropriate cushion to allow intervention. Latency changes were very specific but have limited sensitivity, and do not appear to be very useful, especially at the current alarm criteria of a 10% increase.
700	Aderinsola Aderonmu / Medicine	Amy Althoff, MD	Courtney Weintraub, Amy Althoff	**Assessing Barriers to HIV Treatment Among Patients with Unsuppressed Viremia:** At the end of 2016, approximately 1. 1 million people in the United States were living with HIV. About 80% of new infections came from approximately 40% of people who did not know they were living with HIV or received a diagnosis but were not receiving HIV care and treatment. The U. S. Department of Health and Human Services developed an HIV Care Continuum in efforts to assess gaps in healthcare coverage and develop strategies to support people living with HIV achieve viral suppression (VL<200 copies/mL). 1This study examined barriers to treatment and viral suppression amongst a group of HIV+ patients at a large HIV/primary care clinic in Philadelphia, PA. The clinic temporarily transitioned to telemedicine in March 2020 in response to the COVID outbreak. The implications of this response and other service disruptions is of particular concern for the subgroup of patients with pre-existing ongoing viremia, or a VL>200 copies/mL. A comprehensive qualitative survey was administered via telephone to 50 patients in this subgroup, examining several common barriers to care, as well as potential new barriers given the SARS-CoV-2 pandemic and recent social unrest. Contrary to our expectations, medication and pharmacy access were not commonly reported as the greatest barriers to medication adherence, but, ongoing stigma, disclosure concerns, and overall medical distrust were. COVID-19 and social unrest have had varying degrees and nature of impact on patients at the clinic, highlighting that patient care must be individualized to better build trust between ourselves, the health care system, and our patients in order to optimize health.
701	Jordan Naylor / Medicine Caroline Donahue	Hasan Ayaz, PhD		**Cognitive Impact of COVID-19:** While COVID-19 is more commonly associated with respiratory complications, it is also implicated in a wide array of neurological symptoms, ranging from the seemingly benign like headache, dizziness, anosmia, and ageusia to the severe including stroke, encephalitis, encephalopathy, and paresis. The neurological manifestations of COVID-19 are thought to be due to encephalitic injury by way of a variety of mechanisms including direct viral infection/damage of the nervous system or indirect damage related to the respiratory compromise more commonly known regarding COVID-19 . While acute neurological complications of COVID-19 have been documented, little is known about the potential cognitive effects. This study aims to investigate any short- and long-term neurological consequences, specifically those related to cognition, in recently recovered patients. If such an impact exists, this study hopes to identify which aspects of cognition are affected and for how long. To this aim, we propose a safe, remote cross-sectional and longitudinal study that 1) qualifies and quantifies the cognitive decline of mild to severe COVID-19 cases and 2) evaluates the extent of injury by cognitive recovery rate. In order to understand the potential cognitive impact and recovery of COVID-19, we designed an online behavioral study with a cognitive task battery. We expect performance deficits in processing speed, working memory and attention in the acute recovery phase of COVID-19 patients compared to healthy controls. Further follow-up studies could investigate the longitudinal dimension of cognitive performance in the patient and control groups.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
702	Daniel Kantner / Graduate School of Biomedical Sciences and Professional Studies	Joris Beld, PhD	Amy Ma, Joris Beld	**Cobamide amidohydrolase specificity governs cobamide remodeling in diverse bacteria:** Cobamides, including vitamin B12, are essential micronutrients for many organisms but are only biosynthesized by a subset of prokaryotes. Cobamide variants differ in the identity of the lower base of the nucleotide loop. Many cobamide-dependent enzymes exhibit specificity for certain variants, which can impart specific biosynthetic or nutritional cobamide requirements. Some organisms can import cobamides and use them directly, while others can complete biosynthesis from imported intermediates (salvaging) or convert an imported cobamide to another variant (remodeling). One remodeling pathway involves amidohydrolase CbiZ, which cleaves the nucleotide loop from a cobamide, allowing for incorporation of a different lower base. CbiZ has only been studied in some archaea and Rhodobacter sphaeroides. Whereas archaeal CbiZ cleaves cobalamin, the Rhodobacter homolog cleaves pseudocobalamin. With the presence of dozens of other cobamides in different environments, we hypothesized that other CbiZs have different substrate specificities. With no structure or active site known, we used protein similarity networks to identify clusters of divergent CbiZ sequences. We subcloned five bacterial CbiZs into expression vectors, and purified proteins will be assayed in vitro for specificity in cobamide cleavage. In parallel, we will assay the activity and substrate specificity of CbiZ by supplementation of cobamides to E. coli strains expressing CbiZ proteins. In the aforementioned assays, CbiZ-catalyzed remodeling reactions will be monitored by liquid chromatography mass spectrometry (LCMS). The resulting data will provide a greater understanding of CbiZ-mediated remodeling in bacteria and aid in the understanding of how bacteria participate in cobamide crossfeeding within diverse microbial communities.
703	Brandon Rogowski / Department of Medicine	Charles Cairns, MD	Brent Simmons, I. Michael Goonewardene, Mariana Bernui, Elias Haddad, Brett Croen, Nicholas Semenza, Jennifer Connors, Mark Martens, Carolyn Edwards, Renee McLin, Debra Powell, James Kim	**Longitudinal Assessment of Clinical and Immunological Responses to COVID-19 in a Hospitalized Patient Population:** The IMPACC study (Immunophenotyping Assessment for a COVID-19 Cohort) was established by the NIH in an effort to respond to the global COVID-19 crisis. IMPACC is a prospective cohort study that aims to assess longitudinal immune responses in hospitalized COVID-19 patients. In this preliminary analysis, 53 patients were enrolled within 48 hours of hospitalization due to severe COVID-19 symptoms. These patients were further classified according to severity of disease, survival and intubation status. Upon enrollment, demographics and comorbidity data was captured, and several inflammatory and hematologic biomarkers levels were determined. Within the cohort, nine were COVID-19 negative, 36 were non-intubated survivors, three were intubated survivors, and five were non-survivors. Of the COVID-19 positive patients (N=44), 22 were male and 22 were female. The most frequent comorbidities include obesity (60%), hypertension (51%) and asthma (27%). Notably, D-dimer and procalcitonin, biomarkers associated with coagulopathy and inflammation respectively, were significantly elevated in intubated patients (two-fold-increase). LDH, a biomarker for tissue damage, was significantly elevated in non-survivors (three-fold-increase). Abnormal levels of several other markers were also observed, including creatinine, CRP, troponin, ferritin, PT, INR, BUN, AST, and bilirubin. These preliminary findings suggest that COVID-19 results in coagulopathy, inflammation and multi-organ failure in those with more severe disease. The biomarkers altered at initial hospital presentation were associated with escalation of care and death. Importantly, these findings may be informative for clinicians in early treatment decision making. Currently, we are performing robust immunophenotypic and genomic analyses in order to further investigate these findings.
704	Aakansha Nangarlia / Biomedical Engineering	Irwin Chaiken, PhD	Gabriela Canziani, Petyo Manev, Irwin Chaiken	**Irreversible Inactivation of SARS-CoV-2 Spike by the Lectin Cyanovirin-N (CVN):** The overall goal of this project is to establish lectin-based recombinant proteins to irreversibly inactivate SARS-CoV-2 viruses that cause COVID-19 and therein to stop disease progression. This direction of work is based on the significant structural similarities of the spike protein membrane fusion machine of HIV-1 and SARS-CoV-2 to infect host cells. Previously, we discovered that genetically engineered bifunctional proteins termed Dual-action Lytic Inhibitors (DLIs), composed of a lectin covalently connected to small peptide sequences derived from HIV-1 Envelope (Env) gp41, can inactivate the HIV-1-viruses by triggering changes in the metastable spike complex. At the onset of the COVID-19 epidemic, we tested the hypothesis that lectin-DLIs can inhibit and lytically inactivate SARS coronaviruses. Using functional assays with SARS-CoV-2 pseudoviruses, we found that the lectin-DLI CVN-L4-Trp3, a fusion of CVN and gp41-derived polypeptide sequence, potently inhibited SARS-CoV-2 infection of ACE2 cells. Surprisingly, we also discovered that the lectin alone exhibited not only expected infection inhibition but also enhanced lytic inactivation of the SARS-CoV-2 pseudoviruses, as compared to CVN-DLI. This result suggests the exciting possibility that SARS-CoV-2 spike glycan engagement by lectins can disrupt the spike protein and irreversibly inactivate the virus. CVN alone does not cause lysis of HIV-1 and SARS-CoV-1 pseudoviruses, highlighting the sensitivity of the SARS-CoV-2 spike to lectin. While lectin antiviral activity is not a new finding, the observation of irreversible inactivation of SARS-CoV-2 by lectin is new and provides an exciting proof of concept for a new antimicrobial with therapeutic antiviral potential to prevent transmission of COVID-19.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
705	Heather Yeakel / Otolaryngol-ogy/Head and Neck Surgery	Rebecca Chiffer, MD	Luke Pasick, Gregory Kirchner	**Cost effectiveness of topical inpatient tympanostomy prophylaxis:** Background: Tympanostomy is the most common pediatric ambulatory surgery. Post-tympanostomy otorrhea is a prevalent complication leading to high costs to patients for treatment. The cost-effectiveness of intraoperative inpatient prophylaxis for both patient and institution has not been examined. Study design: An analytical observational study of data collected from the literature and purchasing records. Methods: A break-even analysis was performed to determine the required absolute risk reduction (ARR) and final infection rate in post-tympanostomy otorrhea to make inpatient prophylaxis cost effective with the following outpatient treatments: ofloxacin, ciprofloxacin-dexamethasone ophthalmic version, and ciprofloxacin-dexamethasone otic version. The conservative initial infection rate used was 10%. Results: Ofloxacin inpatient prophylaxis was not cost effective when prescribing ofloxacin outpatient treatment with an ARR of 0. 20. Ofloxacin inpatient prophylaxis was cost-effective with an ARR of 0. 08 for ciprofloxacin-dexamethasone ophthalmic version outpatient treatment. Ofloxacin inpatient prophylaxis was cost-effective for ciprofloxacin-dexamethasone otic version outpatient treatment with an ARR of 0. 01. Ciprofloxacin-dexamethasone inpatient prophylaxis was not cost-effective when prescribing ofloxacin outpatient treatment with an ARR of 1. 52. Ciprofloxacin-dexamethasone inpatient prophylaxis was not cost-effective when prescribing ciprofloxacin-dexamethasone ophthalmic version outpatient treatment with an ARR of 0. 60. Ciprofloxacin-dexamethasone inpatient prophylaxis was cost effective when prescribing ciprofloxacin-dexamethasone otic version outpatient treatment with an ARR of 0. 09. Conclusion: Inpatient prophylaxis can be cost effective for preventing post-tympanostomy otorrhea. Physicians can determine the cost-effectiveness of these interventions for their institutions.
706	Rama Karadsheh / Biochemistry and Molecular Biology	Simon Cocklin, PhD	Simon Cocklin, Adel Ahmed, Alexej Dick	**Conformational analysis of HIV-1 Env structures reveals a druggable pocket near the fusion peptide:** While combination antiretroviral therapy (cART) has increased the quality of life of individuals living with HIV-1, it has inadvertently established HIV-1 strains that are resistant to approved therapies. As a result, there is an evident need to discover novel drugs that inhibit HIV-1 infection. Attractive stages to avert HIV-1 replication are the initial binding and entry of the virion into immune cells. This can be achieved by blockade of necessary receptor interactions of the HIV-1 Env complex or by trapping the metastable Env in a fusion-incompatible conformation. Env is comprised of two non-covalently linked subunits, gp120, which engages host cell receptors, and gp41, which harbors a fusion peptide (FP) motif responsible for membrane spiking and fusion. By analyzing the range of conformations represented by the available high-resolution structures of HIV-1 Env trimers, we identified a pocket in the closed, ground state conformations, which is conserved and potentially targetable. Exploitation of this fusion peptide (FP) sequestration pocket (herein termed the F-site) could lead to inhibitors with broad neutralization capacity. Through rigorous computational screening and preliminary antiviral analysis, we were able to identify hit compounds, FP-12, FP-82, and FP-89, that have micromolar antiviral activity and specificity for HIV-1. Rational chemical modifications of these initial hits will increase antiviral potency and mechanism of action studies will reveal information about Env's convoluted transitions. The novelty of the F-site presents a unique opportunity to develop F-site class inhibitors that would expand knowledge of Env dynamics, supplement vaccine design, and potentially be of clinical utility.
707	Kelly Gillock / Microbiology and Immunology	Will Dampier, PhD	John Corvi, Michael Nonnemacher	**Investigating the overlap of SARS-nCoV2 infection and HIV-1-associated neurocognitive disorder:** The World Health Organization (WHO) announced COVID-19 as an epidemic of international concern on January 30, 2020. Among the typical symptoms associated with the onset of COVID-19 are fever, sore throat, fatigue, cough, headache, and diarrhea. While the primary symptoms of COVID-19 appear respiratory, a growing number of neurological complications are being reported suggesting invasion of the central nervous system (CNS). These complications overlap those seen in HIV-1-associated neurocognitive disorders (HAND). A literature search was conducted using keywords such as "COVID-19," "SARS-CoV-2," "neurological complications," angiotensin-converting enzyme-2," and "HIV-1. " Additionally, preprint servers were searched to review relevant articles ahead of publication due to the rapidly changing landscape of the SARS-CoV-2 virus. A survey of the literature revealed a diverse collection of hypotheses for SARS-nCov-2 entry into the brain: (1) the gut-brain axis route through intestinal expression of ACE2 receptors; (2) transsynaptic transfer through infected peripheral nerve terminals of olfactory neurons and the cribriform plate; (3) brain microvascular endothelial cell ACE2-R may also bind the SARS-nCoV-2 spike protein, promoting a pro-inflammatory response inducing permeability and accessibility through the blood-brain barrier, a similar mechanism to the HIV-1 protein Tat. A review of literature to date found that [36. 4%-69%] patients had neurological symptoms, with loss of smell [27. 7%-38. 5%], and olfactory and gustatory dysfunctions [20. 3%-30. 4%]. While it is early in the SARS-nCov-2 pandemic, it is important to consider how it may impact those with other co-morbidities, particularly HIV-1. The current literature points to potential overlaps with the neuropathogenesis of HIV-1.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
708	Phillip Palmer / Microbiology and Immunology	Garth Ehrlich, PhD	Will Dampier	**Minimally seeded culture (MSC) as a model for studying stochastic persister cell formation:** Persister cells are a transiently tolerant subpopulation of cells that are capable of surviving antibiotic treatment while a large majority of their sister cells perish. Persisters are formed primarily during stationary phase due to a lack of nutrients, however persistence does occur at a low rate during exponential growth. The metabolic state of quiescence in these cells is debated in the literature, and varying protocols or reagents can greatly influence outcomes. The canonical method of studying bacterial growth is through dilution of a culture, that has been grown overnight to saturation, into fresh media. However, this method introduces a large quantity of dormant, stationary phase cells into the inoculum, some of which remain dormant longer than their sisters cells that awaken and begin to reproduce. These dormant remainders from stationary phase are termed carry-over persisters, and studies have shown that persister levels are dependent on inoculum size. Studies utilizing this method are therefore unable to distinguish the affect of experimental variables as contributing to the ability to form persister cells during the growth phase versus the ability to maintain a quiescent state after inoculation into fresh media. We propose the minimally seeded culture (MSC) model which employs extreme dilution to grow a culture from as few inoculating cells as possible to eliminate observations of carry over persister cells when studying persister cell formation during the growth phase.
709	Kayla Socarras / Microbiology and Immunology	Garth Ehrlich, PhD	Michael Hester, Kurt Vandergrift, Timothy . McGuire, Robert Lane, Archana Bhat, Jarolsaw Krol, Joshua Earl, Joshua Mell, Bhaswati Sen, Stephan Lang, Meghan Harrison, Max Pabilonia	**Global Species Level Characterization of the Ixodes pacificus microbiome via MCSMRT Full Length 16s rRNA Microbiome Analysis:** Introduction: Globally, outbreaks of severe and chronic tick-borne diseases (TBD), such as Lyme borreliosis (Lb), are on the rise. Lb is caused by select members of the Borrelia genus and can with other TBD pathogens infect humans fed upon by a ticks. The full microbial exchange, the complete tick microbiome, and the impact of TBDs on human morbidity and mortality are unknown. Aims: TBDs lack effective diagnostics and Lb diagnostics have poor species resolution. To correct this, the tick microbiome must be fully characterized. We aim to obtain a comprehensive species-level characterization of the tick microbiome and discern bacterial diversity differences within/between tick species, sexes, and individuals by geo-locale. We also aim to elucidate the prevalence of known and suspected pathogens within the tick microbiomes and confirm patterns of geo-locale-specific TBDs. Methods: The Ixodes pacificus microbiome was characterized with a high fidelity, pan-domain, species-specific, full-length 16S rRNA amplification, sequenced on the PacBio Sequel sequencing platform, and analyzed with the MCSMRT data analysis and database. Results: The Species-specific Ixodes pacificus microbiome composition illustrates a complex microflora of over 1000 species with high taxonomic diversity, varied by sex, species, and geo-locale. TBD-associated pathogens were identified along with bacteria previously unassociated with ticks. Conclusion: Species-level taxonomic classification of tick microbiomes provides the granularity required to reveal a wide microbial diversity within tick species.
