THE OHIO STATE UNIVERSITY

COLLEGE OF MEDICINE

MEDICAL STUDENT RESEARCH PROGRAM

ANNUAL RESEARCH SYMPOSIUM

OCTOBER 14, 2022

NOON – 3:30 PM

Chloe Amsterdam

Mentor: Dr. Electra Paskett

Project Title: Beliefs and behaviors associated with COVID-19 among younger (age < 65) vs. older (age ≥65) populations

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: COVID-19 related deaths in the United States disproportionately impact older (≥ 65) age groups. COVID-19 vaccination can decrease mortality/transmission, but those < 65 are less likely vaccinated. A survey (3/2/21 - 9/9/21) was distributed to Ohio participants who had agreed to be recontacted previously (n=4605). Questions assessed sociodemographics, COVID-19 related beliefs (perceived barriers, perceived risk, or self-efficacy under the Health Belief Model), and COVID-19 vaccine status (yes/no or intent to vaccinate). Adjusted multinomial logistic regression models assessed association between beliefs and behaviors, with an age group exposure (young vs. old). The sample was a mean (SD) age of 58.7 (13.1). For those offered the vaccine, age group (aOR = 1.7, 95%CI = 1.13 - 2.55) and worry about financial loss predicted vaccination status (aOR = 1.27, 95%CI = 1.01 - 1.59). For the younger age group, having high concern for catching COVID-19 predicted vaccination status (aOR = 2.40, 95%CI = 1.77 - 3.27). For those not offered the vaccine, stress or anxiety due to COVID-19 predicted vaccination intent (aOR = 2.94, 95%CI = 1.45 - 5.97). Improving understanding of COVID-19-related beliefs that impact vaccine uptake/intent provides an informed avenue through which to target vaccine interventions and decrease ongoing COVID-19 fatalities.

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Zaynah Awethe

Mentor: Dr. Jessica Kaffenberger

Project Title: Association of the Dermatology Chair's Gender with Gender Diversity of the Program Director and Faculty

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Background: Dermatology is a female-led workforce, but discrepancies exist in female leadership positions. We wanted to determine if the dermatology chair's gender correlates with gender diversity in the department. We hypothesized that a female chair would be associated with a greater chance of a female residency program director (PD) and greater number of female faculty compared to a male-led department. Objective: Determine if the chair's gender correlates with gender diversity of PD and faculty. Methods: In this cross-sectional study, 111 academic dermatological programs were compiled, and gender was determined by the photo, name, and/or pronouns in the faculty biography. Results: Of the programs, 36.9%(n=41) of chairs are female and 63.0%(n=70) of PDs are female. Departments with male chairs have 52.9%(n=37) female PDs and departments with female chairs have 80.5%(n=33) female PDs(p=0.0043). No significant difference seen amongst female faculty in male vs female-led departments(p=0.58). Programs with a female PD have higher percentages of female faculty compared to male faculty(p=0.030). Limitations: Limitations include relying on academic websites that may not be updated regularly and determining gender based on pronouns, photos, and names. Conclusion: Female-led divisions are correlated with a higher likelihood of female PDs but not with a female-dominant department.

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Sofia Baena
Mentor: Dr. Summit Shah
Project Title: Assessment of hypertension management and outcomes at a Spanish free clinic
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship
Abstract: La Clinica Latina is a student-run free clinic providing care to the Spanish-speaking community in Columbus, Ohio. The most common chief complaint patients present with is hypertension. A retrospective review of medical records for hypertensive patients managed at Clinica over the past year and a half (January 2021-May 2022) was conducted. Patients were included in the study if they had a diagnosis of hypertension, were seen at least 3 times in person during the study period, and if they had a blood pressure reading out of control at the first appointment defined as >130/80 (n=47). The results found that patients with uncontrolled blood pressure who presented to the clinic at least 3 times during the study period are 5.4 times more likely to achieve blood pressure control (p=0.0048) when compared to counterparts who were also seen for hypertension but were excluded due to inadequate number of visits. Additionally, patients at La Clinica Latina achieved greater blood pressure control rates when compared to rates reported by the latest NHANES study. This report is the first installment of a longitudinal project that hopes to characterize and quantify the value in culturally competent care provided at La Clinica Latina.
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Mara Bahri
Mentor: Dr. Joshua Weinberg
Project Title: Retrospective Analysis of Factors Affecting Outcomes Following Carotid Intervention
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship
Abstract: Cerebrovascular disease is the third leading cause of adult death worldwide, and strokes (hemorrhagic and ischemic) are significant contributors to this morbidity and mortality. Prior studies have determined that prompt revascularization significantly reduces the risk of recurrent stroke and improves patient-related clinical outcomes. Carotid endarterectomy (CEA) and carotid angioplasty and stenting (CAS) have long been the leading treatment options ischemic cranial-occlusive disease. Recent advances have revolutionized the endovascular approach for the treatment of these ischemic occlusions. Amongst existing literature, modern clinical trials have focused on the comparative efficacy and durability of CAS versus CEA in symptomatic patients with ≥ 70% stenosis, with additional focus on long-term follow up of restenosis and morbidity measures. However, a paucity of data exists regarding perioperative management and procedural detail between the two treatment options, in addition to analysis of outcomes in patients with asymptomatic stenosis following prophylactic intervention. In this retrospective study, we sought to fill this research gap by analyzing procedural detail and perioperative management in all patients undergoing CEA or CAS at OSUWMC in the management of patient outcomes.
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Nojan Bajestani

Mentor: Dr. Kerry-Ann Mitchell

Project Title: Development of a Novel Mouse Model Of Decompressive Craniectomy after Traumatic Brain Injury