710	Ellen Cook / Medicine	Shara Epstein, MD	Zsofia Szep, Nicole Bernstein, Theresa Christensen, Shara Epstein	**COVID-19 in patients with HIV:** Case Series from an Outpatient HIV Practice: Intro: Little is known about the disease course and severity in persons living with HIV (PLWH) infected with SARsCOV2. Preliminary studies appear contradictory, some suggesting increased morbidity and mortality amongst PLWH while others insinuate protection from the virus due to immunosuppression. The primary aim of this study is to evaluate the severity of COVID-19 in HIV affected individuals. The secondary aim is to examine medical comorbidities and HIV data in the same population. Methods: Case series of patients receiving care at the Drexel Partnership Comprehensive Care practice from March 2021 to August 2021. The Partnership Comprehensive Care Practice serves 1700 PLWH, providing comprehensive primary and specialty health care. All patients had positive PCR test results for SARsCOV2. Charts were reviewed for demographic and clinical information including HIV viral load, CD4 count, antiviral regimen, COVID19 symptoms, and other chronic comorbid conditions. Symptom severity was characterized by factors including hospitalization, need for oxygen, and need for intensive care. Results: 27 patients were diagnosed with COVID19 of which 56% were male with an average age of 47. Most common presenting symptoms were cough (59%) and fever (44%). 4 patients required hospitalization and there were no deaths reported. All patients had a viral load of less than 200 copies/mL. 78% of patients were on an integrase strand transfer inhibiting-containing regimen, 81% on a tenofovir-containing regimen, no patients were on a protease inhibitor. Conclusions: This study supports findings from previous case series suggesting that persons living with HIV are not at increased risk of morbidity and mortality from infection with SARS-CoV-2 compared to the general population. Similar to previous studies, we found that a majority of patients were virologically suppressed. Future larger studies will need to be conducted in order to draw more definitive conclusions.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
711	Wiktoria Gocal / Pediatric Oncology	Brian Fisher, DO, MPH, MSCE	William Otto, Tamara Miller	**Incidence of Proven and Probable Invasive Fungal Disease in a Pediatric AML Cohort:** Invasive fungal disease (IFD) causes significant morbidity and mortality in children with acute myeloid leukemia (AML). Most current data defining incidence in pediatric AML patients is from clinical trials and may underestimate true IFD incidence based on previously described challenges to toxicity reporting. Defining IFD incidence in a contemporary observational cohort can provide insights into infection impacts and help guide prophylaxis decisions. Furthermore, application of guidelines defining proven and probable IFD will provide a reference standard allowing development of a semiautomated process for IFD monitoring in these patients. The electronic medical record of children treated at Children's Hospital of Philadelphia for de novo AML between January 1, 2006 and December 31, 2018 was reviewed and demographic, microbiology, histopathology and radiology data manually abstracted. Guidelines published by European Organization for Research and Treatment of Cancer and the Mycoses Study Group Education and Research Consortium (EORTC/MSGERC) were applied to identify patients who sustained a proven or probable IFD event. Descriptive statistics were used to summarize cases and the cohort's cumulative IFD incidence was calculated. Extraction of demographic data is ongoing. A total of 135 children were included; 27/135 (20%) were diagnosed with proven (23 episodes) or probable (8 episodes) IFD. Invasive candidiasis and aspergillosis were the most frequent IFD. Pulmonary (11/31) and disseminated disease (10/31) were most common infection sites in all episodes, followed by bloodstream infection (4/31), cutaneous disease (4/31), rhinosinusitis (1/31), and CNS disease (1/31). In this cohort, 20% of patients developed IFD at any time point after AML diagnosis. Disseminated disease was common, highlighting early diagnosis importance. Understanding the incidence and microbiology of IFD in pediatric AML can improve future resource utilization for prevention and treatment.
713	Jessica Vadaketh / Medicine	Allison Groves, PhD	Florence Momplaisir, Hervette Nkwihoreze, William Short	**Assessing Knowledge, Interest, Beliefs, and Outcome Expectancy about Oral Pre-Exposure Prophylaxis (PrEP) use in Pregnancy and the use of Long-Acting Injectable PrEP in the Postpartum Period:** Background: PrEP can be used during and after pregnancy to decrease women's risk of HIV acquisition and risk of mother-to-child transmission; however, there is a dearth of research on acceptability of PrEP during this time. Therefore, the study purpose is to describe women's perspectives on PrEP as an HIV prevention strategy during the perinatal period. Currently, there is limited data on the acceptability of oral PrEP during pregnancy and no data on acceptability of long-acting injectable PrEP for women in the postpartum period. **Methods: **We will perform 20 individual in-depth interviews with pregnant women in prenatal care in an academic OB/GYN clinic and with a diagnosis of a sexually transmitted infection (STI) to understand their knowledge, interest, beliefs and outcome expectancy about oral and injectable PrEP. Results: To date, 3 of 28 eligible women participated in the study. Common reasons for declining the interview were not having any knowledge on PrEP and not having time for a virtual interview. All participants were racial/ethnic minorities and had a mean age of 20. Despite being eligible for PrEP, participants did not perceive themselves to be at risk for HIV. In addition, participants had limited knowledge of PrEP. So far, women expressed strong opinions for or against the use of long-acting injectable PrEP in the postpartum period. Conclusion: Preliminary results point to the importance of educating pregnant women on the risks for HIV infection, the possibility of HIV perinatal transmission, and on prevention strategies available to protect themselves and their babies from HIV.
714	Joseph Waller / Radiologic Sciences	Michael Hope, MD	Isabel Allen, Keldon Lin, Michael Diaz, Henry Travis, Michael Hope	**Evaluating the Sensitivities of CT and RT-PCR for SARS-COV-2 Infection:** ObjectivesSeveral studies suggest the sensitivity of chest computed tomography (CT) is far greater than that of reverse transcription polymerase chain reaction (RT-PCR) in diagnosing COVID-19 patients, and therefore, CT should be included as a primary diagnostic tool. This systematic review aims to stratify studies as high or low risk of bias to determine the true sensitivity of CT for severe acute respiratory syndrome coronavirus-2 infection according to the unbiased (low risk) studies. Materials and MethodsThis systematic review involved searching the PubMed and Google Scholar databases for articles conducted and published between January 1 and April 15, 2020. The quality assessment tool QUADAS-2 was used to stratify studies according to their risk of bias. Sensitivity values were then extracted, and random effects meta-analyses were performed. ResultsOf 641 search results, 37 studies (n = 9610 patients) were included in the analysis. The mean sensitivity of RT-PCR for COVID-19 reported by the biased studies was 70% (n = 5409/7 studies; 95% confidence interval [CI], 43–97; I2 = 99. 1%), compared with 78% by unbiased studies (n = 534/4 studies; 95% CI, 69–87, I2 = 89. 9%). For chest CT, the mean sensitivity reported by biased studies was 94% (n = 3371 patients/24 studies; 95% CI, 92–96; I2 = 93. 1%), compared with 75% by unbiased studies (n = 957/10 studies; 95% CI, 67–83; I2 = 89. 5%). ConclusionsThe difference between the sensitivities of CT and RT-PCR for severe acute respiratory syndrome coronavirus-2 infection is lower than previously thought, as after stratifying the studies, the true sensitivity for CT based on the unbiased studies is limited.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
715	John Hanna / Medicine Padmavathi Tipparaju / Medicine	Pooja Jain, PhD		**A clinical data-based analysis evaluating risk factors contributing to the outcomes of human coronavirus diseases with focus on Coronavirus Disease 2019 (COVID-19):** The recent appearance of SARS-CoV-2 is responsible for the ongoing coronavirus disease 2019 (COVID-19) pandemic and has brought to light the importance of understanding this highly pathogenic agent to prevent future pandemics. This virus is from the same single-stranded positive-sense RNA family, Coronaviridae, as two other epidemic-causing viruses, SARS-CoV-1 and MERS-CoV. During this pandemic, one important focus highlighted by the World Health Organization (WHO) has been to understand the risk factors that may contribute to disease severity and predict COVID-19 outcomes. In doing so, it is imperative to understand the virology of SARS-CoV-2 and the immunological response eliciting the clinical manifestation and progression of COVID-19. Herein, we provide a comprehensive clinical data-based analysis to illustrate how risk factors such as gender, race, Human Leukocyte Antigen (HLA) genotype, blood groups, Vit D deficiency, obesity, smoking and asthma are related to disease exacerbation. Through a critical evaluation of these various factors on SARS, MERS and COVID-19 outcomes, we define and provide a detailed account of the highly susceptible populations to the human coronaviruses. We also discuss virluence properties of SARS, MERS-CoV, and SARS-CoV-2, and provide an overview of host immune response to these viruses. We explain how the most severe respiratory outcomes in COVID-19 patients are associated with dysregulated cytokine release storms and elevated IL-6 serum profiles in mediating host inflammation. Additionally, by drawing parallels between pathophysiological features of the three viruses, we discuss the potential for therapeutic approaches that may limit disease progression in patients with higher risk profiles than others.
716	Omobukola Solebo / Microbiology and Immunology	Hangjun Ke, PhD		**PfVP1 Harnesses An Alternative Energy Source to Support Ring Stage Development of Malaria Parasites:** Vacuolar pyrophosphatases are membrane bound pumps that use the energy released from the hydrolysis of pyrophosphate to translocate protons across biological membranes. They are present in bacteria, archaea, plants, and protozoa, but not in yeast or mammals. The absence of this enzyme in humans makes the vacuolar pyrophosphatase in the malaria parasite Plasmodium falciparum (PfVP1) a potential antimalarial drug target. Conventionally, in protozoa, vacuolar pyrophosphatases are localized to intracellular organelles termed acidocalcisomes where calcium and other cations are stored. However, using CRISPR/ Cas9 genome editing, PfVP1 has been found to mainly localize to the parasite plasma membrane (PPM), suggesting that PfVP1 pumps protons across the PPM to generate the electrochemical gradient, which is absolutely critical for parasite viability. Evidence in support of this has been found in our conditional knockdown line, wherein young ring stage parasites fail to mature in the absence of PfVP1. In contrast to the metabolically active trophozoite and schizont blood stages, ring stage parasites face a tighter budget of ATP as their glucose uptake pathways are not fully established. Thus, we hypothesize that PfVP1 is bioenergetically critical for ring stage development. To test this hypothesis, we will complement PfVP1 knockdown parasites with various mutants which either lack the ability to hydrolyze pyrophosphate or pump protons. We will also biochemically characterize the proton pumping activity of wildtype and mutant PfVP1 in a yeast heterologous system. With this information, we expect to conclude that PfVP1 exploits pyrophosphatase as an alternative source to meet the energy demands in ring stage development.
717	Swati Dass / Microbiology and Immunology	Hangjun Ke, PhD	Swati Dass, Maruthi Mulaka, Michael Mather, Akhil Vaidya, Hangjun Ke	**Divergent proteins of unknown function in a Plasmodium mitoribosomal complex:** Mitochondrial ribosomes (mitoribosomes) are the evolutionary descendent of bacterial ribosomes. In many eukaryotes, these complexes specialize in co-translational insertion of membrane proteins that are critical for mitochondrial functions. Mitoribosomes have a conserved composition of core ribosomal RNAs (rRNAs) and ribosomal proteins (RPs), where rRNA plays the enzymatic role of protein translation. Their RPs have undergone many species-specific variations across eukaryotic lineages, which include expansion in the size of conserved ribosomal proteins and recruitment of many additional novel and divergent proteins. The overall trend shows an increase in protein content that balances a reduction of rRNA. The recently reported structure of Trypanosoma brucei mitoribosome provide an example in which the rRNA content is highly reduced (SSU: 620 nt, LSU: 1176 nt), and the protein content has risen to 127 polypeptides, most of which are unique to Kinetoplastids. In Plasmodium spp., mitochondrial rRNA is not only reduced, but are also highly fragmented into 20-200 nt pieces, while, Plasmodium putatively encodes 14 small subunit (SSU), and 30 large subunit (LSU) RPs. We have reported that knocking down SSU (S12, S17) [PMID: 32273345] and LSU (L13) RPs [PMID: 29626096] is lethal to the parasites. Further, we have generated 7 endogenously tagged lines by adding 3HA to 5 SSU (S12, S15, S17, S18, S22) and 2 LSU (L13, L23) RPs. Interestingly, all these RPs are detected in a native complex of about 0. 8 MDa, suggesting that they belong to a common complex. Preliminary mass spectrometry data from one parasite line (expressing L23_3HA) suggest that several unknown proteins associated with this complex may be a part of the mitochondrial translational machinery. Using these parasite lines, we intend to pull down the complex and find the missing players of the Plasmodium mitoribosomes.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
718	Neeta Shadija / Microbiology and Immunology	Hangjun Ke, PhD		**Dynamin-related proteins in Malaria parasites:** Mitochondria are semi-autonomous, double membrane intercellular organelles having their own genome and carrying out various functions. Apicomplexan protozoans, in general, have a single mitochondrion per cell, which is essential for all life cycle stages. The process of mitochondrial biogenesis in apicomplexan parasites, including growth and division, is tightly coordinated with the parasite's reproduction cycle. For instance, in asexual blood stages, the malaria parasite grows and divides via a unique reproduction mechanism termed schizogony to generate 8-32 progeny (merozoites). Hence, the mitochondrion of the parasite also divides into 8-32 pieces to provide one daughter mitochondrion to each merozoite. This mitochondrial division process is known as mitochondrial fission. Despite its significance to parasite reproduction, neither the mitochondrial fission machinery nor the fission mechanism are known in malaria parasites. Studies in other model eukaryotic organisms suggest involvement of the motile protein family Dynamin for mitochondrial fission. Members of the Dynamin superfamily are large GTPases known to be involved in membrane scission processes. As of now, the human malaria parasite Plasmodium falciparum is reported to have three Dynamin-related proteins, of which two are homologous to other dynamins (PfDYN1, PfDYN2) and one is highly divergent (PfDYN3). Being unique to apicomplexans, PfDYN3 becomes a potential antimalarial drug target. Using CRISPR/Cas9, we attempt to endogenously tag PfDYN1, PfDYN2 and PfDYN3 to identify the authentic Dynamin-related protein responsible for mitochondrial fission. Further, we will use BioID approaches to identify other essential components of the mitochondrial fission machinery in the malaria parasite.
719	Angel Lin / Pharmacology and Physiology	Zachary Klase, PhD	Weam Elbezanti, Alexis Schirling, Luca Sardo	**RUNX1 PROTEIN AND ITS INVOLVEMENT IN THE CONTROL OF HIV-1 TRANSCRIPTION:** The HIV-1 DNA integrates into the host genome, and its expression is controlled by the host cellular transcriptional machinery. We have shown that the binding of the transcription factor RUNX1 to the HIV promoter inhibits transcription, and the inhibition of the promoter-binding capacity of RUNX1, using a benzodiazepine (BZD) compound Ro5-3335, synergizes with HDAC inhibitors in reactivating latent cells. We hypothesized that RUNX1 has a role in the establishment and maintenance of transcriptional latency by suppressing the recruitment of transcriptional activators to the HIV. To test this hypothesis, we used ChIP-qPCR to quantify and compare the amount of chromatin repressors and activators recruited to the viral promoter when RUNX is associated or disassociated with the viral LTR. Furthermore, we also generated an HIV molecular clone with an altered RUNX binding site, and evaluated the effect of RUNX in HIV infected PBMC cells. The result shows that the decreased recruitment of CBP/P300 and STAT5 is associated with RUNX mediated viral transcription repression. Several other clinically prescribed BZDs, including Alprazolam, Clonazepam and Clorazepate were also tested and found to synergize with SAHA in activating latent virus. Alprazolam specifically was found to be able to reactivate viral latency without the assistance of SAHA due to its ability to increase STAT5 binding to the HIV LTR, enhanced STAT5 activation at a whole cell level and elevated transcriptional activity through the jak-stat pathway. These findings indicate a critical role for RUNX1 protein recruitment in modulating transcription from the integrated and chromatinized LTR.
720	Hager Mohamed / Microbiology and Immunology	Fred Krebs, PhD	Vandana Miller, Sander Bekeschus, Fred Krebs, Ramona Clemen, Eric Freund, Jan-Wilm Lackmann, Kristian Wende, Jennifer Connors, Elias Haddad, Will Dampier, Brian Wigdahl	**Non-thermal plasma application in a model of latent HIV-1 infection increases markers of immunogenicity:** Human immunodeficiency virus type 1 (HIV-1) has spread to over 30 million people worldwide. Treatment to effectively control HIV-1 is limited to lifelong use of antiretroviral drugs, which prevent disease progression by inhibiting viral replication. When antiretroviral therapy (ART) is discontinued, however, patients progress to AIDS due to reactivation of HIV-1 infection from latent reservoirs, and the various dysfunctions of the immune response that contribute to the failure to control viral replication. We are investigating a novel approach for modulating HIV-1 specific immune function that utilizes non-thermal plasma (NTP), an ionized gas composed of various reactive oxygen and nitrogen species (RONS). We used J-Lat cells as a model of latent HIV-1 infection in experiments to assess the effects of NTP application on viral latency and the emission of damage associated molecular patterns (DAMPs) known to promote antigen presenting cell (APC) function. Application of NTP to J-Lat cells stimulated HIV-1 gene expression, indicating latency reversal and the subsequent production of viral antigens. In addition, NTP-exposed J-Lat cells released pro-inflammatory cytokines and chemokines, including IL-1ß, IFN-ʔ, and CCL2, and displayed the pro-phagocytic markers calreticulin (CRT), HSP70, and HSP90. The emission of these DAMPs correlated with an increase in phagocytosis of NTP-exposed J-Lat cells by THP-1 macrophages. In addition, modulation of surface molecules involved in antigen presentation was also observed, along with an altered array of peptides displayed on MHC I. These results demonstrate potential applications of NTP in an ex vivo immunotherapy to resolve the dysfunctions of the immune system associated with HIV-1 persistence.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
721	Jessica Reyer / Medicine	Michele Kutzler, PhD	Neev Shah, Matthew Bell, Neal Goldstein, Seth Welles, Michele Kutzler	**Identification of specific risk factors associated with hospital acquired Clostridium difficile infection in patients at Hahnemann University Hospital:** Clostridium difficile is a Gram-positive, spore-forming bacterium that poses a significant risk to the United States healthcare system. This bacterium colonizes the large intestine and produces two disease-causing toxins, TcdA and TcdB, resulting in symptoms such as fever, colitis, bloody stool, and abdominal pain. In order to respond to this infection, the immune system creates neutralizing antibodies to prevent toxin binding. However, some patients are at higher risk of developing infection due to predisposing factors. In order to identify specific risk factors, 287 patients at the Hahnemann University were enrolled in this study beginning in 2014. Of these patients, 62 patients had contracted a nosocomial C. difficile infection (CDI) and the remaining 225 were control patients without the infection. Data was collected for these patients including demographic information, comorbidities, medications, blood chemistry, etc. We hypothesize that the risk factors correlated to acquiring a C. difficile infection in this patient cohort include the use of antibiotics, above the age of 65, immunosuppression, and lower socioeconomic status. The identification of these risk factors allows for the development of clinical prediction tools to use at other hospital to both better identify and prevent CDI. Although the hospital has since closed, identification of these risk factors allows for determination of at-risk populations for acquiring CDI and future target populations for C. difficile vaccine intervention.
722	Matthew Bell / Microbiology and Immunology	Michele Kutzler, PhD	Neev Shah, Mariana Bernui, Hal Jones, Naglaa Mohamed, Michael Pride, Annaliesa Anderson, Kathrin Jansen, Michele Kutzler	**Age-associated defects in the adaptive immune response to Clostridium difficile infection impair the development of a protective immune response in the elderly:** Clostridium difficile is the number one cause of healthcare-associated infection in the United States and the most lethal acute enteric pathogen. The elderly (=65) have the greatest risk of* C. difficile* infection (CDI) and severe morbidity and mortality due to CDI. Additionally, most recurrent CDIs occur within the elderly. To better understand why the elderly are at greater risk of severe and recurrent CDI, our lab has conducted a longitudinal study of the aging immune response to primary and recurrent CDI in patients at Hahnemann University Hospital. Both elderly and young CDI patients were enrolled in the study, and stool and blood samples were collected at enrollment and 12 days after diagnosis of CDI. Analysis of the samples looking at the humoral response in elderly versus young CDI patients shows that the early humoral response in elderly patients is impaired when compared to young CDI patients. In addition, recurrent CDI patients have similarly defective humoral responses. Finally, preliminary work in an aging mouse model of CDI further supports that age-related defects within the adaptive immune response impair the development of a protective immune response. Since the adaptive immune response to CDI plays an important role in neutralizing toxins produced by C. difficile, an impaired humoral response in both aged and recurrent CDI patients may contribute to the increased risk of infection, morbidity, and mortality observed in elderly patients. Future studies will seek to further characterize the aging immune response using patient samples as well as aging mouse models of CDI.
723	Jessica Kim / Medicine	Vincent Lo Re III, MD		**The Treatment Cascade for Hepatitis B Virus Infection Among HIV-Infected Patients in Care in the North American AIDS Cohort Collaboration on Research and Design, 1995-2016:** Background: The HIV treatment cascade (diagnosis, linkage to care, prescribed antiretroviral therapy, viral suppression) is an effective tool for improving the health of HIV-infected patients and for achieving the public health benefits of antiretroviral therapy. Identifying gaps in care of hepatitis B virus (HBV) infection among HIV-infected persons is important for development of programs to improve management of this chronic infection. Objectives: We determined the proportion of HIV/HBV-coinfected persons in the North American AIDS Cohort Collaboration on Research and Design (NA-ACCORD, the largest consortium of HIV cohorts on this continent) who completed each step along a proposed HBV treatment cascade: 1) prescribed HBV therapy, 2) had HBV DNA measured, and 3) achieved undetectable HBV. Methods: We identified HIV-infected individuals with 1) =18 years of age, 2) HBV coinfection (defined as positive HBV surface antigen, HBV e antigen, or detectable HBV DNA), 3) HIV RNA and CD4+ count assessed between January 1, 1995 and December 31, 2016, and 4) at least 6 months of observation in NA-ACCORD. Among these patients, we determined the proportion who: 1) received an HBV-active antiretroviral (tenofovir disoproxil fumarate, lamivudine, emtricitabine) or entecavir, 3) had HBV DNA assessed, and 4) achieved HBV DNA <200 IU/mL. Results: Among 8,354 HIV/HBV patients in NA-ACCORD from 1995-2016, 7,878 (94. 3%) received an HBV-active antiretroviral or entecavir, 5,316 (63. 6%) had HBV DNA assessed, and 3,656 (43. 8%) achieved HBV DNA <200 IU/mL. Conclusion: Efforts are needed to increase HBV DNA testing and ensure undetectable HBV is achieved among North American HIV/HBV-coinfected patients.
724	Teresa LuPone / Microbiology and Immunology	Sonia Navas-Martin, PhD	Olivia Cipollini	**Investigating infection dynamics and innate immune sensing of neurotropic Usutu virus (USUV) in vitro:** Usutu virus (USUV) is an African neurotropic Arbovirus with a positive sense single-stranded RNA (+ssRNA) genome that belongs to the Japanese encephalitis virus (JEV) serocomplex in the Flavivirus genus. Since its first appearance in Europe two decades ago, three USUV introductions have occurred across bird migratory routes, causing mass mortality in bird populations. Emerging serological data suggests USUV circulates silently among asymptomatic humans in Europe. Accompanying recent epizootics, neurological disorders has presented clinically, including facial paralysis, encephalitis, meningitis and meningoencephalitis, in immunocompromised as well as immunocompetent patients. USUV host interactions, antiviral response, and neuropathogenesis remain ill defined. Here, we evaluate the ability of USUV virus to replicate in murine macrophages and microglial cells. As a consequence of viral replication, USUV dsRNA activates the innate immune receptor Toll like receptor 3 (TLR3), leading to the activation of the antiviral response in murine macrophages and microglia. Murine wild type microglia and wild type, TRIF-/-, and TRIF/MYD88-/- bone marrow derived macrophages were infected with two strains of USUV (SAAR 1776, and ENT MP 1626), or left untreated (mock). USUV Infection and activation of TLR3, IRF3, STAT3, and cleaved caspase-3 was examined at various days post infection using confocal microscopy. We observed viral replication in these cells as well as activation of TLR3 in infected cells, suggesting a potential role in antiviral response and/or neuropathogenesis. Whether that role is host-protective, or detrimental warrants future study in a mouse model.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
725	Douglas Krauth / Microbiology and Immunology	Sonia Navas-Martin, PhD	Brett Labier	**Novel insights into SARS-CoV-2 ORF8 using an in silico analysis approach:** The zoonotic transmission of the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) in December 2019 has caused a global pandemic claiming over 760,000 lives. Following the 2003 SARS and 2012 MERS outbreaks, this recent pandemic has illustrated that better understanding these emerging pathogenic Coronaviruses is critical to global public health. The SARS-CoV-2 genome consists of 4 structural proteins, 16 nonstructural proteins, and 6 small open reading frames (ORFs). While the structural and nonstructural proteins share significant homology to their SARS counterparts, the ORFs are not so similar. Particularly, the SARS-CoV-2 ORF8 is a merged mutant of the SARS ORFs 8a and 8b and undergoes a higher rate of mutation than the other SARS-CoV-2 proteins. These divergences suggest that ORF8 may have a key role in SARS-CoV-2 immune evasion. Very little is currently known about the function of ORF8. Here, we perform an in silico approach to investigate ORF8 and predict possible functions. Our results deliver insights into the structure and cellular localization of the protein as well as implicate ORF8 in syncytia formation and a variety of innate immune evasion mechanisms. Overall, these results will guide our future studies using fully infectious SARS-CoV-2 virus.
726	Cassandra Spector / Microbiology and Immunology	Michael Nonnemacher, PhD	Joshua Mell, Azad Ahmed, Zsofia Szep, Jeffrey Jacobson, Brian Wigdahl, Michael Nonnemacher, Andrew Atkins, Gregory Antell, William Dampier, Anthony Mele, Vanessa Pirrone, Shendra Passic, Katie Kercher, Jaroslaw Krol	**HIV-1 Tat genetic variation within patients of the Drexel CARES Cohort:** use of the third-generation PacBio sequencing platform to examine co-selection: HIV-1 mortality has decreased with the prolonged use of suppressive antiretroviral therapy (ART) while the incidence of HIV-1-associated neurocognitive disorder (HAND) has increased. The HIV-1 Tat protein has been shown to cause neurotoxicity and be associated with neuroinflammation and neurocognitive impairment. Variation within Tat has been observed to affect its function and ability to induce neurotoxicity. We recently identified and characterized predominant amino acid variants within Tat that associate with HAND. Initial studies amplified Tat exons I and II separately from patient PBMCs from the Drexel Medicine CNS AIDS Research and Eradication Study (CARES) Cohort using PCR, and amplicons were sequenced using Illumina next-generation sequencing. Statistical analyses were able to associate variants with HAND diagnoses. To examine the co-selection of amino acid variants across both Tat exons, a PCR assay was developed to amplify both exons of the Tat gene, spanning over 3 kilobases of the HIV-1 proviral genome. This method was applied to an initial set of 8 samples, which were sequenced using PacBio next-generation long-read sequencing technology. Results demonstrated variation in the number of dominant sequences, where some patient amplicons had a single dominant sequence and others had several minor variants. Following preliminary analysis, the study was expanded to include an additional 57 patient samples, which were PCR-amplified using the same strategy, but utilized primers extending from Tat exon I into the 3′ long terminal repeat (LTR) region. Future studies will focus on the impact of Tat amino acid variation and co-selection on Tat-mediated neurotoxicity and HAND. This work is supported by, NIMH P30 MH092177 (CNAC/CTRSC, Drexel Component PI, BW), NIMH T32 MH079785 (Drexel Component PI, BW), and R01 NS089435 (PI, MRN)
727	Charvi Malhotra / Biomedical Engineering	Gail Rosen, PhD	Bahrad Sokhansanj	**Analysis of Clinical Outcomes of COVID-19 Viral Subtypes:** Background: The novel coronavirus responsible for COVID-19, SARS-CoV-2, has rapidly spread globally, with 30 million confirmed cases as of September 2020. Genetic subtyping analysis has revealed that different regions of the world are associated with varying clinical presentations and severity of disease. The most frequent variant observed globally is the A614G Spike receptor glycoprotein variant. Our analyses focused on this mutant to observe its effects on clinical outcomes. Methods: Using data obtained from GitHub, data was mined for specific parameters that were considered to have the greatest impact on clinical outcomes. To make the dataset more uniform for analysis, patient status was categorized in a binomial format, Mild vs. Severe. Any patient status that resulted in any hospital visit or stay was categorized as Severe, while all remaining categories were considered as “Mild”, including “asymptomatic” infection. Logistic regression analysis was completed on data using R software. Various parameters were analyzed for their impact on changes in patient status, including country, continent, age, sex and spike protein variant. Multi-variable chi-squared analysis allowed for individual parameter affect assessment, and logistic regression allowed for a comparative profile of all parameters effects. Results and Discussion: The coefficient estimate of the variable Spike G is b = 0. 61009, which is positive, leading to the conclusion that the Spike G protein variant presents with a greater probability in Severe patient status categorization. Based on all other analysed parameters, Males above the age of 51, with the Spike G variant, living in Asia or Europe are statistically more likely to be in the Severe patient status category. The model was validated with the accuracy of 80%.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
728	Stuart Brand / Graduate School of Biomedical Sciences and Professional Studies	Tina Ross, PhD		**Risk Analysis of the Parameters Underpinning Predictive Models Employed Throughout Public Health Crisis Caused by the SARS-CoV-2 Pandemic:** If the function of modeling for COVID-19 is to assess relative effectiveness of different interventional measures to control its infectious spread among the population, then models should take the interaction of two key foci into account. The first involves mechanisms which SARS-CoV-2 implements to sustain its life cycle in human host cells. This aspect of modeling entails reliance upon developing virological research about SARS-CoV-2, as well as research into human physiological responses to infection, including immunological responses aided by antiviral agents and vaccines-in-development. A second focus of COVID-19 modeling involves risk assessments based on examining dynamics of human behavioral responses to the pandemic. This incorporates analysis of decision-making processes occurring within the pandemic situation. Decision-based responses to governmentally-enforced lock-downs, effectively mandated mask-wearing and social-distancing policies as well as SARS-CoV-2 testing are included. Additionally, decision-making analysis examines hand sanitization, diet/exercise, all aimed at reducing risk for poor outcomes. My research aims to examine the extent to which these diverse factors have been embodied within the current institutional COVID-19 modeling efforts, largely based out of scientific research institutions. There is also modeling produced by Morgan Stanley, where economics-based analysis of decision-making and risk-assessment contribute a differing modeling approach. Theoretically, modelling based on comprehensive, hybridized approaches that integrate factors related to the pathophysiology of SARS-CoV-2 infection with factors related to decision-making about infection control measures should optimize risk assessments of current and future pandemics.
729	Nicole Bernstein / Family, Community and Preventive Medicine	Zsofi Szep, MD	Nicole Bernstein, Shara Epstein, Ellen Cook, Zsofi Szep	**Telemedicine during COVID-19: Efficacy in HIV Care Delivery:** Background: The novel coronavirus (COVID-19) has affected millions of people worldwide, with over 6. 4 million confirmed cases and over 193,000 deaths in the U. S. There has been ongoing investigation into how the pandemic is specifically affecting persons living with HIV (PLWH). To date, there have been few studies examining the efficacy of telemedicine in treating PLWH. The Partnership Comprehensive Care Practice serves 1700 PLWH, providing comprehensive primary and specialty health care. Prior to COVID, the clinic saw minimal utilization of telehealth modalities due to technological barriers and in-person appointment preference. The pandemic created a unique opportunity to study telemedicine in the HIV population, as the clinic was forced to adapt to a telehealth model. The primary aim of this study is to compare appointment attendance during a Pre-COVID in-person appointment period to a telemedicine-only appointment period. The second aim is to compare barriers to appointment attendance during the in-person period and the telemedicine-only period. The third aim is to compare HIV viral load suppression (% of patients with VL <20) during the two time periods. Methods: We evaluated appointment attendance using non-paired t-tests to compare proportion of missed appointments across both time periods. Results: During the in-person appointment period, 38. 7% of 782 total visits in January and 43% of 745 total visits in February were missed. During the telemedicine period, 19% of 567 total visits in April, 13. 8% of 559 total visits in May, and 19. 2% of 589 total visits in June were missed. Overall, there was a statistically significant decrease in missed appointments during the telemedicine period (p<0. 01). Conclusions: Higher appointment attendance rates during the telemedicine-only period suggest that telemedicine is an efficacious health care delivery method. Telemedicine will likely continue to be incorporated into patient care to improve health care accessibility.
731	Swaksha Rachuri / Microbiology and Immunology	Akhil Vaidya, PhD	Joanne Morrisey, Lawrence Bergman, Akhil Vaidya	**Exploration of the Antimalarial Drug Target PfATP4:** Phenotypic Effects of Resistance Associated Mutations: Background: Malaria is a parasitic disease transmitted by the bite of an infective female mosquito. Malaria incidence has largely decreased in the past decade due to eradication efforts; however, resistance to antimalarial drugs poses an alarming threat. Discovering new antimalarial drugs is essential to counter this threat. Previous Research: A newly discovered antimalarial drug target being studied in our laboratory is a P2-type sodium-proton pump on the plasma membrane of the parasite. This pump maintains low cytosolic sodium concentrations within the parasite while using ATP hydrolysis to drive sodium efflux from the parasite cytosol into the red blood cell. Drugs that target this pump include spiroindolones, pyrazoleamides, and dihydroisoquinolones. These drugs disrupt sodium homeostasis within the parasite that leads to rapid clearance of the parasites in vivo as well as blocking the transmission of the parasites. Previous studies have shown that mutations of PfATP4 cause resistance to these drugs. We have observed that certain parasites that were resistant to pyrazoleamide were hypersensitive to spiroindolones. This suggests a potential strategy whereby combination of two different drugs targeting PfATP4 could set a genetic trap for the parasite resulting in minimization of resistance development. Proposed Research: My project will focus on characterizing the potential fitness costs associated with individual, double and triple resistance-associated mutations of PfATP4. These mutations are located on different sites along the PfATP4 gene, indicating that the antimalarials bind at different locations. Therefore, development of these mutant parasites may inform us of possible compensatory mechanisms. I will derive merodiploid transgenic parasite lines in which the endogenous pfATP4 gene is conditionally regulated, allowing assessment of phenotypic effects of PfATP4 gene bearing various combinations of mutations expressed from an ectopic site.
732	Jackie Longother	Michael Weingarten, MD		**The Diagnosis-Related Group Payment System and Effect of the Covid-19 Pandemic on Hospital Payments:** The Diagnostic Related Group system was enacted in the 1980's by the Federal Government to calculate Medicare payments and reduce health care costs. Payments are determined based on standardized costs of prior hospital stays with other modifying factors for a given diagnosis. Reimbursement for Covid-19 patients has been difficult to quantify due to lack of previous hospitalization data. As such, hospitals have potentially been underpaid by insurance companies due to misdiagnosing or reclassifying cases of Covid-19 as less severe upper respiratory infections.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
733	Rebekah Madrid / Microbiology and Immunology	Brian Wigdahl, PhD	Michael Bouchard, Michael Nonnemacher, Will Dampier, Brian Wigdahl, Cassie Spector, Jamie Marino, Anthony Mele, Jill Lawrence, Ronak Loonawat, Andrea Rosenkranz	**Meta-analysis of HIV Tat and HBV HBx protein interactions that may influence hepatocellular carcinoma:** An estimated 250 million people have a chronic hepatitis B virus (HBV) infection. An estimated 38 million people are infected with human immunodeficiency virus type 1 (HIV-1). HIV and HBV have similar routes of infection, and HBV co-infection occurs in approximately 10–25% of HIV-infected individuals. Chronic HBV infection is the most common cause of hepatocellular carcinoma (HCC). HIV/HBV co-infected individuals have a significantly higher incidence of liver disease, including HCC, compared to mono-infected individuals, even with anti-HBV and anti-HIV therapy. Current therapies do not block synthesis of viral proteins, including HBV HBx and HIV-1 Tat, which regulate cellular signaling pathways that can be carcinogenic. This may explain why current therapies do not eliminate the risk for developing liver disease. Studies suggest that HIV-associated liver disease is caused by the impact on the liver microenvironment of circulating HIV products in the blood, such as Tat secreted from HIV-infected T cells or macrophages that traffic to the liver or HIV-infected Kupffer cells (liver-resident macrophages). To our knowledge, no studies examined Tat effects on HBV, or cooperative effects of HBx and Tat on hepatocyte physiology. Preliminary studies to answer whether HBx and Tat interact are underway by performing literature reviews. In this study, various genes were researched to determine how they interact with HBx. With this information, we will be able to answer whether there are commonalities between the effects of HBx and effects of Tat within the liver, which may indicate why co-infected patients have higher prevalence rates of HCC.