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: More than 69 million people worldwide suffer from traumatic brain injuries (TBI) each year. TBI can elevate pressure within the brain due to swelling and bleeding. Decompressive craniectomy involves removal of a large segment of skull to reduce intracranial pressure and prevent neurologic deterioration. After swelling resolves, the patient's own bone or a synthetic implant is replaced in an operation called cranioplasty. The goal of this proposal was to develop a novel animal model with which to study calvarial bone healing after decompressive craniectomy and reconstruction with autologous or synthetic implants. After sacrificing the mice, imaging and histological analysis was completed. Scans were evaluated for osteogenesis within the mice's skull to delineate the timing and mechanism of calvarial bone healing. Micro-CT imaging analysis revealed minimal bone healing in mice 4-weeks and 6-weeks post-surgery. The skulls of mice sacrificed after 8 weeks demonstrated bone alignment and almost total fusion. Histological analysis was adjusted to include the entire skull in future specimens as the skulls evaluated in this study were too thin for processing. The protocols from this study will be used to evaluate bone-healing in sheep and establish sheep as a reliable translational model to test novel cranial implant devices.

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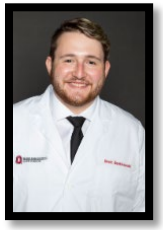

Brett Bentkowski

Mentor: Dr. David Flanigan

Project Title: Is Tobramycin a Viable Agent in ACL Allograft Cleaning?

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Surgical site infection following anterior cruciate ligament (ACL) reconstruction is an outcome which can require repeat surgery. Wrapping harvested graft tendon in gauze soaked with vancomycin is effective in eliminating Staphylococcus epidermidis and Staphylococcus aureus, common infectious agents. Vancomycin resistance in these species requires alternative antibiotics to reduce infection. We aim to determine if tobramycin is a possible alternative and hypothesize that tobramycin will be as effective as vancomycin in reducing bacterial burden on tendons. Cadaveric human gracilis tendon was divided into segments and inoculated with S. epidermis. These segments were then treated with vancomycin or tobramycin at various doses for either 10 or 20 minutes. After treatment, the tendons were placed in recovery media which was serially diluted and plated for colony counting. We found that tobramycin achieves significant bacterial reduction at lower doses than vancomycin. Further, treatments of more than 10 minutes are only significant for vancomycin, suggesting tobramycin works within the first 10 minutes. We conclude that tobramycin is a viable intra-operative alternative to vancomycin for ACL graft cleaning. We suggest that further studies investigate the cytotoxic properties of tobramycin on cells in the knee environment to ensure it can be applied safely at the required doses.

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Koral Blunt

Mentor: Dr. David Flanigan

Project Title: Influence of Staphylococcus epidermidis Biofilm on Collagen Crimp Patterns of Soft Tissue Allograft

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Postoperative infections, commonly from Staphylococcus epidermidis, may result in anterior cruciate ligament (ACL) graft failure and necessitate revision surgery. In biomechanical studies, S. epidermidis has been shown to establish biofilms and reduce graft strength. We hypothesized that an increase in S. epidermidis biofilm will compromise tendon crimp, a pattern necessary for mechanical integrity, of ACL allografts. Cultures of S. epidermidis were inoculated on tibialis anterior cadaveric tendons to illicit biofilm growth. Conditions assessed included 5 x 105 CFUs or concentrated spent media from culture and incubation times of 30 minutes, 3 hours, 6 hours, and 24 hours. Second-harmonic generation microscopy allowed for visualization of collagen autofluorescence. Incubation time positively correlated with increasing S. epidermidis bioburden. Both fine and coarse crimp patterns lengthened with increasing incubation time. Significant coarse crimp changes were observed after only 30-minute incubations, whereas fine crimp lengthened significantly after 6 hours. No trend in crimp lengthening was identified following incubation media lacking living bacteria. The results of this study demonstrate that S. epidermidis biofilms negatively impact collagen crimp structure and suggest that a bacterial metabolite may aid in this process, which highlights the need for antimicrobial precautions to prevent graft colonization and maximize graft mechanical strength.

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Sarah Board

Mentor: Dr. Namal Liyanage

Project Title: A Novel Adjuvant to Enhance NK Cell Responses in HIV Vaccines

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Despite HIV taking more than 36.3 million lives, an effective vaccine remains elusive. The RV144 clinical trial used an ALVAC-HIV vector and alum adjuvanted AIDSVAX B/E gp120 protein, yielding the most successful attempt with an efficacy of 31.2%. The vaccine regimen provided limited, but significant protection, serving as a foundation for further research (Rerks-Ngarm et al., 2009). Previous studies conducted in rhesus macaques identified NK cells as correlates of protection against SIV infection (Vaccari et al., 2016). One strategy for improving the RV144 HIV vaccine efficacy is the use of novel adjuvants which may enhance immune responses against HIV, specifically stimulating the expression of correlates of protection (Coffman et al., 2010). In vitro studies have demonstrated that LL001, a novel mucosal adjuvant, elicits a strong mucosal innate immune response. This study sought to investigate the immune response elicited in mice by LL001 administered alone and in concomitance with the RV144 HIV vaccine. LL001 was found to modulate NK cell phenotype, functionality, and tissue migration patterns. The results of this study demonstrated that LL001 may serve as an efficacious adjuvant which elicits NK cell cytokine and receptor expression to enhance the immunogenicity of a RV144 like HIV vaccine strategy in vivo.