734	Raidizon Mercedes / Microbiology and Immunology	Brian Wigdahl, PhD	Brian Wigdahl, Andrew Atkins, William Dampier, Neil Sullivan, Chung Cheng-Han, Shendra Passic, Jean WIlliams, Vanessa Pirone, Michael Nonnemacher	**Validating CRISPR/Cas9 gRNAs using GUIDE-Seq Literature Review:** HIV-1 is a retrovirus that integrates its viral genome into host cells. Its persistence is due to the integration of proviral DNA in reservoir tissues such as peripheral blood, brain and gut. CRISPR/Cas9 is a powerful gene editing technique that could be used to remove integrated HIV-1 provirus from individual cells. One of the challenges of using CRISPR/Cas9 as a treatment is the specificity of the therapy across the all HIV-1-infected patients. In order to successfully excise the virus, a set of guide RNAs (gRNAs) that can recognize viral variations while decreasing off-target DNA editing. Our aim is to develop gRNAs that can meet this criteria. To assess the efficiency of DNA cleavage assay and validation of off-target efficiency, the genome-wide unbiased identification of DSBs enabled by sequencing (GUIDE-Seq) method with next-generation sequencing is used. The GUIDE-Seq assay has been shown to identify the sequence locations of double-strand breaks (DSBs) in living cells including those generated by CRISPR/Cas9. Through an in-depth evaluation of GUIDE-Seq data sets, gRNAs can be evaluated and assessed for specificity. This information can be used to design gRNAs with increased specificity for the HIV-1 proviral DNA target while minimizing off-target effects.
735	Theodore Gurrola / Biochemistry and Molecular Biology	Brian Wigdahl, PhD	Alexander Allen, Neil Sullivan, Will Dampier, Vanessa Pirronee, Shendra Passic, Michael Nonnemacher, Brian Wigdahl	**Silencing HIV-1-infected cells utilizing broad-spectrum guide RNAs:** The latent HIV-1 reservoir constitutes the primary challenge antagonizing a cure. Genomic editing with the CRISPR/Cas9 system holds promise to permanently excise or inactivate integrated provirus. To this end, broad-spectrum gRNAs were designed by isolating patient PBMCs and deep sequencing their LTRs. This resulted in the development of broad-spectrum gRNAs named SMRT1 to 10. Based on an in silico prediction algorithm, it was demonstrated that the broad-spectrum gRNAs were predicted to cleave 100 percent of patient-derived LTR samples. In TZM-bl cells, P4R5 cells, and the molecular clone pLAI, SMRT gRNAs were shown through beta-gal expression to be effective individually and in combination, even more so than previously established gRNAs, while maintaining a high degree of cell viability. We have previously used a number of approaches to measure gRNA effectiveness that include flow cytometry, beta galactosidase, and fluorescent microscopy. These results have demonstrated that the gRNAs possess broad-spectrum cleavage activity and could contribute to HIV-1 treatment strategies or possibly even a cure at some point in the future. Our next steps will be to continue testing our SMRT gRNAs in increasingly physiologically relevant cells, individually and in combination, and to identify what factors may augment or inhibit the effectiveness of our HIV-1 treatment strategy. Additionally, to increase the rigor of our techniques, we will utilize more quantitative techniques such as qRT-PCR to measure intracellular and extracellular HIV-1 mRNA levels during the course of therapeutic intervention using CRISPR technologies.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
800	Ishani Khatiwala / Microbiology and Immunology	Fahad Alam, MD		**Could this be another case of COVID-19 encephalitis?:** This study explores an exceptionally rare presentation of the infamous virus that has taken over the world in the past few months: COVID-19. The virus most commonly presents with an interstitial pneumonia picture, including fever, cough, and dyspnea; occasionally, patients will experience GI symptoms, anosmia, or a hypercoagulable state. Very rarely, patients infected with COVID-19 may present with neurological deterioration with encephalitis-like symptoms, such as altered mental status, headaches, generalized seizures, signs of meningeal irritation, or other neuropsychiatric manifestations. Though the exact mechanism is still unknown, there are several emerging theories on the route of CNS penetration by COVID-19, including hematogenous spread from systemic to cerebral circulation or dissemination through the cribriform plate. There have been studies on prior coronaviruses that suggest an affinity for neuronal targets in the cardiorespiratory centers, but recent research has found that this affinity may be even higher in SARS-CoV-2 (Montalvan et al, 2020). Additionally, recent case reports have described the detection of SARS-CoV-2 antibodies and elevated protein in the CSF analysis of infected patients presenting with these symptoms of encephalitis, often in the absence of alternative causes of encephalopathy (Andriuta et al, 2020). Due to the rapid emergence of COVID-19 and insufficient research on the neurological manifestations, studies like the one we present here are crucial towards gaining insight and determining successful treatment options for patients with these unusual presentations.
802	Alena Nixon / Medicine	Amy Baranoski, MD		**Examining Possible Bias and Inequality in USMLE STEP 1 Resources:** There are numerous forms of bias that are possible within the field of medicine, particularly those geared around gender or race/ethnicity. Unfortunately, these implicit biases have been shown to be indicative of inadequate care. The goal of the study was to investigate how bias can be introduced and possibly be affected by parts of the educational experience, looking specifically at practice questions in resources commonly used by medical students for board studying. In our study, we assessed questions from two USMLE STEP 1 resources, "NBME Subject Examination Sample Items" (NBME) and "First Aid Q&A for the USMLE STEP 1" (3rd edition) (FA), for gender and race usage and necessity. Our hypothesis is that, because of the psychometric assessments the NBME uses in the development of questions, that source would be more of a "gold standard" with less gender disparities compared to First Aid book. Statistical analysis including Chi square testing for categorical variables and student T-test for continuous variables using IBM SPSS Statistics, v26. Of the 870 questions examined, 220 (25. 3%) were from NBME and 650 (74. 7%) were from FA . There were 719 (82. 6%) which mentioned gender, with 322 questions (44. 8%) listing the patient as female, 48. 9% in NBME and 43. 4% in FA (p = . 206). When examining questions by specialty sub-section, 8 of 17 sub-sections across resources had greater than 60% of questions referring to men versus women and 6 of 17 had greater than 50% to 60%. Thirty-eight questions (4. 4%) contained racial and/or ethnic information, with 0. 5% from NBME and 5. 7% from FA (p=0. 001). As these are common educational resources that medical students can use, it is important that these materials have little to no bias, lest they eventually affect their care towards patients in the future.
803	Junaid Mir / Medicine	Priyanka Bhatia, MD		**Rare Case of Hepatic Infarction:** Introduction: Hepatic infarction is a rare event given dual blood supply of liver from hepatic artery and portal vein. Reported cases of hepatic infarction typically involve hepatic artery occlusion with or without portal vein thrombosis (PVT). Carrol in his review of literature found only 19 acceptable cases of hepatic infarction. Twelve of the cases were due to hepatic artery embolism while seven were due to hepatic artery thrombosis. Case summary: 80 year old man presented with acute severe right upper quadrant abdomen pain. Past medical history significant for Atrial fibrillation on warfarin and Coronary artery disease • Physical examination significant for irregularly irregular cardiac rhythm, Right upper Quadrant abdominal tenderness • Laboratory work up significant for transaminitis with mildly elevated bilirubin,Sub therapeutic INR and unremarkable tumor markers. • Abdominal ultrasound showed large hypo echoic irregular area in the right hepatic lobe. • CT Abdomen and pelvis showed right portal vein thrombosis with liver lesion. • MRI Abdomen showed right portal vein thrombosis and a wedged shape area of low enhancement adjacent to right portal vein suggestive of right hepatic infarct. • Echocardiogram did not show cardiac thrombus. • He was started on I/v heparin and warfarin • Abdominal pain improved and transaminitis resolved. • He was discharged on Apixaban. Significance: • Hepatic infarction is typically described in patients with intra-abdominal surgery or inflammation, liver transplant status, hepatocellular carcinoma undergoing chemo embolization, PVT insetting of cirrhosis, and antiphospholipid antibody syndrome. • We hypothesize acute PVT and underlying Atrial fibrillation with sub-therapeutic anti-coagulation predisposed this patient to develop hepatic infarction. • Treatment involves anticoagulation for underlying portal vein thrombosis. Novel oral anticoagulants have proven effective.
804	Mary-Katharine McMullen / Family, Community and Preventive Medicine	Janet Cruz, MD	Raina Choi, Christian Johnson, Christian Pino, Paul Reilly, Janet Cruz, Annette Gadegbeku	**Analyzing medical student intervention in reducing barriers to telemedicine utilization in primary care:** Telemedicine in the United States has historically been underutilized, with only 42% of hospital systems and 15% of family physicians readily adopting telehealth (Lin et al., 2018). This study sought to determine whether medical student assistance during the telemedicine process would increase the successful implementation of telehealth visits. Medical students assisted patients seen via telemedicine at four primary care clinics in the Philadelphia area between May and August 2020. This intervention included assistance via telephone with various tasks including set-up of Epic MyChart account and associated mobile application, as well as helping patients connect to video appointments. Patients were surveyed following their appointments to assess satisfaction and any challenges that arose. The results of this intervention and a discussion of their meaning in the context of the global COVID-19 pandemic are reported. Additionally, a number of barriers encountered in this process were identified and discussed

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
805	K . Johnson / Family, Community and Preventive Medicine	Janet Cruz, MD	Raina Choi, Mary-Katharine McMullen, Christian Pino, Paul Reilly, Annette Gadegbeku	**Identifying Barriers to Telehealth Implementation in Primary Care:** The global COVID-19 Pandemic of 2020 disrupted many areas of human life, including the delivery of healthcare (Lin et al., 2020). Telemedicine has been identified as an important tool during the COVID-19 pandemic to reduce risk of transmission in the United States; it has been noted helpful in previous pandemics including SARS-CoV, MERS-CoV, Ebola, and Zika (Ohannessian et al., 2020). This study aimed to identify some of the barriers faced by patients in utilizing telemedicine during the pandemic. We employed medical students to conduct phone surveys of patients seen via telemedicine at four primary care clinics in the Philadelphia area between May and August 2020. We will discuss the results of these surveys within the context of the COVID-19 pandemic.
806	Lorena Melendez / Department of Family and Consumer Science	Nelida Duran, PhD	Caroline Plaza	**Case study: CSUN's response to COVID-19 as it relates to Health and Wellbeing:** Purpose. On March 11, 2020, the World Health Organization announced COVID-19 was a global pandemic. Due to this, all the face-to-face activities at California State University, Northridge were changed to online modalities. The restrictions created because of COVID-19 affected all departments including student health and wellbeing services. This case study aims to investigate the university's response to COVID-19 and the students' views about the university's response to COVID-19 as it relates to promoting their health and wellbeing. Methods. National Institute on Minority Health and Health Disparities Research Framework was used to organize the data. Focus groups were conducted using convenience sampling, data was collected from emails sent to students, and different CSUN websites. Data was analyzed using thematic analysis for the focus groups and descriptive analysis for emails and websites. Results. Major themes emerged: Optimism towards the future, and concern over their health and the health of others. CSUN students felt that the university was concerned about their well-being. Student health behaviors were affected and outcomes were found at the individual level. Campus programs and services swiftly were delivered virtually leveraging the zoom and telehealth technologies. Discussion. CSUN does not have a standard form of communication. Students prefer different platforms to find information: e-mail, instagram, CSUN websites. Students should be allowed to pick their preferred contact method: e-mail, text message, instagram, or other to improve awareness of resources on campus. Professors should be involved in the promotion of student health and wellbeing.
807	Christina Fleckenstein / Psychiatry	Eduardo Espiridion, MD	Eduardo Espiridion, Adeolu Oladunjoye, Patrick Boyle	**A Rare Case of Pseudocyesis in a Patient with Bipolar Disorder:** Pseudocyesis is a rare condition in which a person believes to be pregnant and has signs/symptoms of pregnancy, despite the absence of verified gravidity. This disorder is confirmed with negative b-HCG tests and negative ultrasound findings. Most cases are recorded in the setting of major depressive disorder or psychotic disorders, with very few documented during mania. Pseudocyesis is also most-often reported in developing countries that place a unique emphasis on childbearing. We present a 30-year-old American woman with pseudocyesis in the setting of bipolar-associated mania. This patient was found by police officers with signs of mania-associated psychosis, including auditory hallucinations and persecutory delusions. She had bipolar disorder and PTSD and discontinued her psychiatric medications several months prior, worried they would harm her believed-pregnancy. She described increasing abdominal size, whitish discharge from her nipples and feelings of fetal movement, despite negative pregnancy tests and a negative workup by her family doctor. Examination revealed an obese, disheveled woman with a non-distended abdomen, a non-palpable uterus and no breast tenderness or enlargement. She was involuntarily committed and stabilized and eventually transferred to a long-term psychiatry facility. Pseudocyesis is a rare condition, predominately documented in developing countries, within the context of depression or psychotic disorders. This patient represents a unique instance of pseudocyesis occurring in the US within the context of mania. More studies need to be done to better understand this rare condition and its variants.
809	Anila Hussain / Medicine	Jonathan Finkel, MD	Rahul Gaiba	**Embolic Stroke after embolization of Pulmonary Arterio-venous Malformation (PAVM):** An unfortunate Complication: Introduction: Pulmonary AVM is a rare cause of right to left shunts usually presenting with dyspnea and hemoptysis. However, they can lead to paradoxical emboli resulting in stroke or brain abscesses. We present a rare case of AVM leading to recurrent stroke. Case Description: A 64-year-old male with hypertension, embolic stroke 10 years ago, and suspected Hereditary Hemorrhagic Telangiectasia (HHT) presented with acute right-sided weakness and slurred speech. The diagnosis of HHT was suspected based on frequent epistaxis and exertional dyspnea that improved significantly after the embolization of a 4. 5 mm PAVM 3 years ago. On this admission, he was found to have a left MCA territory stroke secondary to a left internal carotid artery thrombus. Bubble echocardiography revealed an intrapulmonary shunt and a PFO was ruled out. 24-hour telemetry monitoring did not reveal any arrhythmias. In the absence of other explanations, the embolic stroke was attributed to the recanalization of the PAVM. The patient was discharged on anticoagulation with a follow-up plan for re-embolization. Discussion: CT angiogram of the chest is the gold standard for the diagnosis of PAVM. Treatment ranges from observing asymptomatic patients to surgical excision of severe shunts. Embolization remains the mainstay of treatment for most pulmonary AVMs >2 mm in size. R-L shunts may persist despite embolization and recanalization occurs in up to 20% of embolized PAVMs. Anticoagulation and frequent follow up is recommended for secondary prevention of stroke in patients with PAVM.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
810	Connor Diaz / Medical Student	Brian Forsythe, MD	Enrico Forlenza, Ophelie Lavoie-Gagne	**Acromioclavicular Joint Separation: A Matched Cohort Analysis of Return to Play and Player Performance from 1999-2018 in Elite UEFA Professional Soccer Players:** Background: Acromioclavicular joint separation is a common injury in professional soccer players, threatening future performance, and team contributions in elite soccer leagues. Information detailing professional soccer players' return to play after this injury is limited. Purpose: To determine the rate and time to return to play (RTP) and player performance following acromioclavicular joint separation in soccer players from top professional leagues with a retrospective matched-cohort analysis. Results: Fifty-one soccer players with ACJ separation were identified. The mean age at injury was 24. 61±5. 27 years and mean time to RTP was 49. 76 ± 24. 29 days (5. 88 ± 4. 08 games). 81% of players returned to play at elite league level at any timepoint with 69% of players RTP at elite level within the 1st season after injury and an additional 21% of players RTP at elite league level within 2nd season post injury. Two players suffered reinjury of ACJ separation in their professional soccer careers. Athletes played 9. 25 (SD: 36. 50) fewer minutes per game in their 3rd season post injury (p<0. 05) and 18. 22 (SD: 35. 87) fewer minutes per game in their 4th season post injury compared to their match, uninjured controls. Most players' quality of play when reentering elite league soccer was similar to their pre-injury levels and was not significantly different than the performance of their matched, uninjured controls. However, defenders played fewer minutes in their 1st season back, while also contributing fewer assists during that time period compared to matched, uninjured controls. Conclusions: Similar to athletes participating in other major sports, the average RTP rates are high (81%) for elite soccer players suffering an ACJ separation. Players were largely able to return to elite soccer leagues, while maintaining performance comparable to pre-injury levels and that of matched uninjured controls, with the exception of defenders' first season post-injury.
811	Gayathri Vijayakumar / Orthopedic Surgery	Ryan Garcia, MD	Casey Sabbag, Erika Gantt	**Acute Hand and Forearm Compartment Syndrome after Radial Arterial Line Placement in Therapeutically Anticoagulated Patient:** Acute compartment syndrome is one of the few true surgical emergencies in Orthopedic Surgery. Although it is typically caused by trauma, several iatrogenic causes can lead to its development including intravenous line infiltration, arterial cannulation, and anticoagulation. A high level of clinical suspicion is key to obtain a timely diagnosis and prevent irreversible tissue damage. We report a case of acute compartment syndrome of the forearm and hand following radial arterial line placement for a routine cardiac procedure in a patient on therapeutic anticoagulation. Upon initial presentation, the patient was noted to have tense hand and forearm compartments and all "5-Ps" of late stage compartment syndrome including pain out of proportion, pallor, parasthesias, pulselessness and paralysis. Duplex ultrasound demonstrated absent flow within the radial artery with a faint pulse audible on Doppler ultrasound. The patient underwent emergent hand and forearm fasciotomies, irrigation and debridement. The index procedure was followed by several repeat irrigation and debridement procedures ultimately resulting in radical resection of the volar forearm compartment and mobile wad musculature requiring staged wound coverage with dermal matrix and autologous split thickness skin graft. Five months after the initial presentation, the patient had healed wounds on the volar forearm, functional interossei muscles and could make a near full composite fist. This case is an example of iatrogenic compartment syndrome from a routine radial arterial cannulation for a cardiac procedure that even though appropriately managed, resulted in multiple surgical debridements, significant loss of viable muscle, and staged wound coverage.
812	Hakan Orbay / Surgery	Charles Geller, MD	Sirivan Seng, Daniel Kim	**Increasing incidence of sternoclavicular joint infections in intravenous drug users:** Sternoclavicular joint septic arthritis is rarely seen in the general population. The majority of cases are seen in intravenous drug users. Given the lack of reported cases in the literature, there is no standardized treatment algorithm for this disease process. Accepted treatment methods range from medical management to wide local debridement. The incidence of sternoclavicular joint septic arthritis will likely continue to increase with rising usage of intravenous drugs in the United States. Within the past year, our institution treated four cases. We present this case series and a review of the literature regarding the current treatments of sternoclavicular joint septic arthritis.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
813	Subha Saeed / Medicine	Charles Geller, MD	Maitreyee Rai, Naida Aslam	**Hamman's Syndrome: Spontaneous Pneumomediastinum Associated with Prolonged Vaginal Delivery:** Spontaneous pneumomediastinum (SPM) is often a sequela or concomitant presentation associated with multiple pulmonary pathologies. Hamman's syndrome, postpartum SPM with vaginal delivery, is a rare phenomenon. Approximately 200 cases to date have been reported worldwide [1,2]. Herein, we present an additional case of pneumomediastinum following a prolonged vaginal delivery. Case: A 35-year-old woman, G5, P3-0-2-2, at 41-week gestation, presented to the emergency department (ED) in active labor. She had a 2-pack year smoking history. The patient underwent an attempted vaginal delivery at home by a midwife who conducted unsuccessful maneuvers for breech footling presentation for an undocumented duration. In the ED, the patient was afebrile, blood pressure (BP) 112/99mmHg, heart rate (HR) 120 beats/minute(bpm), respiratory rate (RR) 28/minute, oxygen saturation 99% on room air (RA). Physical examination was notable for mild vaginal bleeding with the infant's head stuck in the vaginal canal with occiput posterior presentation. Laboratory studies were significant for white cell count 31. 7 x 103 [normal (4. 8-10. 8) 103]/uL and elevated lactate 8. 5 (normal 0. 5-1. 9) mmol/L. The baby was delivered in ED. On postpartum day 1, the patient complained of chest and shoulder discomfort. Concurrent physical exam revealed BP 105/61mmHg, HR 88bpm, RR 18/minute, oxygen saturation 98%RA regular heart sounds and clear bilateral breath sounds. Chest x-ray showed findings consistent with pneumomediastinum and soft tissue emphysema in the neck. The patient was managed conservatively with supplemental oxygen, analgesia and bed rest with gradual resolution of the pneumomediastinum. Discussion: Patients with pregnancy-related SPM typically present during the postpartum period with symptoms of chest pain, dyspnea, cough, hemoptysis, dysphagia, and dysphonia. The pathophysiology involves rupture of blebs, marginal alveoli, and tracking of air along the perivascular tissue planes towards the mediastinum. Like coughing, screaming, and vomiting, the phenomenon can be explained by the Valsalva maneuver and increased intrathoracic pressure during prolonged and intense labor [4]. Subcutaneous emphysema can result from the air escaping from the mediastinum to the subcutaneous and deep tissue of neck [5]. A history of smoking is a risk factor for SPM [2,3]. This case demonstrates the interplay of risk factors (smoking) and prolonged labor for the development of SPM. The management of SPM is typically conservative with supplemental oxygen, analgesia and avoidance of active pushing. Early recognition during labor should prompt utilization of forceps or urgent C-section to curtail strenuous Valsalva and hence, progression of the mediastinal emphysema [1,2]. Conclusion: Hamman's syndrome is a rare condition with a benign clinical course. Ominous causes of chest pain during pregnancy and labor include pulmonary embolism, myocardial infarction, and air embolism. It is prudent for physicians to consider the unusual diagnosis of SPM depending based on clinical and radiographic presentation.
814	Aisha Bosula / Medicine	Elissa Goldberg, MSS, LSW		**Analyzing Academic Achievement in Adult Education Programs:** Mansion Evening Campus is a part of One Bright Ray, a high school diploma granting program in Philadelphia serving adults who want to complete their primary education. The demographics and pass rates of the students attending this campus were collected for the Fall 2019, Winter 2019, and Spring 2020 semesters. By analyzing this data, a significant relationship between gender and pass rates was found. Between the 137 students who attended all three semesters, 36% of females did not pass at least one class. Over the same time period, over 76% of males did not pass one class. Given this striking observation, a thorough literature review was conducted relating gender and academic achievement, with influences of masculinity, race, and social and behavioral skills being highly supported. In order to further learn about how the students at Mansion evening campus are impacted by these factors of gender roles, race-related stress, and differences in approach to learning, a 13 item survey based on previously validated and established surveys was sent to Mansion Evening House students. The survey results indicated that the majority of students had been treated unfairly at their place of work because they are Black and believed being male includes being self sufficient. Thus this research implies male black students are impacted by both race and masculinity related stress, which may explain the disproportionately higher percentage of male students who have not passed classes at Mansion Evening House. This research intends to serve as a basis for creating interventions which can better support vulnerable students.
815	Esther Kim / Psychiatry	Tina Goldstein, PhD	John Merranko, Mary Beth Hickey, Kelly Monk, Danella Hafeman, Rasim Diler, Dara Sakolsky, Boris Birmaher, Tina Goldstein	**Risk for Suicidal Ideation and Suicidal Behavior Among Offspring of Parents with Bipolar Disorder:** A Longitudinal Study: Background: Bipolar Disorder (BP) is a highly heritable, episodic mood disorder associated with an elevated risk of suicide attempts and death by suicide. Objective: To examine rates of suicidal ideation and behavior among high-risk offspring of parents with BP as compared to offspring of healthy control parents and parents with other psychiatric disorders. Methods: Participants included offspring of parents with BP (n=511) and offspring of healthy control parents (n=143) and parents with non-BP psychiatric disorders (n=202) enrolled in the Pittsburgh Bipolar Offspring Study (BIOS). Offspring were recruited between ages 6-18 (mean age=12) and reassessed every 2 years over an average of 10 years. Rates of suicidal ideation and behavior among the three groups of offspring were examined over follow-up. Results: Of the 511 offspring of BP parents, 288 experienced lifetime suicidal ideation (56. 4%) and 72 experienced lifetime suicidal behavior (14. 0%). These rates were significantly greater than rates of lifetime suicidal ideation (SI) and suicidal behavior (SB) observed among offspring of healthy parents (SI p<0. 0001 and SB p<0. 0001) and parents with other psychiatric disorders (SI p=0. 0285 and SB p=0. 0009). Conclusions: Offspring of BP parents are at elevated risk for suicidal ideation and behavior into young adulthood. Future analyses will identify demographic and clinical risk factors among the offspring of BP parents that are most strongly associated with suicide risk to inform suicide risk assessment and prevention.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
816	Madeleine Bruce / MD Student	Harsh Grewal, MD	Christopher Pennell	**Congenital paraesophageal hernia with gastric volvulus:** An unusual cause of emesis in the newborn: Congenital paraoesophageal hernia (PEH) with gastric volvulus is rare, presenting with nonspecific symptoms including vomiting, respiratory distress, recurrent pneumonia, and anemia. It can be difficult to diagnose because these symptoms are typical of other more common pathologies. We present a case of a newborn with failure to thrive (FTT) and intractable emesis caused by congenital PEH and gastric volvulus to highlight it as an important differential diagnosis in this population, and to demonstrate the feasibility of emergent laparoscopic repair. A previously healthy 9-day old male presented to the Emergency Department (ED) with FTT. Initially, he had been fed breastmilk, but was trialed on several formulas due to progressively worsening emesis. On examination, he was ill-appearing with a 15% decrease from birth weight. His abdomen was non-tender without peritoneal signs. He had an episode of bilious emesis in the ED and an upper gastrointestinal series revealed a type 3 PEH with gastric volvulus causing obstruction at the level of the diaphragm. He underwent emergent laparoscopic reduction and sutured hiatal hernia repair with gastropexy. The stomach was viable but herniated through the esophageal hiatus with an organoaxial volvulus within the mediastinum. An esophagram on post-operative day (POD) 2 showed normal position and contour of the esophagus and stomach with no delayed passage of contrast. He remained asymptomatic at 1 month follow up at which time his gastrostomy was removed. Vomiting in infants is common and most often due to nonsurgical pathologies like gastroesophageal reflux (GER). Some infants, however, present primarily with PEH causing GER that require surgical repair. Gastric volvulus is associated with PEH in 7% of cases and can have devastating consequences should ischemia and necrosis occur. Therefore, the presence of a congenital PEH is considered an indication for surgical repair irrespective of the presence of symptoms.
817	Jothika Challapalli / Radiologic Sciences	Matthew Hartman, MD	Harmanpreet Bandesha, Timothy Mickus, Kossivi Dantey, Kiet Ma, Matthew Hartman	**The Many Flavors of EVALI: What a Radiologist Needs to Know:** E-cigarettes also known as vapes are an increasing problem in the United States. First introduced in 2007, these handheld devices aerosolize additives such as nicotine, cannabis, solvents, and aldehyde flavorings. A 2018 national survey identified 1 in 5 high school students has used e-cigarettes in the last 30 days. This is attributable to clever marketing by a multibillion-dollar industry that promotes the perception of a cleaner, safer ideal. However, vaping has been shown to cause worse cardiovascular outcomes, increased inflammatory responses, and lung damage - now termed e-cigarette or vaping associated lung injury (EVALI). In August 2019 an outbreak of EVALI cases prompted national scrutiny showing strong links to THC and Vitamin E acetate. Literature since then has described many patterns of injury including hypersensitivity pneumonitis, lipoid pneumonia, and giant cell interstitial pneumonia, among others. We describe a series of 3 cases seen at our institution of young adults aged 19-36 with history of vaping use. CT imaging initially revealed bilateral ground glass opacities in all 3 cases with multiple patterns of injury including organizing pneumonia and acute eosinophilic pneumonia. Lung biopsy of 1 patient on representation revealed intralveolar fibroblastic proliferation and reactive type II pneumocytes consistent with diffuse alveolar damage. Patients showed improvement after treatment with steroids. We report these cases of EVALI to highlight the role of radiologists in diagnosis, which requires a high degree of clinical suspicion. Recognizing and raising the possibility on imaging is paramount to cessation, a key step in treatment.
818	Nishtha GuptaIn / Formation Science	Jina Huh-Yoo, PhD	Nishtha Gupta, Jina Huh-Yoo, George Demiris	**Studying the Role of Laugh in Patient-Provider Interaction:** Therapy has previously been strongly recommended for caregivers of those with chronic conditions. The therapeutic alliance describes the bond experienced by a patient and a therapist, one that has previously been proven to be increased or enhanced using humor during a session. 282 unique transcripts were received from a study regarding the use of problem-solving therapy for caregivers of older adults or chronic conditions. Of those, 167 had the transcription of the action “laugh. ” Through an analysis of 355 laugh events among 17 transcripts nested within 15 different clients with 2 different providers, we were able to identify that among all laugh types within each session, most laughs occurred in response to a Cheerful Stimulus (68%), one with positive emotional context, either stated by the patient or the therapist, directly following a Laugh Target (61. 17%). Several of these visits were sorted by visit 1, 2, 3 or exit and by mode of visit- video, phone, or in-person. Among the subset of visit types, the words “laugh” and “chuckle” were counted via frequency count for all 167 transcripts which had the “laugh” action transcribed and the unpaired student’s T-test was once again run between unique combinations of all visit types and visit modes. Conducting this analysis led to the findings that exit visits, which were always conducted on the phone, contained the least number of laughs and were the shortest among sessions. In addition, all phone visits also contained the least number of laughs. However, the number of laughs between in-person and video visits did not appear to be significantly different. This study provides promising future results for the development of a complementary laugh- enabled chatbot, providing us further with knowledge of when it may be most appropriate to respond with “laugh” during a session and when it may not be appropriate, further aiding future therapy guidelines.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
819	Tara Lamb / Obstetrics and Gynecology	Xuezhi Jiang, MD/ PhD	Xuezhi Jiang, Jonathan Rodger	**Efficacy and Safety comparison of an innovative two-hand vs. one-hand technique for fetal head extraction during low transverse cesarean section: A randomized control trial:** Objective: The one-handed technique has been the standard maneuver used for delivering fetal head during a cesarean section. The use of the two-handed method, which is an innovative approach to manual head extraction, with surgeon's both hands formed as a pair of forceps, is now hypothesized to be comparable to the one-handed method in the efficacy and safety of the maneuver. The objective of the study is to compare the effectiveness and safety of two-handed technique with one-handed approach. Method: The research design of the study was a randomized control study that included two study groups (one-handed vs two-handed technique) and measured the duration (seconds) from hand insertion into uterine incision to fetal head delivery (U-D interval). Data was analyzed using two tailed Nonparametric Mann Whitney U test and multiple linear regression model. Results: A total of 11 pregnant women who were scheduled for repeat cesarean section were recruited for the study, with 8 in one-handed and 3 in two-handed group. Mean (SD) for duration of hand insertion into uterine incision-hand delivery was significantly longer for one-handed extraction than two-handed extraction (14. 94[10. 77] vs. 3. 33[0. 56] seconds, p<. 014). No significant adverse event was seen in either group. Conclusion: Study recruitment was significantly impacted by COVID-19 pandemic and study is still ongoing. The sample size is too small to allow investigators to draw a concrete conclusion. The preliminary results suggest that two-handed technique was significantly quicker than one-handed technique for U-D interval, with a comparable safety profiles to one-handed approach.
820	Anna Roble / College of Medicine	Xuezhi Jiang, MD	Tara Lamb, Xuezhi Jiang, Anna Bossert, K. Nathan Parthasarathy, Kristine Leaman, Shahab Minassian, Peter Schnatz, Mark Woodland	**Clinical Guideline Implementation May Allow for Hormone Level Stabilization and Impact Side Effect Incidence in Postmenopausal Women on Pellet Hormone Therapy:** Introduction: Although promoted as a safe alternative to FDA-approved hormone therapy, custom-compounded pellet hormone therapy has been associated with significantly higher side effect incidence and supraphysiological peak hormone levels than its FDA-approved counterparts. This study evaluates the impact of departmental guidelines standardizing laboratory follow-up recommendations on serum hormone levels and side effect incidence in postmenopausal women on pellet hormone therapy. Methods: Reading Hospital's Electronic Medical Record was used to collect patient chart information including demographics, course of treatment, serum hormone levels, and side effects in postmenopausal patients on pellet hormone therapy. Two data groups from before and after guideline implementation were compared using paired t-test and McNemar tests. Results: 106 postmenopausal women on pellet hormone therapy before and after guideline implementation were identified. The After group demonstrated significantly lower serum level fluctuation in estradiol (81. 5[65. 6] vs. 200. 8[126. 8] pg/mL, p<. 0001), total testosterone (73. 0[59. 2] vs. 105. 6[70. 0] ng/dL, p=. 001), and free testosterone (6. 7[6. 9] vs. 11. 3[20. 7] pg/mL, p=. 027) than the Before. While the incidence (58 [54. 7%] vs. 77[72. 6%], p=0. 011) and total number (0. 9[1. 0] vs. 1. 8[1. 6], p<. 0001) of side effects were significantly lower in the After group, the total number of side effects per year was significantly higher in the After than the Before (0. 6[0. 6] vs. 0. 4[0. 4], p=0. 015]). Conclusion: Standardized clinical guidelines may have led to stabilization in serum estradiol and testosterone levels. While incidence and total number of side effects were reduced after guideline implementation, total number of side effects per year remained significantly higher after implementation.
821	Haizea Alemany / Division of Pre-medical and Pre-Health Programs	Monika Jost, PhD	Jose Collazo, Louis Fedele, Lauren Haack, Cameron Holmes	**Cost-Effective Approach to Pediatric 3D-Printed Elbow-Powered Arm Prosthetic:** As an independent chapter of e-NABLE, we are part of a global community of volunteers using 3D-printing to provide cost-effective prosthetic devices to individuals with upper limb amputations and/or reductions. Our goal for this pediatric client was to create a device that allowed him to effortlessly and independently grip and release objects. We printed the Alfie v2. 0 model, the design for which was obtained from UnLimbited, another e-NABLE chapter. Upon initial testing, the client successfully grasped and released objects, but reported discomfort and some pinching. We adjusted various aspects, such as the molding angles and amount of padding, in order to achieve maximum comfort. The device gave our client the ability to grasp objects with increased the dexterity of his left arm, giving him greater independence with handling medium-sized objects. In light of the COVID-19 pandemic, we are unable to meet with prospective clients in person, so we are exploring new ways to serve our communities. While we continue building relationships with clients organizations in the Philadelphia area, we are also planning to supply each current member with a small 3D-printer and filament in order to print and donate items needed during this pandemic, such as hands-free door adapters, face shield head bands, face mask "ear savers", and more. We are excited for this opportunity to maximize our ability to continue serving our communities even outside of Philadelphia.