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Chelsea Bray
Mentor: Dr. Jonathan Godbout
Project Title: Impaired Neuronal-Glial Interactions in the Hippocampus Following Traumatic Brain Injury
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship
Abstract: Traumatic Brain Injury (TBI) leads to neurodegenerative pathologies and cognitive decline. Our recent scRNAseq shows interleukin-1 signaling pathway is prominently enhanced in trauma-associated microglia 7dpi. Based on these data, we hypothesize that reducing IL1R1 signaling reduces TBI-associated inflammation, neuronal dysfunction, and restores cognition. First, IL1R1tdTom-reporter mice were uninjured or subjected to TBI. Histological analyses showed that IL1R1 was increased on neurons in the hippocampus 7dpi compared to controls. To investigate the role of IL1 signaling in the HPC, IL1R1WT and IL1R1KO transgenic mice were subjected to TBI and mRNA and histology assessed. There was less TBI-associated inflammatory mRNA levels in the HPC of IL1R1KO-TBI compared to IL1R1WT-TBI groups. TBI increased percent area of Iba-1 microglia labeling, but this was independent of IL1R1. In the final experiment, mice were injected bilaterally in the HPC with a virus designed to transfect neurons to overexpress an IL1R antagonist. First, TBI was elicited and the AAV2-IL1Ra construct was administered in the HPC concomitantly. TBI promoted deficits in NOR/NOL 7dpi and these deficits were prevented by neuronal overexpression of IL1Ra in the HPC. Taken together, these data indicate that IL1R1 mediated signaling in neurons after TBI is important in hippocampal neuronal dysfunction and cognitive impairment.
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Megan Broughton
Mentor: Dr. Bethany Mundy-Bosse
Project Title: The Impact of SUMOylation Blockade on Natural Killer Cell Anti-Leukemic Activity
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship
Abstract: Acute myeloid leukemia (AML) is a hematologic malignancy for which there remains a poor prognosis and few therapeutic options despite decades of research. Natural killer (NK) cells are a subset of the innate lymphoid cell (ILC) family that act as elite anti-leukemic cells known for their cytotoxic abilities against cancer cells. The SUMOylation pathway shows promise in playing a key role in the restoring NK cells in a leukemic context. In this project, the presence or absence of a SUMOylation inhibitor in cultures with ILCs with or without a leukemic environment is studied to assess potential restoration of NK cell differentiation and functionality. Methods used to complete this project include cytotoxic assays and developmental assays, which were evaluated with flow cytometric analysis. The results of this project have demonstrated that, among the AML cell lines and primary patient samples, there are varying responses to SUMOylation inhibition and its directly cytotoxic effect. There were common trends and consistency seen within AML cell lines but differing levels of cell death. This suggests there could be an innate mechanism of the AML cells that are affecting their susceptibility to killing by treated NK cells and to the directly cytotoxic effect of the treatment.
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Abigail Buckley
Mentor: Dr. Amy Moore
Project Title: Evaluating Patient Demographics, Acute Presentation, and Referral Patterns in the Acute Flaccid Myelitis Population
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Acute Flaccid Myelitis (AFM) is a rare but debilitating neurologic condition that causes muscle weakness and paralysis.1-5 Currently, we know little about patient demographics, etiology of disease, or treatment viability. Our team treated a significant number of AFM patients from 2014-2020. We performed a retrospective chart review to determine patient demographics, acute presentation, and referral patterns to better understand the AFM population and prepare the medical community for treating AFM in the future. Based on our cohort, patients at acute presentation are mostly white males between the ages of 5-9. Additionally, 83.9% of acute cases demonstrate at least 2 limb paralysis, and over 77% of patients received IVIG and steroids at presentation. Time from diagnosis to nerve clinic presentation was on average greater than two years, which is outside the ideal treatment window. Finally, most patients were self-referrals to the nerve clinic, but social media referrals are a new and increasing avenue for healthcare access. With this information, we have a better idea of how to diagnose AFM patients early, reach patients on social media platforms, and better understand the treatment time course so that patients who can benefit from surgery are referred to clinic within the optimal window.

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Galo Bustamante
Mentor: Dr. Robert Magnussen
Project Title: Comparison of skeletal maturity in outcomes of operative fixation of loose trochlear osteochondral defects
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Purpose: Compare outcomes of open reduction and internal fixation(ORIF) of loose osteochondritis dissecans (OCD) fragments of the trochlea based on skeletal maturity. Methods: A retrospective chart review of OCD fixation surgeries performed by the senior author between 2010 and 2021 was completed identifying 12 patients who underwent ORIF of a loose trochlear defect. Patient demographics, history, imaging findings, surgical factors, fixation failure, and skeletal maturity were all collected and compared. Of the 12 patients identified, 10 (6 skeletally immature, 4 mature) were able to be contacted for telephone follow-up and KOOS and Marx scores. Comparative statistics were calculated using a Fischer's exact and T-tests at p=0.05. Results: Long term success rates, based on reoperation of the index knee, showed no difference between skeletally immature and mature groups, 85.7% vs 80% (p=0.530), respectively. There appears to be no significant difference in follow-up KOOS scores between skeletally immature and mature patients, 93.3±7.4 vs 80.5±18.8 (p=0.271), respectively. Further similarities can be appreciated in Marx activity scores between the same groups, 10.2±4.6 vs 8.0±7.5 (p=0.631). Conclusion: Based on skeletal maturity, no difference in success rates or outcomes was appreciated in patients who underwent ORIF of loose trochlear OCD fragments

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Drayson Campbell

Mentor: Dr. Ihab Halaweish

Project Title: Are Diverting Ostomies Beneficial Prior to Reoperative Surgery For Hirschsprung Patients?