822	Emma Johnson / Medicine	Anastasios Kapetanos, MD	Anastasios Kapetanos	**Bacterial Endogenous Endophthalmitis: A Cautionary Tale:** Endophthalmitis is inflammation of the intraocular fluids, commonly due to infection, that can lead to irreversible vision loss, especially when not diagnosed early. Endophthalmitis can be caused from exogenous sources, usually as the result of trauma, or from an endogenous source, most commonly a bloodstream infection. Endophthalmitis occurs from endogenous sources in only 2-8% of cases. While ophthalmologic screening is strongly recommended by the IDSA for candidemia, a practice that has been called into question, routine screening in bacteremia is not performed, and thus requires a high index of suspicion. We report a case of a 47-year-old man who presented with pain and redness in his right hand. A CT revealed suppurative cellulitis without tenosynovitis, and he underwent simple incision and drainage. Concurrently, his blood cultures turned positive for MRSA, and IV vancomycin was initiated. On the fourth day of hospitalization, he awoke with complete vision loss in his left eye. At that point, he was transferred to our facility and underwent a comprehensive ophthalmologic evaluation. As the retina could not be visualized, he was given an empiric intravitreal injection of vancomycin following an anterior chamber tap. Despite this, he did not regain vision in the weeks that followed, and his visual prognosis remains poor. Given the potential for rare, but life-altering vision loss from bacterial endogenous endophthalmitis, visual acuity testing and funduscopic examination can be considered as part of the intake examination for patients with bacteremia, as overt symptoms may only occur once the illness has progressed irreversibly.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
823	Santiago Rengifo / Otolaryngology /Head and Neck Surgery	Caroline Kolb, MS	Caroline Kolb	**Management of Congenital Bilateral Cholesteatomas with Endoscopic Ear Surgery:** A Case Study: Transcanal endoscopic ear surgery is emerging as an effective approach for the treatment of cholesteatomas. In the present case, a two-year-old female was diagnosed with aggressive bilateral congenital cholesteatomas with extension deep into the euatachian tubes. She underwent bilateral transcanal endoscopic removal of the cholesteatomas. There were no complications and she appeared to have complete extirpation of the disease at the end of the procedure. Transcanal endoscopic ear surgery can be an acceptable alternative to the conventional microscopic surgical approach with excellent visualization of the deep Eustachian tube orifice. Further assessment of cases is required to demonstrate the benefits of this approach.
824	Tamim Hossain / Medicine	Mahesh Krishnamur-thy, MD	Arunmozhi Palanivelu, Aniqa Malik	**A Unique Case of Cardiac Sarcoidosis:** Sarcoidosis is a granulomatous disease of unknown etiology. Of symptomatic cases, respiratory findings dominate but can be accompanied by findings in other systems. In symptomatic cardiac disease, the primary finding is arrhythmia. We present a unique case of probable cardiac sarcoidosis presenting similarly to acute coronary syndrome (ACS) in a 40 year old female with a significant PMH of hypertension, recently diagnosed sarcoidosis, asthma and CHF. The patient presented to the emergency department with sudden-onset central chest heaviness. The pain was 10/10 in intensity, dull, non-radiating, but improved with nitroglycerin and 2L of oxygen. Initial vitals, lab studies, and imaging were concerning for ACS vs pneumonia and ruled out pulmonary embolism. Further workup and history revealed that the patient had a full workup for ACS including cardiac catheterization within the past week at another institution; workup there was negative for coronary atherosclerosis significant enough to cause her symptoms. Additionally, it was found that the patient's ambulatory Pulmonologist had recently begun to taper down her steroid treatment for her sarcoidosis. After negative workup for other etiologies, the patient was discharged with an increased dose of steroids and a presumed diagnosis of cardiac sarcoidosis. This case describes the difficulty pathway to delineate cardiac sarcoidosis from other common etiologies of chest pain, particularly in patients with multiple comorbidities. The importance of proper preventative management and investigation of sarcoidosis in order to prevent unnecessary hospitalization and invasive workup is also explored.
825	Trevor Luck / AGH Neurosurgery	Dorian Kusyk, MD	Dorian Kusyk, Donald Whiting	**Headache as a symptom of DBS battery failure:** Deep Brain Stimulation (DBS) is an effective treatment for a variety of neurological indications, namely movement disorders such as Parkinson's Disease, Essential Tremor, and Dystonia. DBS has become a preferred surgical treatment, and is associated with fewer adverse events compared to traditional resective surgery or medical management on its own. While newer models of the Implantable Pulse Generator (IPG) devices used in DBS have been quickly replacing their predecessors with updated and increasingly sophisticated hardware and software, there have been recent concerns that these new devices, in the name of optimizing therapeutic success, may have significantly less battery life that actually contributes to an earlier recurrence of clinical symptoms. This of course means more surgical procedures, risk, and cost for the patient. As such, it is critically important to better characterize the presenting symptomology of battery failure in DBS patients to continue to evaluate device safety and efficacy, and better anticipate the need for battery change. Here, we present a case series of two DBS patients who presented with headache, which to our knowledge is a significantly underreported symptom of battery failure.
826	Nadia Aslam / Medicine	Micheal Lashner, MD	Muhammad Usman Ali, Rizwan Naseer, Maitreyee Rai	**A Nerve-Racking Tale: Broken Heart Syndrome and Cardiogenic Shock:** Takotsubo cardiomyopathy (TTS) is acute and mostly reversible stress cardiomyopathy. It is defined as left ventricular systolic dysfunction without angiographic evidence of obstructive coronary disease or acute plaque rupture and typically mimics an acute coronary syndrome. The prevalence reaches approximately 2% in patients with acute coronary syndrome undergoing cardiac catheterization. Case: A 58-year-old female with a past medical history of depression, anxiety and recent history of emotional stress presented with a new onset of severe chest pain. On presentation, Blood pressure was 85/45 mmHg and heart rate was 90 beats/min. Initial EKG showed ST segment depression. Troponin came back 3. 78ng/ml. The patient was admitted to the intensive care unit for working diagnosis of non-ST elevation myocardial infarction with cardiogenic shock. Patient was started on intravenous heparin and norepinephrine and subsequently dobutamine and milrinone drips were also initiated. Echocardiogram showed an ejection fraction of 25-30% with severe global wall motion abnormality. Cardiac catheterization was done that showed non-obstructive coronary disease. Patient was managed with supportive care and pressers were weaned off as tolerated in three days. Discussion: Takotsubo Cardiomyopathy is known to result in various life threatening complications that include cardiogenic shock, cardiac thrombus, arrhythmia and sudden death. A ST segment elevation is common finding (43%) on EKG but our patient has ST segment depression that is a less common finding (7%) in stress cardiomyopathy. TTS is a diagnosis of exclusion. Long term prognosis is excellent with complete restoration of left ventricular ejection fraction within 3-6 months in most cases. The diagnosis of takotsubo cardiomyopathy should be suspected in adults who present with acute coronary syndrome in the setting of acute stress.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
827	Muhammad Moiz Tahir / Medicine	Douglas Lieberman, MD	Maitreyee Rai, Douglas Lieberman	**Acute Esophageal Necrosis: A Case Report:** Introduction: Black esophagus, or acute necrotizing esophagitis, is a rare syndrome of unclear etiology with an incidence of 0. 01-0. 28%. It is defined as broad circumferential black pigmentation of the esophagus. Case: 45-year-old female with past medical history of diabetes and pancreatitis, presented with complaint of severe epigastric pain of one day duration, associated with nausea and vomiting. On physical exam, patient was febrile (100. 4F). She had epigastric tenderness with guarding. Lab studies were unremarkable, including normal liver enzymes and lipase. Ultrasound showed no significant biliary, gall bladder or hepatic findings. Computerized topography of abdomen was unremarkable. Upper gastrointestinal endoscopy showed diffuse black ulcerations consistent with black esophagus. Esophageal biopsy showed full thickness mucosal necrosis. Duodenal biopsy showed superficial mucosal appearance of ischemic enteritis. No viral cytopathic changes were seen. Helicobacter pylori testing and fungal stain were negative. Gastrin levels were elevated 121(normal<100)pg/mL. Positron emission tomography scan was negative for gastrinoma. Patient was managed with proton pump inhibitor. Symptoms resolved and follow-up endoscopy after 3 months showed a normal esophagus. DiscussionIschemia is the main contributory factor in pathogenesis, other possible cause include ingestion of corrosive agents. Our patient has a history of diabetes, a risk factor for ischemic insult. Main complications are perforation, superinfection of necrotic area, and stricture formation. It carries a poor prognosis with a mortality of 13-35%. Therapy is directed towards treating the predisposing condition, and intravenous proton-pump inhibitors or histamine receptor blocker.
828	Lacee Collins / Orthopedic Surgery	Mary Mulcahey, MD	Sione Ofa, Cadence Miskimin, Mary Mulcahey	**Cognitive Deficits Following Concussion: A Systematic Review:** Purpose: The purpose of this study was to examine the cognitive deficits following concussion/traumatic brain injury in the acute, intermediate, and long-term time period after initial head trauma. Methods: This study used search terms such as: “mild/moderate closed head injury,” “traumatic brain injury,” and “cognitive impairments. ” Inclusion criteria included explicit time points following injury, a focus on cognitive deficits, and medically diagnosed injured. Exclusion criteria included studies measuring non-cognitive deficits and those based solely on subjective measures. Three separate databases were then explored: Pubmed, Web of Science, and PsychInfo. Twenty-four articles were chosen and data and information extraction was completed based on the studies’ statistical analyses regarding the cognitive deficits following injury. Results: Over 3,000 participants were involved in the studies combined. 67% studies were separated into control groups versus concussed groups or compared baseline scores of the same athlete, while 4% separated the symptomatic versus asymptomatic groups, 12,5% focused on complicated versus uncomplicated participants, and another 16. 7% focused on injury severity. Over 95% of the chosen studies found cognitive deficits to be apparent at some time point following a concussion. Conclusions: This study support previous research on TBI by showing that cognitive deficits were found following traumatic brain injuries, The main finding of this systematic review was that in individuals who sustained a TBI, cognitive deficits were seen across all the domains of cognitive functioning in the acute, intermediate, and long-term period following initial TBI. Future studies could include the separation between ages in those with TBI to determine if age is a confounding variable.
829	Anas Qatanani / Medicine	Aasim Padela, MD		**Conceptions of Human Dignity and their Relevance for Islamic Ethics of End-of- Life Healthcare:** The ever-increasing technological advances of modern biomedicine have increased physicians’ capacity to carry out a wide array of clinical interventions near the end-of-life. The new-found ability to intervene upon and control physiology has resulted in “new” states of life that blur the once clear lines between the living and the dead. As a result, societies and individuals grapple with questions about the moral worth of physiological states that have minimal or no cognition. In bioethical debates surrounding end-of-life healthcare delivery, the concept of human dignity is invoked by all sides: those seeking to end the posited suffering of individuals in physiologically and neurologically compromised states by withdrawing life support, those who desire to control the time and manner of their passing and request the medical professional to assist, and those who believe all human life, irrespective of the state of that life, has inestimable worth and merits preservation by any means. Some scholars decry the concept of dignity as a worthless one. Other scholars search for a universal meaning of human dignity in hopes of clarifying its true relevance for bioethical analyses. This paper seeks to provide greater theoretical clarity to the construct of human dignity within the context of the Sunni Islamic tradition as it relates to the end-of-life care ethics. The Islamic concepts of “karamah” and “?urmah” serve as analogues to the term “human dignity” as used within western bioethical discourse. This paper demonstrates the Qur’an and Sunnah evidence for each of the three categorical usages of dignity (intrinsic, attributed, and inflorescent) as relevant to bioethical discourse. Theory is then applied to ethics by describing how the Islamic theological concepts of human dignity and inviolability provide a moral vision for end-of-life healthcare by furnishing the ethical grounds for non-intervention at the end-of-life and underscoring the need for spiritual care.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
830	Shannara Bauer / Surgery	Christopher Pennell, MD	Aubrey DiBello	**To Pee or Not to Pee: Is Urinalysis Useful in the Evaluation of Pediatric Blunt Abdominal Trauma?:** Urinalysis is often performed during pediatric trauma evaluation, but its ability to predict clinically important intra-abdominal injuries (ciIAI) is not well studied. We hypothesize that microscopic hematuria as criterion for undergoing additional workup increases the rate of unnecessary imaging without identifying additional ciIAIs. Children <18 years presenting as level 1 or 2 trauma activations after blunt thoracoabdominal trauma from 2016-2019 were reviewed. Demographics, physical examination, serum chemistries (AST, ALT, lipase), urinalysis, and ciIAIs (injuries causing death, requiring therapeutic surgical or angiographic intervention, blood transfusion, or hospitalization =2 nights) were extracted. Using univariate analysis, predictive values of microscopic hematuria in conjunction with physical exam and serum chemistries were evaluated. 240 children were included, of which 165 (68. 8%) had screening urinalysis, and of which 9 (3. 8%) had ciIAIs. The presence of abnormal physical exam or serum chemistry test had a sensitivity of 88. 9% and a negative predictive value (NPV) of 99. 3% for ciIAI. In those children for whom urinalysis was performed, adding the presence of microscopic hematuria increased the number of children screening positive for potential injury by 28. 6% but did not increase sensitivity or NPV. This increased the false positive rate by 12. 1% without identifying additional ciIAIs. Microscopic hematuria provides no significant predictive power beyond the physical exam and serum chemistry studies routinely performed in a trauma evaluation. Isolated microscopic hematuria without abnormal physical or serum chemistry findings does not predict ciIAIs, and its place in pediatric trauma screening pathways should be reconsidered.
831	Ryan Meehan / College of Medicine	Juan Poggio, MD	Bailey Balouch, Syed Kaleem	**A Meta-Analysis Investigating the Viability of Umbilical Placement of a Temporary Diverting Ileostomy as an Alternative to Traditional Placement:** Background: To compare surgical outcome and patient-centered measures following temporary ileostomy with stoma placement in the umbilical region versus traditional placement in the region of the right iliac fossa. Methods: Using the PRISMA model for database searches, relevant studies were identified and reviewed in a systematic manner. Operative data such as operative time, blood loss, duration of hospital stay, and time until ileostomy reversal was compared between patients who underwent umbilical defunctioning ileostomy (UDI) and conventional defunctioning ileostomy (CDI). Incidence of postoperative complications such as infection and incisional hernia were evaluated by Fisher's exact test and calculation of odds ratio. Results: Six retrospective studies were included with a total of 375 patients who underwent either CDI or UDI. The UDI procedure had significantly fewer instances of complications such as surgical site infection (SSI), incisional hernia, and other complications. Laparoscopic UDI was also performed significantly more frequently than laparoscopic CDI. Other parameters of the procedures such as operative time, time until reversal of the stoma, and length of hospital stay tended to slightly favor UDI over CDI. Conclusion: UDI serves as a viable alternative to conventional placement with fewer complications than CDI and similar outcomes of operative parameters. Randomized control studies need to be performed to determine superiority of one procedure over other, however the quality of life benefits provided by UDI should be discussed and considered when performing a temporary diverting ileostomy.
832	Milap Desai / Medicine	Rashmika Potdar, MD	Milap Desai, Meghana Parsi	**A Rare Case of Spontaneous Tumor Lysis in Newly Diagnosed Chronic Lymphocytic Leukemia Unmasked by Acute Renal Failure:** A Needle In The Haystack: Tumor lysis syndrome (TLS) is the phenomenon of metabolic derangements that typically follows the initiation of cytotoxic chemotherapy. Metabolic disturbances include hyperphosphatemia, hyperkalemia, hyperuricemia and hypocalcemia. Hematological malignancies with cell high-turnover are associated with spontaneous TLS (STLS), meaning cell lysis in the absence of chemotherapy. STLS is extremely rare in chronic lymphocytic leukemia (CLL). This has been documented only once in the medical literature, making this extraordinarily uncommon. A 68-year-old male with a history of benign prostatic hyperplasia (BPH) presented with a 2-week history of abdominal pain and no urine output for 3 days, despite adequate fluid intake. Labs yielded the following: WBC 120. 8x103 (normal 4. 8-10. 8x103/uL), 73% lymphocytes (normal 16. 0-43. 5%) with smudge cells. The potassium was 6. 9 mmol/L (normal 3. 5-5. 1), phosphorus 12. 2 mg/dl (normal 2. 7-4. 5), uric acid 19. 3 mg/dl (normal 3. 4-7. 0), BUN 202 mg/dl (normal 10-20), and creatinine 14 mg/dl (normal 0. 7-1. 3). EKG revealed peaked T- waves. CT abdomen and pelvis showed mild perihepatic ascites and splenomegaly. Ultrasound of retroperitoneum and kidneys was unremarkable for hydronephrosis. These extreme laboratory values were concerning for STLS. Flow cytometry confirmed the presence of an abnormal B-Cell population consistent with B-cell chronic lymphocytic leukemia, with the following markers: CD19+, CD20+, CD23+, CD5+, CD10-. He was aggressively fluid resuscitated and administered allopurinol and rasburicase.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
833	Sirivan Seng / Surgery	Asanthi Ratnasekera, MD	Katherine Valles, Jintong Hou, Sandra Durgin, Jennifer Collins, Danielle Gritenas	**Highlighting The Burden Of Firearm Injuries: A Ten-Year Trend Of Gun Violence In Southeastern Pennsylvania:** Firearm injury is a major public health concern in the United States. In 2015 alone, firearms killed over 35,000 people and injured over 200,000. The purpose of the study was to provide a 10-year trend of firearm injuries of Chester, Delaware and Gloucester counties, which encompasses a city with the 10th highest homicide rate in the country. A retrospective review of patients with firearm injuries from 2009 to 2019 at a Level 2 Trauma Center was performed. All patients who met inclusion criteria for the Pennsylvania Trauma Outcome Study registry were included. Patients with firearm injuries were compared in mild to moderate (ISS<16) and severe injury (ISS=16) cohorts based on injury severity score (ISS). 1028 patients met inclusion criteria. The 10-year in-hospital mortality was 8. 2%, decreasing from 14. 3% in 2009 to 7. 5% in 2019 (p=0. 06). The most common demographic was African-American (84. 3%) and male (90. 2%), with a median age of 24 (20, 31). Overall, median ISS was 9 (4, 17). Patients with ISS=16 had a higher rate of massive transfusion protocol activation (MTP) (p<0. 0001) and mortality (p<0. 0001) compared to those with ISS<16. Of the 331 (32. 2%) patients with ISS=16, 190 survived past 24 hours. Within the cohort with ISS=16 that survived past 24 hours, MTP was activated in 48 cases (25. 3%) and 143 (75. 3%) went immediately to the operating room. Upon their discharge, 25. 8% went to long term acute care, rehabilitation or skilled nursing facilities, while mortality was 6. 3%. The study highlights the burden of injuries related to gun violence. Results indicate gun violence disproportionally affects young, African-American men. While mortality has shown a downward trend, the number of firearm injuries has increased in the past ten years. Efforts to include hospital-based violence intervention programs should be pursued to decrease firearm-related injuries.
834	Zaheer Faizi / Surgery	Asanthi Ratnasekera, MD	Daniel Kim, Humayun Ammar, Ratnasekera Asanthi	**Fat Embolism Syndrome Masquerading as COVID-19:** Background: In the wake of the novel coronavirus (COVID-19) pandemic and its associated mortality and virulence, a high clinical suspicion must be maintained for all patients presenting with respiratory failure. However, there are well known disease processes which may have a similar presentation. Case Presentation: We present a case of a 25-year-old male who suffered a right tibia fracture after a motor vehicle collision. He had acute hypoxic respiratory failure within twenty-four hours of admission, requiring mechanical ventilation. His condition significantly improved with airway pressure release mode of ventilation and proning. Although his chest CT demonstrated characteristic findings of COVID 19, he subsequently tested negative multiple times. The differential included aspiration pneumonia and fat embolus syndrome from the lower extremity fracture. Conclusions: Fat Embolus syndrome can very closely mimic COVID-19. The rapid onset and improvement of symptoms coupled with serial negative COVID-19 testing may aide in the diagnosis. Keywords: COVID-19, Fat Embolus, ARDS, Polytrauma, Long Bone Fracture, Tibia
835	Matthew Sayegh / Surgery	Asanthi Ratnasekera, MD	Sirivan Seng, Matilda Whitney, Durgan Durgin, Alicia Lozano, Danielle Sienko, Alexandra Hanlon, Niels D Martin	**Limb Salvage After Fasciotomy In Penetrating Vascular Extremity Injuries:** ObjectivesOne of the most devastating and feared complications of penetrating vascular extremity injuries is extremity compartment syndrome. Delayed or inadequate fasciotomy can lead to loss of function, muscle necrosis or limb loss. The objective of this study was to further delineate the association of fasciotomies and their timing in limb salvage after a penetrating vascular extremity injury. MethodsUsing the Pennsylvania Trauma Outcome Study registry, a retrospective review of patients with penetrating arterial and/ or venous extremity injuries from 2013 to 2017 was performed. Outcomes were compared in those with an early or late fasciotomy and those without fasciotomy. ResultsOf the 848 patients with penetrating vascular extremity injuries, 186 (21. 9%) underwent a fasciotomy. Both injury severity scores (p<0. 0001) and abbreviated injury scales (p<0. 0001) were higher for those with a fasciotomy compared to those without. The femoral artery, femoral vein, popliteal artery, popliteal vein and ulnar artery were the most prevalently injured vessels in the fasciotomy cohort (p<0. 0001). Those with a fasciotomy had a higher rate of amputation compared to those without (p<0. 01). All of the patients who had an amputation after fasciotomy underwent a combined open and endovascular procedure and had a higher complication (p=0. 0002) and mortality rate (p=0. 0018) when compared to those without amputation. Additionally, those who had fasciotomy more than 7 hours after injury had a higher rate of amputations (p=0. 029) and complications (p=0. 029) compared to those who had fasciotomy less than 7 hours after injury. ConclusionsPatients who required fasciotomies following penetrating vascular extremity injuries had higher rates of complications, including amputation, especially when performed in a delayed fashion respective to the initial injury. Early fasciotomy should be considered, where appropriate, in penetrating vascular extremity injuries. ?
836	Princess Ogidi / Family, Community and Preventive Medicine	Brian Reed, MD		**Observation of Changes in Food Insecurity with Changes in COVID-19 Positivity Rate:** This study was designed to observe the impact of the increase in the (COVID-19) positivity alongside the number of families who were deemed food insecure. Methods: Patients were tested for SARS-COV-2 (COVID-19) using the two types of tests that are approved through the Emergency Use Authorization which are the Rapid ID NOW Abbott Test along with the standard RT-PCR method through LabCor. For food insecurity, there were two methods of screening with a food security survey given by medical assistants. **Results: **The overall average positivity rate for SARS-COV-2 (COVID-19) at the El centro de corazon clinic was observed to be steady at 24% from April to June 2020. This was observed alongside a 1400% increase in the number of patients who were coded for food insecurity. Discussion: The impact that SARS-COV-2 has is widespread and food insecurity is only one of the social determinants of health that have been exacerbated throughout this pandemic. Food insecurity falls under the Economic branch of the SDOH. The core issue that we wanted to observe was the impact of the COVID-19 pandemic on social determinants of health.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
837	Adrian John Jones / Medicine	Corinne Rhodes, MD, MPH	Brian Coburn, Corinne Rhodes, Krisda Chaiyachati, Srinath Adusumalli, Damien Leri, Deirdre Sawinski, Lauren Eberly, Nwamaka Eneanya	**Telemedicine Accessibility: A Pilot Study on Patients' Technology Access and Capability:** Due to COVID-19, there has been a large-scale transition from in-person clinic visits to telemedicine. The effects of telemedicine implementation on vulnerable populations remain poorly characterized. The widening gap, termed "digital divide," between those with ready access and ability to use to communications technology and those without hardware, broadband access, and/or ability to use these resources has been further highlighted by the pandemic. Eberly et al. [Circulation (2020)] examined phone versus video telemedicine utilization and found patients with completed telemedicine video visits were less likely to be Black and had a higher median household income. Initial data from our study indicates that clinic and health system goals have led to a significant increase in the proportion of telemedicine visits completed by video from less than 10% before the pandemic started to greater than 80% after. However, there is a lack of research assessing the effect increased use of video visits will have on accessibility and health disparities. This pilot study aims to describe a patient population's perceived technological capability and determine the feasibility of telemedicine visits within a primarily underserved population. Patients seen in an outpatient clinic were distributed a survey which measured internet and technology access, capability, and preference for telemedicine visits. Patients' survey data will be assessed in relation to race, socioeconomic status, and clinic completion rates. We hope our findings can elucidate important patient risk factors and disparities related to technology access to better target interventions to reduce disparities in care.
838	Samuel Brimmer / Orthopedic Surgery	John Rinaldi, MD	John Rinaldi, Mina Tawfik, Harper Padolsky, Daniel Benckart, Mark Sangimino	**Proximal Tibia Physeal Fracture with Popliteal Artery Injury Requiring Bypass Graft and Fasciotomies:** Case-Report and Review of the Literature: A 14-year-old male patient with a proximal tibia epiphyseal fracture sustained with a self-reported "awkward step" as a mechanism of injury experienced a change in neurovascular status 24hrs after initial presentation. A loss of distal pulses in the injured limb during a closed reduction in the operating room required an intra-operative vascular surgery consultation, with subsequent popliteal artery bypass grafting. It was not until video footage of the initial injury event was obtained, that the true severity of the mechanism of injury was fully appreciated by the medical team. Factual vs actual reporting of mechanisms of injury by the patient may affect initial physician concern and management for possible vascular injury in proximal tibia physeal fractures. We present the unique case of a patient with a proximal tibial physeal injury captured on video with a normal initial neurovascular exam, requiring popliteal artery bypass graft immediately after closed reduction in the operating room.
839	Jessica Zavadak / Medicine	Diana Robins, PhD	Andrea Wieckowski, Ramesh Raghupathi, Diana Robins	**Autism Spectrum Disorder and its Relationship to Early Childhood Brain Injury:** Traumatic brain injuries (TBIs) are one of the leading causes of hospitalization for children and adolescents. The first three years of life are a critical period for the neurodevelopment of the brain of children. Studies show that many symptoms of children who suffered TBIs at an early age are similar to those diagnosed with Autism Spectrum Disorder (ASD). This study explores the frequency of brain injury in children with ASD and the relationship between brain injury and ASD symptom severity. Based on similarities in symptoms between ASD and TBI, we expect a higher incidence of brain injury within children diagnosed with ASD children as compared to toddlers without an ASD diagnosis. Data from an extensive health history form completed by caregivers of 1,030 toddlers (12. 30-59. 70 months) were used to categorize children into three different brain injury groups or a no injury group. Following a comprehensive evaluation, children were also categorized into three diagnostic groups: ASD (n=422), other developmental disability (DD; n=373), or nonDD (n= 235). Upon evaluating frequency of injury within each diagnostic group, it was found that the nonDD and ASD groups had no significant difference in incidences of brain injury, X2(1, N=518)=0. 525, p=0. 469. However, within the DD group, there was an increased incidence of brain injury compared to nonDD group, X2(1, N=445)=8. 708, p=0. 003. Furthermore, when comparing Autism Diagnostic Observation Scores, a standard assessment of ASD symptoms, between brain injury (M=7. 52, SD=2. 16) and no injury (M=6. 82, SD=2. 02) within children diagnosed with ASD, brain injury in early childhood was not related to more severe ASD symptoms, t(324)=-1. 76, p=0. 078. When looking at diagnosis percentages within injury groups, brain injury had higher diagnoses of ASD and DD as compared to nonDD, X2(2, N=84)=15. 071, p=0. 001, suggesting that brain injury itself is related to a higher frequency of any developmental delay diagnoses, including ASD.
840	Ashni Nadgauda / Family, Community and Preventive Medicine	Kathryn Ryczak, MD	Aditya Brahmbhatt, Matthew Coates, Ana Nunez	**Survey of the Extent of Sex and Gender Pathophysiology Taught In Preclinical Years of Undergraduate Medical Education:** To train our physicians to be fully equipped to take care of persons of all backgrounds, it is imperative that sex and gender-based medicine is added into medical school curriculums. In 2008, a survey of 1,267 third and fourth year medical students revealed that though students reported feeling moderately prepared to take care of women, their medical education regarding women's health and sex and gender topics was just brief to moderate, rated as 2. 53 on a four point scale (Henrich, Viscoli et al. 2008). In 2012, a 35 question evaluation tool found that less than 20% of medical students felt that topics relating to sex and gender were taught in areas of nephrology, neurology, and orthopedics, (Miller, Flynn et al. 2012). The primary objective of this research study is to assess the current extent to which sex and gender physiology is included in the pre-clinical curriculum of undergraduate medical education in the United States. In this study, a survey tool was created using the Qualtrics electronic platform and distributed to the head professor of pathophysiology at each of the 141 LCME accredited medical schools in the United States. The survey response rate was 14. 89%. Topics such as the epidemiology of the most common cancers affecting each sex and the risk factors for development of osteoporosis between the different sexes seem to be most well developed into preclinical medical school curriculums according to our survey. The topics of dosing of zolpidem between different sexes, differences in smoking cessation between different sexes, and difference in physiologic mechanism of addiction relating to narcotics between different sexes into preclinical curriculum, had the highest rates of reported as no coverage in school curriculums. The results of this survey show us to what extent certain specific topics relating to sex and gender pathophysiology are being taught in medical school preclinical curriculums in the past year.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
841	Lauren Chung / College of Computing and Informatics	Aleksandra Sarcevic, PhD	Angela Mastrianni	**Understanding Barriers to Vital-Sign Task Completion on Digital Checklists:** Technological advancements in the medical field are increasingly replacing paper records, generating unique opportunities to improve patient care. In previous studies, we developed a digital checklist intended to guide physician leaders in patient management and decision-making during trauma resuscitations. This study examines team performance on obtaining, evaluating, and documenting vital signs in pediatric trauma resuscitations. By identifying the barriers that can impede physicians from attaining and documenting vital signs on the digital checklist, we can better design alerts on the checklist for missing vital values. We analyzed checklist logs and videos from 44 resuscitations to understand barriers that could have hindered appropriate documenting of vital signs on the digital checklist. The barriers included, but were not limited to: high noise level in the trauma bay, external distractions to the team leader, and multiple failed attempts at obtaining vitals. Using a 5-minute cutoff based on the results of a prior analysis of checklist use, we divided the resuscitations into 5 groups: all vitals completed within 5 minutes, all vitals missing, all vitals delayed, 1-3 vitals delayed, and 1-3 vitals missing. While certain barriers such as high noise level were seen across all groups, others such as external distractions to leadership were seen only in groups with missing or delayed vitals. We predict that the missing vital alerts may be especially helpful for mitigating barriers such as distractions to leadership. We also discuss how the results from this study will inform the design of future alerts for critical tasks.
842	Nicholas Cha / Information Science	Aleksandra Sarcevic, PhD	Angela Mastrianni, Chenyang Gao	**Optimizing an Automated Speech Recognition Algorithm for Transcription of Trauma-Resuscitation Procedures:** Trauma resuscitation occurs in a dynamic environment that requires efficient and effective teamwork and communication. Standard evaluation protocols have been established to improve efficiency, but errors still persist. These process errors have been associated with adverse patient outcomes, ranging from long-term disability to death. In an effort to identify areas of inefficiency, this project analyzes verbal communication among team members in a trauma resuscitation setting. Audio recordings were collected from a trauma center of an urban pediatric teaching hospital. Recordings were manually transcribed and labeled with the specific activity being performed. The manually created transcripts were then used for training an Automatic Speech Recognition (ASR) algorithm to recognize the performed activity based on speech. While many speech recognition systems exist, the automatic detection is especially difficult in trauma resuscitation given the structure and vocabulary of trauma-related speech, as well as the nature of overlapping speech with multiple, simultaneously performed activities. We therefore developed a scoring system based on word accuracy to evaluate the performance of the ASR algorithm over time. Recordings were also assessed for their usability in training the ASR algorithm based on the quality of the audio. The long-term goal is to have the ASR algorithm identify aspects in speech that cause delay, which can have clinical consequences. This knowledge can then be used for designing a decision-support system that can alert teams of errors and process deviations to improve patient outcomes.
843	Jane Tong / Otolaryngology /Head and Neck Surgery	Robert Sataloff, MD	Luke Pasick, Daniel Benito, Robert Sataloff	**Adverse Events Associated with Laser Use in the Upper Airway:** Objective: Surgical lasers are used extensively in head and neck surgery. Laser use in the upper airway offers many treatment advantages, but also presents risks to patients and operators that have not been reported comprehensively. This study aims to summarize device-related adverse events, patient complications, and subsequent interventions related to laser use in the upper airway. Methods: The U. S. Food and Drug Administration's Manufacturer and User Facility Device Experience (MAUDE) database was queried for all reports of surgical laser adverse events from January 2010 to March 2020. Data were extracted from reports pertaining to laser use in the upper airway. Results: Sixty-two reports involving laser use in the upper airway were identified, from which 95 adverse events were extracted. Of these adverse events, 40 (42. 1%) were patient-related, 53 (55. 8%) were device-related, and 2 (2. 1%) were operator-related. Dislodgement of laser fiber in the airway (23 [57. 5%]), burn (8 [20%]), and scar (5 [12. 5%]) were the most common patient-related adverse events. Fiber break (26 [49. 1%]) and flare (12 [22. 6%]) were the most common device-related adverse events. Two incidents of eye exposure to the laser through unfiltered microscope lenses were the only operator-related adverse events reported. Conclusion: Surgical lasers have demonstrated great utility in head and neck surgery, but they also are associated with risks. This study emphasizes the shortcomings in current reporting of adverse events associated with laser surgery in the airway. Multi-institutional research is needed to better understand adverse events related to surgical laser use and to allow accurate estimation of their prevalence.
844	Bailey Balouch / Otolaryngology /Head and Neck Surgery	Robert Sataloff, MD, DMA, FACS	Heather Yeakel, Swetha Vontela, Ghiath Alnouri	**The relationship between chronic cough and laryngopharyngeal reflux:** Chronic cough is multifactorial in origin, may affect quality of life adversely, and often poses a diagnostic challenge for physicians. Laryngopharyngeal reflux (LPR) is one common contributing factor for chronic cough, but the mechanism by which reflux causes cough remains unclear. Objective: The purpose of our study was to investigate the relationship between chronic cough and LPR using the objective results of 24-hour pH impedance studies. Methods: We conducted a retrospective chart review of all patients who presented to the voice center of the senior author (RTS) with a chief complaint of chronic cough and no previous diagnosis of reflux. Results: We identified 28 patients who presented with a chief complaint of chronic cough and who had not been diagnosed with or treated for reflux previously. 23 had additional risk factors for chronic cough (asthma, chronic sinusitis and bronchial schwannoma). All 28 had findings consistent with LPR upon exam. Treatment with reflux medications and lifestyle modification decreased the reflux finding score significantly from 11. 39 to 9. 21 (p = 0. 005). 60. 7% of patients reported subjective improvement in cough symptoms. The cough had improved in 50. 0% and had resolved completely in 10. 7%. Conclusions: Our findings suggest that LPR may be a prevalent contributing or etiologic factor for chronic cough. The expected improvement after initiating reflux treatment is 60% at 3 months. Cough resolved completely in 10% of patients at 4 months. Non-responders may have other contributing causes of cough, including esophageal dysmotility, mycoplasma, pertussis, and others. Further studies are needed to confirm or refute these findings.

#	Name/ Program	Mentor	Co-Authors	Poster Title & Abstract
846	Sruthi Samala / Medicine	Sana Siddique, MD		**Capillary hemangioma: A rare cause of Cholangitis:** Cholangitis is an infection of the biliary tree resulting from biliary obstruction. Choledocholithiasis and malignant biliary strictures are considered to be the most frequent causes of biliary obstruction. Recent findings suggest that malignant obstruction due to presence of tumor in the gallbladder, bile duct, ampulla, duodenum, or pancreas is becoming the most common cause of cholangitis. Here, we present a novel case of an elderly patient who developed cholangitis secondary to a capillary hemangioma at the ampulla of vater. A 70-year-old male with past history of prostate cancer presented to the emergency department with acute right upper quadrant abdominal pain associated with nausea and subjective fevers. He was septic with HR 105 and WBC 26 along with elevated liver enzymes AST 560, ALT 576, ALP 102, and TBIL 3. 5. He was treated with fluids, antibiotics and ultimately underwent ERCP with sphincterotomy given sepsis, elevated ALP, TBIL and imaging showing distended gallbladder, intrahepatic and extrahepatic biliary ductal dilation. Cholangiogram demonstrated ductal dilation but no filling defects suggestive of stones. Balloon sweeps were performed and a small intraductal polypoid lesion was swept out of the distal duct protruding out of the ampulla and was resected endoscopically. Histopathological analysis of this lesion was suggestive of capillary hemangioma. The patient's symptoms were relieved after resection of the lesion and the patient continued to remain stable with stable hemodynamics and down-trending labs. Previously, few reports illustrate the clinical occurrence of unusual lesions at the ampulla of vater causing biliary obstruction. Our case illustrates a rare cause of biliary obstruction and cholangitis due to an intraductal hemangioma. It demonstrates the importance of further evaluation and intervention with endoscopic ultrasound and/or ERCP to rule out tumors and other lesions of the biliary tree when non-invasive testing is unrevealing.