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Treatment for Hirschsprung's Disease (HD) involves a pull-through (PT) with resection of the affected colon, but some children experience postoperative obstruction and subsequent colonic dilation. Thus, many receive a diverting ostomy, promoting colon shrinkage and safer anastomosis during redo PT, but ostomies can lead to morbidity. Despite their regular use at pediatric surgical centers, the impact of diversion on colonic shrinkage and surgical outcomes remains unclear. We conducted a retrospective chart review of 167 patients with HD that received a redo PT at our hospital after 2014. We used the contrast enemas taken between 42 patients' first and second PTs to quantify colonic shrinkage. Children had their initial and redo PTs at median ages of 2.5 months and 3.8 years, respectively. 115 patients had an ostomy placed, and one-third of these patients experienced an ostomy-specific complication. The presence of a diverting ostomy was not associated with colonic shrinkage or redo PT complication rates. Patients with HD have a high stoma complication rate. Diversion was not associated with improved outcomes, so ostomy creation before redo PT should likely be limited to patients that absolutely require additional interventions following the failure of non-operative bridging measures.

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Shelby Cash

Mentor: Dr. Eugene Arnold

Project Title: Effects of trainer continuity and experience on neurofeedback treatment of ADHD in children

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Theta-beta neurofeedback (NF) therapy has been used as a non-pharmacological treatment of pediatric ADHD. The first large double-blind RCT of this treatment by Arnold et al. (2020) showed both sham and true NF lead to roughly equal symptom reduction. This implies that something other than NF reduces symptoms. A trainer administers the therapy, and we hypothesized that trainer continuity and experience levels would impact outcome. Trainer continuity was quantified by calculating the highest percentage of sessions each participant had with a trainer. Trainer experience was calculated by tracking how many sessions each trainer had completed by each session. A trainer was considered experienced after 100 sessions, and the percentage of sessions each participant had with an experienced trainer was calculated. We examined the effect of these variables on symptom reduction at end treatment and 13-month follow up on the Connors Inattention Scale using linear mixed modeling, controlling for baseline score and including NF vs control. We found that trainer continuity did not impact outcome (P=0.916), but that trainer experience positively correlated with increased symptom reduction (P=0.013, Slope=0.217) in both the control and treatment group. This supports the importance of trainer experience in sham or true NF therapy.

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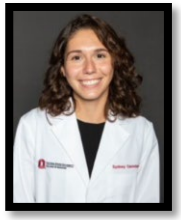

Sydney Castellanos

Mentor: Dr. Ginny Bumgardner

Project Title: PD1 Expression Defines Distinct Subsets of CXCR5+CD8+ T cells with Antiviral or Antibody Suppressor Functions

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: While immunosuppressive therapies have come a long way in preventing acute allograft rejection, alloantibody production remains a limitation of long-term graft survival. In addition, immunosuppression leaves transplant recipients vulnerable to infections such as lymphocytic choriomeningitis virus which can damage the allograft. Thus, suppression of alloantibody production and viral infection would significantly enhance allograft function and longevity. A key CXCR5+CD8+ T cell subset has recently been identified to inhibit alloantibody production. These antibody-suppressor CXCR5+CD8+ T cells predominately lack PD1 expression. In other models, reports have shown antiviral CXCR5+CD8+ T cells that express PD1. While these subsets have been studied independently, the importance of PD1 expression and the precise function of each subset requires further examination. To investigate these subsets, cohorts of CD8 KO hepatocyte transplant recipients were infected with MCMV and received adoptive cell therapy of primed CD44+CXCR5+PD1+CD8+ or CD44+CXCR5+PD1-CD8+ T cells. These subsets were isolated from alloprimed or MCMV-primed wild-type hosts. By using this model of CMV infection and transplantation, we assessed the specificity, function, and cytotoxicity of both alloprimed and MCMV-primed CD44+CXCR5+PD1-CD8+ and CD44+CXCR5+PD1+CD8+ T cells. Current data suggests that the absence of PD1 expression by alloprimed CD44+CXCR5+CD8+ T cells critically defines the antibody-suppressor subset.

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Jin Young Chang

Mentor: Dr. Courtney Collins

Project Title: Effects of socioeconomic status on complex ventral hernia repair surgery in elderly patients

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: The study aims to understand how a patient's socioeconomic distress impacts the course and outcome of complex ventral hernia repair in the older population. Patients aged 65 or above who underwent complex ventral hernia repair between 2013 and 2021 were identified using the Abdominal Core Health Quality Collaborative (ACHQC) database. The patient's individual zip code was further analyzed using the Distressed Communities Index (DCI) which assigns each community into quintiles based on 7 economic metrics. The 5 tiers of communities were compared to using a Cox proportional hazards model. Total of 4172 met the inclusion criteria. Patients from distressed communities were younger ($p< 0.001$), more likely to identify as a racial minority ($p< 0.001$) and had worse health condition including higher BMI ($p< 0.001$) and other certain comorbidities. Patients also had considerable effect on postoperative complications depending on the community distress quintile ($p=0.050$). Patients from at risk communities had a shorter time to recurrence when compared with prosperous communities ($p=0.03$). As the study population is highly vulnerable due to old age and large hernia size, it is necessary to better understand the role of socioeconomic status to provide optimal surgical care.

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David Chesko

Mentor: Dr. Lauren Southerland

Project Title: Use of Physical Therapy in Emergency Departments for Older Adults with Fall-Related Chief Complaints: A Retrospective Cohort Study of Current Clinical Practice

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Current Geriatric Emergency Department (ED) Guidelines recommend that older patients receive fall risk assessment and physical therapy (PT) consultation if indicated, but these guidelines have had limited adoption within Emergency Medicine. Many EDs, including the accredited Geriatric EDs, have no PT or fall risk interventions for older adults. Our objective was to assess the current utilization of PT and occupational therapy (OT) consults performed in the ED to determine the risk factors that increase the odds of yielding an influential PT/OT consultation. A retrospective chart review was completed at an urban, academic, Level-1 trauma center. We reviewed a random selection 200 adults ≥ 65 years old who presented to the ED for a fall-related visit from 4/1/2020 - 3/31/2022. A total of 9% (n=18) of patients received PT evaluation and 5.5% (n=11) of patients received OT evaluation. Based on prior data, this was lower than the anticipated PT/OT consultation rate of 10%. However, the rate of consults yielding influential outcomes from PT (83%, n=15) and OT (91%, n=10) was higher than the expected 60%. Further analysis of this data and from additional EDs is required to identify the subset of patients who are most likely to benefit from PT/OT evaluation.

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Jacob Christofi

Mentor: Dr. Hamdy Elsayed-Awad

Project Title: The Effects of miR-155 on Glutamate and GABA Receptor Expression in a Mouse Model of Spinal Cord Ischemia

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Ischemic spinal cord (SC) injury is a devasting complication open repair of aortic aneurysm surgery, that involves the need for transient clamping of aorta which can result in paralysis. A shift in the balance between inhibitory and excitatory synaptic transmission in the SC may contribute to excitotoxicity after the ischemic insult. GABA receptors and glutamate receptors are potentially the major players involved in this toxicity. The focus of my MDSR project was to test whether miR-155 affects the expression of glutamate and GABA receptor genes in the SC, after transient aortic cross clamping (ACC) in mice. To achieve this, I ran qPCR on genes of interest in a mouse model of ACC induced paralysis established by the hosting PI (Dr. Awad). The results indicated that miR-155 exerts effects on GABRA1 receptors, yet there is likely no difference between groups that received a miR-155 inhibitor and those that did not in the rates of Chat+ motor neuron survival rate. Indicating that a different cell type is determining rates of paralysis at 48 hours, possibly the nearby GABAergic interneuron population.

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Emily Coffey
Mentor: Dr. Laura Schmitt
Project Title: Impact of ACL Graft Choice on Meniscal Repair Outcomes
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship
Abstract: Meniscal tears are one of the most common orthopedic injuries, often occurring simultaneously with an anterior cruciate ligament tear. Despite the clinical importance of preserving the meniscus, repair failure rates are significant. The purpose of this study is to evaluate the relationship between anterior cruciate ligament reconstruction (ACLR) graft choice and meniscal repair outcomes during concomitant surgical repairs. A retrospective chart review identified patients who underwent concomitant repairs during the study period. Patients who received any allograft or hamstring autograft during the ACLR and with a minimum of 1 year follow up were included. Data collection included patient demographics, meniscus repair failure, time to failure, and patient-reported outcome measures (PROMs). Of the 677 meniscus repairs performed, 241 patients with average follow up of 4.9 years met the inclusion criteria. There were no significant differences in meniscus repair failure rates or time to failure between those who received an allograft and a hamstring autograft, respectively. Other than Marx Activity scores, there were no significant differences among PROMs between allografts and autografts. ACLR graft choice does not appear to influence the rate of meniscal repair failures. The relationship between ACLR graft choice and meniscus repair failure is complex and requires further research.
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Bailey Conrad
Mentor: Dr. Daniel Spakowicz
Project Title: Assessing the impact of microbiome modification on lung cancer immunotherapy.
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship
Abstract: Non-small cell lung cancer (NSCLC) outcomes have improved with immune checkpoint inhibitor (ICI) treatment targeting the PD-1/PD-L1 axis, but over half of the tumors do not decrease. The gut microbiome has been shown to affect response to ICIs. This study aims to modify the microbiome via black raspberry (BRB) nectar to promote ICI response. In a randomized, placebo-controlled, crossover trial, high-risk individuals for NSCLC were given the dietary intervention of BRB or placebo beverage for 4 weeks, separated by a 2-week washout period. Blood and stool samples were obtained at different time points. We used generalized linear mixed models and found no significant increase in cytokines after subjects were given BRB. Although, significant increases were seen in specific microbes (Roseburia CAG 309, Lachnospira pectinoschiza, and Blautia obeum). Based on these data and the preceding literature, we selected stool samples representative of an increase in these taxa for fecal microbiota transplant to mice injected with cancer cells. The mice were then treated with anti-PD1 antibodies or IgG. Tumor volume measurements suggest the modified microbiome may promote response to ICIs in some individuals. These preclinical studies guide us in finding how to improve the response to immunotherapy using the microbiome.
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Alejandro De La Cova
Mentor: Dr. Nathaniel Bates
Project Title: Assessing Impact of Neuromuscular Training Program on Clinical Variables associated with Mechanisms of ACL Load in Athletes
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: With more reconstructed primary ACL tears, there is increased risk of secondary injury following return-to-sport. We aimed to evaluate if targeted neuromuscular training (NMT) post return-to-sport clearance alters performance in hop testing distances and variability. 64 ACL reconstructed athletes completed clinical hop testing pre/post 6 weeks one of three intervention programs: NMT, home exercise, or standard of care. Athletes performed single, triple, crossover, 6-meter timed hop tests. Statistical analysis included a 3x2x2 measures ANOVA for program type, sex, and limb side. Single hop distance: Time, Sex, Limb Side were significant. Single hop deviation: Sex, Sex*Time were significant. Triple hop distance: Time, Sex, Limb Side were significant. Triple hop deviation: Group*Time was significant. Crossover hop distance: Time, Sex were significant; Program*Time approached significance. Crossover hop deviation: Program, Sex, Side, Time were significant. 6 M timed hop: Time, Sex were significant; Limb Side, Group*Sex approached significance. Males exceed females and uninvolved exceed involve limbs in hop testing. None corrected Sex or Limb Side differences. Persistent Limb Side differences suggest that athletes return to sport with asymmetry and risk for reinjury. Interaction between Program*Time was only observed in the crossover hop. Additional study is necessary to establish whether minimal clinically important differences exist.