847	Shu Zhao / Emergency Medicine	Adam Sigal, MD		**Impact of Expedited Referral to Treatment on Emergency Department Utilization / Recidivism Amongst Patients with Opiate, Benzodiazepine and Alcohol Addiction:** Substance Use Disorder (SUD) affects millions of Americans and contributes heavily to the burden of disease in the nation. In 2018, an estimated 164. 8 million people aged 12 or older in the United States used substances (tobacco, alcohol, or illicit drugs) in the past month. [1] Patients with SUD frequently seek medical care from the Emergency Department (ED) and for some, this may be their only contact with the healthcare system. [2] Therefore, EDs have an opportunity to intervene and link at risk patients with treatment options. In 2015, the Department of Drug and Alcohol Programs created the "Warm Handoff" Program for EDs to target patients with SUD. [3] This project aims to measure the impact of the Warm Handoff Program for patients identified with SUD on Tower Health's ED recidivism and utilization, short-term morbidity and mortality. Substances include heroin and other opioids, benzodiazepines, cocaine, methamphetamines, K2, THC, and alcohol. This project also aims to measure patient compliance with the subsequent steps of the program. For this descriptive-outcomes study, we used the REDCap web application to collect and record data from patient charts in EPIC, the electronic medical record service used by Tower Health. Interim analysis of 2019 data showed that there was an association between age and gender in the patients who accepted the program. However, there was not an association between patients who utilized the program and subsequent follow-up visits related to substance abuse issues.
848	Kathleen Healey / Medicine	Chen Song, MD		**Methamphetamine Induced Takotsubo Syndrome:** Takotsubo cardiomyopathy (TCM), also known as Broken Heart Syndrome, is characterized by transient hypokinesis of the left ventricle as a result of physical or emotional stress. TCM can present similarly to acute coronary syndrome, but cardiac catheterization reveals normal coronary artery blood flow without obstruction. Despite extensive research, causes and pathogenesis of TCM remain incompletely understood. This report describes a rare case of methamphetamine associated cardiomyopathy (MAC) in a 24-year-old woman who presented with chief complaint of chest pain secondary to methamphetamine overdose. Methamphetamine is a highly addictive central nervous system stimulant and is now the second most abused substance behind cannabis. It has cardiovascular effects such as vasospasm, arrhythmia, aortic dissection and sudden cardiac death; the exact mechanism is not well understood, but is thought to be related to methamphetamine mediated adrenergic stimulation. Methamphetamine acts on both the central and peripheral nervous system by releasing and blocking the reuptake of serotonin, dopamine, epinephrine, norepinephrine. This catecholamine surge results in catecholamine toxicity, adrenoceptor-mediated damage, coronary vasoconstriction and vasospasm, and increased cardiac workload. These aforementioned mechanisms contribute to myocardial damage, which manifests functionally as transient apical left ventricular ballooning. Cases of methamphetamine associated cardiomyopathy (MAC) are not well documented especially in patients with no prior cardiac abnormalities. A stronger recognition and understanding methamphetamine associated cardiomyopathy (MAC) may greatly improve patient outcomes. Early diagnosis of MAC can hasten further deterioration by evidence-based medical therapy as illustrated by this case.

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849	Conrad Stoy / Medicine	Jacob Tulipan, MD	Tyler Kreitz, Pedro Beredjiklian, Jacob Tulipan	**Post-Operative Analysis of Double Crush Versus Single Peripheral Nerve Decompression:** Introduction: Double crush syndrome patients present with C6-7 radiculopathy and median nerve compression in the carpal tunnel(1-2) report greater nerve irritability and weakness post-decompression than those with peripheral nerve compressions alone(3). We hypothesize that patient-reported outcome is inferior following surgical release at both cervical spine and wrist when compared with patients who required only a single site of nerve decompression. Methods: Patients who underwent anterior cervical decompression and fusion (ACDF) for C6-7 radiculopathy and patients who underwent carpal tunnel release (CTR) were identified. A total of 477 patients were analyzed, 157 having both CTR and ACDF, 203 having only CTR, and 117 having ACDF. Postoperative outcome measures including Disability of the Arm, Shoulder, and Hand (QuickDASH), Neck Disability Index (NDI), and visual analog scale (VAS) outcome scores were collected at an average of 2 years postoperatively and compared. Results: QuickDASH scores were higher in the DC group versus the CTR group (36 versus 22, p<. 0002) (Figure 1). Postoperative disability in the ACDF group was significantly higher than in the DC group (50 versus 36, P<0. 017). There were no differences between the ACDF and DC group with regard to arm pain intensity, but the CTR group demonstrated significantly greater arm pain intensity than the DC group (5. 7 versus 3. 6 on a 10-point scale, p<. 01). Mean NDI scores did not differ between groups. Discussion: Patients undergoing surgery for ACDF and CTR have greater postoperative disability than those undergoing CTR alone, but less postoperative disability than those undergoing ACDF alone, indicating that cervical radiculopathy may contribute a greater proportion of long-term disability postoperatively. Additionally, CTR alone had greater postoperative arm pain than DC patients, potentially indicating high rates of undiagnosed cervical radiculopathy or other source of arm pain in these patients.
850	Shraddha Damaraju / College of Medicine	Suren Visvanathan, MD	Pushti Khandwala, Suren Visvanathan	**Gradenigo Syndrome: A Rare Case with Optic Nerve Involvement:** Gradenigo Syndrome, a rare complication of otitis media, is a triad of suppurative otitis media, trigeminal nerve pain and abducens nerve palsy. We describe a rare instance with optic nerve involvement. A 50 year old female with type 2 diabetes and recent otitis media treated with Augmentin presented to the Emergency Department with a 3-month history of otalgia, hearing loss, left sided vision loss, diplopia and left-sided facial pain. Exam showed left afferent pupillary defect, left lateral rectus palsy, left tympanic membrane bulge with effusion, and left visual acuity restricted to hand motion detection. Labs showed leukocytosis of 11. 6 x 10^9/L, and MRI showed inflammation extending from the left pterygoid musculature to the left orbital apex. She was diagnosed with Gradenigo syndrome, started on IV antibiotics and high dose steroids, and recovered. Gradenigo syndrome is generally not seen since the advent of antibiotics, but typically affects children via inadequately managed otitis media. In this rare adult case, the inflammation extended to the optic nerve, leading to visual defects in addition to classic symptoms. Careful follow-up in adults with otitis media is critical and may have prevented our patient's presentation. Additionally, Gradenigo syndrome has been described in diabetic patients such as ours, potentially representing a consequence of diabetic immunocompromise and highlighting the importance of proper diabetes management. Finally, Gradenigo syndrome is treatable and physicians should have a low threshold for MRI, IV antibiotics and steroids in a patient with similar presentation.
851	Joseph Park / Medicine	Sara Wallach, MD		**Idiopathic Portal Vein Thrombosis in an Immunocompetent Adult Female:** Portal vein thrombosis (PVT) is characterized by a complete or partial occlusion of the portal vein by a thrombus. The formation of the thrombus is usually attributed to an underlying condition that is causing a hypercoagulable state, such as malignancy or cirrhosis. When these causes are ruled out, a hypercoagulable workup can reveal other underlying prothrombotic etiologies. Still, some cases of PVT occur without any definitive underlying condition, leading to the diagnosis of idiopathic PVT. This occurred in our patient, a 53-year-old female who presented with PVT but had no clear underlying condition that led to her pathology after an extensive medical investigation.
852	Alyssa Calder / Otolaryngology /Head and Neck Surgery	Michael Weingarten, MD	Wilbur Bowne	**Transoral Endoscopic Thyroidectomy Vestibular Approach:** A Novel Approach for Scarless Surgery: Transoral Endoscopic Thyroidectomy Vestibular Approach (TOETVA) is a novel surgical technique that surgeons in Thailand began to investigate as an alternative to an open thyroidectomy (OT) in order to improve cosmesis and avoid scarring of the neck. Since these initial operations, this approach has expanded to the United States and has been performed on a small subset of patients. This poster aims to explain the surgical technique behind TOETVA and compare the safety and efficacy of TOETVA to the current standard of care, OT. A comprehensive review of current literature was performed on PubMed, focusing on studies and review articles that compared TOETVA to OT and were relevant to the primary objectives of this study. Two retrospective studies were included. The first study, completed in Thailand, demonstrated approximately 17% of patients experienced transient hypoparathyroidism, transient recurrent laryngeal nerve palsy, or transient mental nerve injury. However, no patients suffered from permanent complications. The operative time was reportedly longer for the TOETVA (100. 8 min) verses OT (79. 4 min), but the patient pain scale was improved in TOETVA (1. 1) compared to OT (2. 8). Complication rates and mean blood loss were similar between both procedures. The second study, completed at Yale New Haven Hospital, showed similar results—the mean TOETVA procedure time was longer (222 min), but the TOETVA procedure occurred with minimal blood loss, no complications, no conversion to open surgery, and no pathologic compromise. Overall, TOETVA is an experimental procedure that appears to be safe and effective based on two retrospective studies included in this analysis. However, more extensive studies, such as multicenter-based and long-term prospective studies, are needed to understand the outcomes across various patient populations, long-term consequences, and the cost-effectiveness compared to OT.

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853	Diane Armenta / MD Student	Michael Weingarten, MD, MBA	Diane Armenta, Michael Howley	**Pushed to the Edge: How COVID-19 Upended the Weakest Links in U. S. Healthcare:** Background: The U. S. has long been criticized for its high-cost healthcare system with non-superior life expectancies and high chronic disease burden compared to other developed nations. Due to pre-existing U. S. healthcare limitations, the COVID-19 pandemic has had an outsized impact on U. S. populations. Aim: To delineate pre-existing weaknesses in our current healthcare system that have contributed to the broad spread of COVID-19. Methods: Information collected from published expert opinions, government policy, and Centers of Disease Control (CDC) and U. S. Department of Labor statistics. Findings: Lack of a centralized database slowed surveillance, hindered research efforts on experimental treatments, and inhibited efficient allocation of healthcare resources. With 50% of health insurance tied to employment and with skyrocketing unemployment rates, lack of a comprehensive, universal healthcare system has increased the number of uninsured and underinsured individuals limiting access to urgent care. Underlying healthcare disparities between racial/ethnic groups have been potentiated under the strained system. Marginalized groups may be avoiding care all together due to unclear government policies. To limit costs, hospitals are increasingly sourcing from limited global supply chains and implementing just-in-time purchasing strategies. The inability to accommodate a surge in demand has resulted in a lack of emergency preparedness and equipment shortages. Conclusion: The COVID-19 pandemic has accentuated the shortcomings of American healthcare including the lack of a central database for medical information, the lack of comprehensive healthcare coverage, population healthcare inequalities, and inflexibility regarding sourcing supplies.
854	Jessica Pawly / Medicine	Michael Weingarten, MD	Wilbur Bowne, Michael Weingarten	**Hybrid Transvaginal NOTES Cholecystectomy: Next Step in Minimally Invasive Gallbladder Surgery?:** Natural Orifice Transluminal Endoscopic Surgery (NOTES) uses a natural orifice to access the peritoneal cavity and may result in fewer complications, better cosmetic outcomes, decreased pain and reduced costs. Hybrid transvaginal NOTES cholecystectomy (TVC), the most performed NOTES, combines transvaginal access with abdominal trocars. It is important to evaluate TVC prior to widespread clinical adaptation. The aim of this review is to compare the safety and benefits of TVC to current standard of care, laparoscopic cholecystectomy (LC), in randomized control trials (RCTs) to reduce the bias associated with other studies. A comprehensive review of prospectively collected data from RCTs comparing hybrid TVC and LC was conducted on PubMed. The reference lists of articles were searched to identify other studies. All RCTs were included in this analysis and data was extracted to meet the objective. Four RCTs have been published between 2012 to 2017. TVC has similar rates of post-operative complications in all studies, 10% conversion rate to LC in one study and significantly longer operative time in 3 of the studies. One study demonstrated decreased post-operative pain in the first 48 hours and up to POD-10, increased satisfaction with aesthetic results and had improved quality of life with TVC. Patients who underwent TVC had no incidence of dyspareunia at one-year follow-up in a different study. In conclusion, TVC combines decreased invasiveness with a comparable safety profile to laparoscopic surgery in symptomatic cholecystolithiasis. However, RCTs excluded patients with acute cholecystitis, gallbladder malignancy, prior abdominal surgery and obesity. In addition, these surgeries are conducted at academic institutions by skilled surgeons, potentially affecting widespread applicability. There remains a need for larger RCTs to evaluate the safety and potential in diverse clinical settings and populations, as well as the cost-effectiveness and advantages for widespread use.
855	Nimerta Sandhu / Surgery	Michael Weingarten, MD	Michael Weingarten, Carolyn Giordano, Michael Howley, Michael Howley, ShiYuan Chen	**Medical School Emergency Remote Teaching Effectiveness:** OBJECTIVE: The sudden onset of COVID 19 demanded a rapid transformation from in-person education to remote learning at the Drexel College of Medicine. The purpose of this research is to examine the impact of the emergency conversion to remote teaching on students and faculty. METHODS: To evaluate this transition, we conducted an exploratory online survey of the course directors, as well as rising third- and fourth-year students. RESULTS: Most students (59%) and faculty found the conversion to remote learning challenging. Two-thirds of the students had connectivity problems. The challenges for faculty included maintaining student engagement and the amount of time required to prepare for remote teaching. Students liked the flexibility of the new delivery format and the extra time that became available. One third of faculty felt the remote format was comparable to in-person classes and 66% agreed that a remote component would enhance future in-person clerkships. CONCLUSIONS: Student and course director feedback revealed the importance of IT support services, opportunities for interaction and discussion, and pedagogy changes in the transition to online learning. IT supports offers students the opportunity to quickly receive support without missing course information. Discussion remains paramount and becomes even more critical during uncertain times brought upon by COVID-19. Opportunities for small group discussions are essential to help students connect with peers. Given the benefits in terms of flexibility and access, online learning may continue and supplement traditional teaching.

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857	Andrew Samoyedny / Medicine	Thomas Wilczynski, MD	Thomas Wilczynski	**Highly Numerous Post-Traumatic Intraparenchymal Splenic Pseudoaneurysms:** A Case Report: A 55-year-old male presented to the ED with worsening left abdominal pain one week after assault with a wooden board to the left abdomen. The patient had no documented history of alcohol use disorder, pancreatitis, or peptic ulcer disease. No mention of bacteremia or endocarditis were found upon chart review. Physical exam revealed a hemodynamically stable and afebrile patient with ecchymosis and tenderness to palpation of the left chest wall and left upper quadrant of the abdomen without rebound tenderness. Pertinent labs included a hemoglobin of 14. 8 and white blood cell count of 8. 5. Contrast-enhanced CT was obtained with pre-contrast, arterial, venous, and delayed phases. Pre-contrast imaging demonstrated abundant, mildly attenuating rounded foci within splenic parenchyma similar to aortic attenuation. Arterial phase demonstrated numerous strongly enhancing rounded foci concerning for intrasplenic hemorrhage or pseudoaneurysms. No early enhancement of splenic vein was seen, making arteriovenous fistula less likely. Delayed phase demonstrated washout of previously enhancing foci, favoring multiple pseudoaneurysms over active intrasplenic hemorrhage. The patient recovered with supportive care only. Follow-up contrast-enhanced CT one month post-discharge revealed resolution of the pseudoaneurysms but new appearance of several hypoattenuating nonenhancing foci within the splenic parenchyma suggestive of chronic hematoma or regions of infarct. Also seen were superior and inferior subcapsular splenic hematomas - suggestive of possible interval rupture of pseudoaneurysms with capsular tamponade. This case is notable for the sheer number of pseudoaneurysms (rare phenomena themselves) as well as uncomplicated resolution without surgical intervention.
858	Pooja Jotwani / Medicine	Yanhong Zhang, MD		**Submassive Pulmonary Embolism in a Young Individual with Ulcerative Colitis and COVID-19 infection:** INTRODUCTION: Pulmonary embolism (PE) is reported in upto 20-25% of patients with COVID-19 infection. The impact of COVID-19 on ulcerative colitis (UC) and associated PE risk is unknown. CASE DESCRIPTION: A 29-year-old man with well-controlled UC (on mesalamine) and recently diagnosed COVID-19 infection (a week ago) presented with acute dyspnea and pleuritic chest pain. On examination, he was normotensive, saturating 98% on 2 liters oxygen. Laboratories were significant for D-dimer 10. 68 ug/dL, CRP 241. 2 mg/L,troponin 0. 42 ng/mL. CT Angiography revealed thrombus in the distal right interlobular artery and lower lobar artery, segmental thrombus in the right upper lobe and wedge-shaped infarct in the right lower lobe. Echocardiogram demonstrated right heart strain. He was begun on heparin infusion and treatment of COVID-19. He did not require endotracheal intubation and was discharged with 3-6 months of apixaban therapy. CONCLUSION: Risk for COVID-19 related PE may be compounded by pre-existing inflammatory conditions like UC. Patients with UC already have a threefold increased risk of developing PE, with risk increased to eight-fold in active flare. Further studies are needed to determine the increased risk, morbidity and mortality of PE in patients with UC and COVID-19. Patients with pre-existing inflammatory conditions should have adequate disease control and be advised strict adherence to social distancing and precautionary measures. Additionally, empiric anticoagulation should be strongly considered in such patients on presentation with COVID-19.