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Ivana Devengencie
Mentor: Dr. Douglas Kniss
Project Title: Pro-resolving lipid mediators in preeclampsia: Therapeutic potential of aspirin
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Preeclampsia is a disorder related with pregnancy that is characterized by hypertension, fetal growth restriction and other signs of end-organ damage. The underlying pathophysiology of preeclampsia is not completely understood, but there has been shown to be an imbalance of angiogenic and anti-angiogenic proteins that leads to widespread inflammation and endothelial damage. Aspirin, through its selective and irreversible effects on cyclooxygenase-2 (COX-2), induces the production of the pro-resolving inflammatory mediator aspirin-triggered 15-epi-LXA4 and is thus used as a preventative medication for women at risk of preeclampsia. Low dose aspirin (50-162 mg/day) is currently the only approved intervention by ACOG. Using what we know about the effects of aspirin, an in-vitro model of preeclampsia was implemented using human umbilical endothelial cells (HUVEC) in order to better characterize the effects of aspirin on proinflammatory and pro-resolving proteins as it applies to a dose response of increasing concentrations of aspirin. ELISA and RT-qPCR were utilized for data collection. It was determined that in the presence of aspirin, aspirin triggered LXA4 levels increased in a dose responsive manner while pro-inflammatory mediators decreased. This data supports the potentially therapeutic benefit of higher doses of aspirin in preventing preeclampsia in women of elevated risk.

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Ryan Dopirak
Mentor: Dr. Kanu Goyal
Project Title: Outcomes Following Surgical Denervation of the Thumb Carpometacarpal Joint for CMC Arthritis
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Introduction: To determine patient perceived effectiveness of thumb carpometacarpal (CMC) denervation as treatment for CMC arthritis. Osteoarthritis of the thumb CMC joint significantly impacts quality of life. Denervation of the CMC joint is a newer procedure compared to traditional surgical approaches following conservative treatment failure. Methods: Patients receiving CMC denervation were interviewed via telephone call after at least three months of post-operative recovery. Seventeen patients were interviewed over a one-time phone interview. Patients rated CMC pain at rest and with activities of daily living (ADL) pre- and post-operatively. Patients rated their perceived pain and functional improvement, satisfaction with the procedure, and if they would hypothetically undergo CMC denervation again. Results: Patient reported pain at rest and with ADL both pre- and post-operatively was significantly reduced following denervation, but displayed high variability. Patient reported pain and functional improvement was mostly split between no improvement and full pain resolution. There was no correlation between pre-operative CMC joint arthritic stage and post-operative pain improvement. Conclusion: The findings of this study demonstrate that CMC denervation can significantly reduce arthritic pain of the thumb CMC joint. High variation between patients highlights future objectives of pre-operatively determining which patients CMC denervation will benefit.

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Morgan Doty
Mentor: Dr. Jennifer Cooper
Project Title: Association between high deductible health plans and the incidence of umbilical hernia repairs in young children
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: High deductible health plans (HDHPs) have been associated with the avoidance of both necessary and unnecessary care. We hypothesized that families with HDHPs are more likely to delay umbilical hernia repair (UHR) until 4 years of age than families with other commercial plans. Children 0-18 years of age residing in metropolitan statistical areas (MSA) who underwent UHR in 2012-2019 were identified in the IBM Marketscan Commercial Claims and Encounters Database. A quasi-experimental study design using MSA-year level HDHP prevalence among all children in the database as an instrumental variable was employed to account for selection bias in HDHP enrollment. Two-stage least squares regression modeling was used to evaluate the association between HDHP coverage and age at UHR. 8601 children were included (median (IQR) age of 5 years (3-7)). Univariable analysis revealed no significant difference in rates of UHR at < 4 years of age between HDHP vs. non-HDHP groups. Geographic region, metropolitan area size, and year were associated with HDHP enrollment; having a chronic condition or concurrent procedure were not. Instrumental variable analysis demonstrated no association between HDHP coverage and the probability of UHR at < 4 years. Future studies should investigate ways to avoid UHRs in young children.

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Bryce Dzubara
Mentor: Dr. Robert Duerr
Project Title: Does Delaying Revision ACLR Lead to Worse Outcomes?
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship
Abstract: Objective: To identify whether a delay of greater than three months between reinjury and subsequent revision anterior cruciate ligament reconstruction (ACLR) influences outcomes. Methods: A retrospective chart review was conducted to identify patients who underwent revision ACLR at an academic institution between 2004 and 2018. Demographic and surgical information, along with outcomes, were recorded. Patients who underwent revision ACLR within three months of documented reinjury were defined as the Early Revision Group, and patients who underwent revision ACLR at least three months after reinjuring their knee and patients with chronic ACL deficiencies were defined as the Late Revision Group. Intra-operative findings, subsequent graft failure risk, and patient-reported outcomes were compared between the groups. Results: A total of 62 patients met inclusion criteria. Patients in the Late Revision Group were more likely to have Outerbridge cartilage grades of 2-4 in the patella ($p=0.005$), trochlea ($p< 0.001$), medial tibial plateau ($p=0.038$), lateral femoral condyle ($p=0.049$), and lateral tibial plateau ($p=0.005$). No significant differences in other pathologies or outcomes were observed. Conclusion: Patients who undergo revision ACLR more than three months after graft tear demonstrate more severe articular cartilage damage, although failure rates and patient-reported outcomes did not differ in this study.
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Chloe Evering
Mentor: Dr. Blair Hayes, MD
Project Title: High Dose Epidural Fentanyl for Second Stage Labor Analgesia
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship
Abstract: Neuraxial analgesic techniques are common means of providing pain relief during labor. Continuous epidural infusions (CEI) and programmed intermittent epidural boluses (PIEB) can be inadequate for some patients, as well as the standard low-dose fentanyl/bupivacaine "rescue" bolus. We hypothesized that clinician-administered epidural boluses of 10mL of 0.125% bupivacaine with 100 mcg fentanyl ("high dose fentanyl/bupivacaine") would result in superior pain relief at 30 +/- 5 minutes after dosing compared to the standard "low dose fentanyl/bupivacaine" bolus. 62 patients were enrolled and randomized to receive 0.125% bupivacaine 10mL with either 100 mcg fentanyl (Group 1: "high dose fentanyl/bupivacaine", n=7) or 20 mcg fentanyl (Group 2: "low dose fentanyl/bupivacaine", n=8), administered only if subjects experienced a qualifying pain event. Those who did not require a rescue bolus were considered screen failures. Verbal rating scale (VRS) pain scores, side effects, labor, and neonatal outcomes were recorded, and no significant differences between Group 1, Group 2, or the screen failure group were noted. PIEB methods seemed to be sufficient for the majority of subjects enrolled, but more around-the-clock data collection is needed to determine which dose, if any, is superior when a rescue bolus is warranted.
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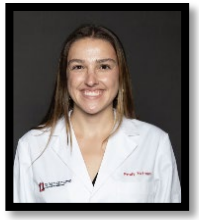

Emily Fortman

Mentor: Dr. Electra Paskett

Project Title: COVID-19 Vaccination Behaviors and Attitudes in Those with and without a History of Cancer

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: The COVID-19 pandemic has had a widespread global impact. Vaccinations against SARS-CoV-2 have lowered morbidity and mortality, but challenges remain in vaccine uptake. Immunosuppressed populations, including cancer patients, are especially susceptible to the virus. Thus, understanding this populations' attitudes is especially important. Following the emergence of the pandemic, a survey was created by the Ohio State University Comprehensive Cancer Center(OSUCCC) in conjunction with other NCI-designated cancer centers to assess challenges and changing attitudes to cancer care during COVID-19. A non-probability sample of participants was collected. History of cancer was compared to a non-cancer population to assess vaccination status, perceived safety, efficacy, and vaccine hesitancy. Out of the participants that were offered the vaccine, those with a history of cancer were slightly more adherent. Reasons for hesitancy between the two populations were similar. However, despite higher vaccination rates, the history of cancer population was less likely to believe the vaccine would protect them (OR 0.72 (0.55-0.93)), and less likely to be concerned about contracting COVID-19 (OR 0.72 (0.55-0.93)). Results demonstrate diversity in demographics and beliefs. Further study should be conducted to assess a cancer population's views in more depth and to create potential interventions to increase vaccination rates.

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Valeria Gamarra

Mentor: Dr. Ibrahim Khansa

Project Title: Quality-of-Life in Children with Craniosynostosis

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Craniosynostosis is the premature ossification of sutures in the infant skull, resulting in distortion of the cranial vault and face. This can lead to cranial growth restriction, intracranial hypertension causing neurologic defects, and difficulties with speech/language development, mental functioning, emotional wellbeing, self-image, functioning. The study cohort included 35 pediatric patients ranging from 2-7 years of age. The aim of this study is to investigate the quality-of-life in children, who have undergone different treatments for craniosynostosis, through the parent/guardian's perspective, utilizing a standardized, validated assessment instrument, the Pediatric Quality of Life Inventory(PedsQL). The results showed that pediatric patients who underwent minimally-invasive strip suturectomy with spring implantation had a better QoL especially regarding their physical health and cognitive function when comparing them with patients treated with open cranial vault surgery and minimal-surgery with helmet therapy. In the future, there should be a higher number of participants, and continue to follow up with the patients as they age to acquire their quality of life from their own perspective. Additionally, there should be further prospective studies looking into the patient's family socioeconomic status, race/ethnicity, and other social determinant factors that could have an effect on a patient's achieving a higher quality of life.

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Samantha Gawrys

Mentor: Dr. Jonathan Slaughter

Project Title: Identification of Factors Associated with Patent Ductus Arteriosus Closure in Preterm Infants within 72 hours Postnatal

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Patent ductus arteriosus (PDA) is the most commonly diagnosed cardiovascular condition in preterm infants. It is associated with harmful long-term outcomes and increased mortality. Most PDAs spontaneously close without treatment; however, physicians cannot currently predict which infants will likely show spontaneous closure. This paper evaluates factors associated with early PDA closure. Data were collected from neonatal patients within the Nationwide Children's Hospital Network. Among the 406 infants enrolled in the study, 27.66% had spontaneous closure of the PDA within 72 hours. Both infant gestational age and birthweight were found to correlate with the proportion of infants with closed PDAs. When placed into a logistic regression model, these variables significantly predicted PDA closure. However, the ROC curve did not show the model to be much better than simple guessing. In future studies, once all data are input into the database, we plan to add additional variables to the model. These variables include 5-minute APGAR score, neonatal resuscitation, delivery method, respiratory status, and prophylactic indomethacin. We hope that with the additional variables, this model will be useful in understanding why some preterm infants undergo spontaneous PDA closure. Ultimately, this research aims to prevent harmful overtreatment of PDAs that would have closed spontaneously.

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Andrew George

Mentor: Dr. Zihai Li

Project Title: Investigating the Tumor Microenvironment of Glioblastoma

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Glioblastoma (GBM) is one of the most aggressive forms of cancer, leading to a median survival of one year after diagnosis. Within the tumor microenvironment (TME) of GBM, many factors contribute to its ability to evade the immune response, most notably TGF-Beta. To examine the immune cells involved in GBM-TGF-Beta signaling, we utilized multiplex immunofluorescent labelling to target glycoprotein-A repetitions predominant (GARP), a transmembrane protein required for the activation and regulation of TGF-Beta. We hypothesized that GARP expression would correlate negatively with various immune markers throughout human GBM samples. Tissue sections were repeatedly stained with various antibody markers against antigens such as CD4, CD8, CD11b, pSMAD, FOXP3, and GARP to create a multiplex image of overlapping localization. Imaging software then identified correlations between different markers within the samples. GARP was found to be heterogeneously expressed throughout each sample while modulating the phenotypical immune response of the TME. Regions of high GARP expression showed diminished immune infiltration whereas minimal GARP expression allowed robust immune proliferation. These findings demonstrate that GARP modulates the immune environment and may be a key driver of tumorigenesis, further implicating GARP as a therapeutic target against GBM.

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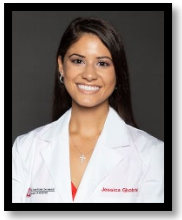

Jessica Ghobrial

Mentor: Dr. Sayoko Moroi

Project Title: Understanding Plateau Iris Anatomy On Cataract Surgery Outcomes

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Plateau iris is a narrowing of the anterior chamber angle caused by a relative anterior rotation of the ciliary body which alters the peripheral iris position in the anterior chamber angle. This anatomic variation is a cause of acute angle closure glaucoma in young patients. Likewise, in older individuals, it can lead to undesirable cataract surgery outcomes as the implanted lens can chafe against anterior segment structures, causing inflammation, increased intraocular pressure, or vitreous hemorrhages. Although these complications are known, a thorough anatomical-based analysis has not been published. Our purpose is to evaluate how plateau iris anatomy predisposes patients to post-cataract surgery complications, known as refractive surprises. Retrospective chart review and ultrasound analysis of patients with post-cataract refractive surprises was performed. Using MATLAB to segment regions of UBM images, we examined reproducibility of results by comparing intensity values generated among different users. Our analysis showed no significant difference in the segmentation methods of each team member (ciliary body p-value=0.3048, sclera p-value=0.6337), indicating reproducibility of intensity values. We conclude that with reproducibility of results in our image analysis methods, we can apply this method in characterizing plateau iris anatomy and identifying the condition prior to cataract surgery to prevent refractive surprises.

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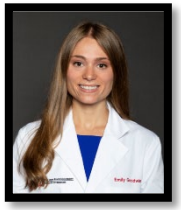

Emily Goodwin

Mentor: Dr. Gregory Wiet

Project Title: Understanding Tracheostomy in Infants: Maternal Depression

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Maternal stress, preterm pregnancy, and low birth weight pregnancies are associated with an increased prevalence of maternal depression. Furthermore, tracheostomy status in infancy is associated with higher rates of maternal stress and is commonly associated with prematurity and low birth weight. Because of these relationships, we hypothesized that maternal mood would vary according to a child's tracheostomy status, with mothers of tracheostomy-dependent infants displaying higher rates of depression. Edinburgh Postnatal Depression Scale (EPDS) scores from mothers with tracheostomy-dependent infants were collected retrospectively. Mothers with tracheostomy-dependent infants prior to the EPDS screening were compared to mothers who were screened for depression via the EPDS prior to their child's tracheostomy. In the tracheostomy group, the prevalence of depression was 20%, with one of five mothers scoring ≥ 13 on the EPDS. In the control group, the prevalence of depression was 29%, with four of 14 mothers scoring ≥ 13 on the EPDS. There did not appear to be a significant difference in the rates of depression between the two groups. To further investigate the impact of a tracheotomy on maternal depression, we plan to compare these two groups to a third group of mothers with infants who never receive a tracheostomy.

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Emma Hansen

Mentor: Dr. Michael Baria

Project Title: Response to platelet-rich plasma injection therapy is not correlated with baseline patient characteristics

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Knee osteoarthritis is an extremely common joint disease that is increasing in prevalence. Biologics, such as platelet-rich plasma (PRP) injections, represent a potential therapeutic avenue for patients who do not respond to traditional treatments. This study retrospectively evaluated a cohort of knee osteoarthritis patients (n=31) who received PRP injections at baseline and were evaluated at baseline and 6 months of follow-up. Patients were divided into 2 groups, responders to PRP therapy (n=21) and non-responders to PRP therapy (n=10), based on Knee Injury and Osteoarthritis Outcome Score (KOOS) pain subscores at 6 months of follow-up. We hypothesized that patients in the responders group would have a younger age, lower BMI, higher platelet count, and less severe knee osteoarthritis. We found no statistically significant differences between groups for the following data points: age, BMI, platelet count, Kellgren-Lawrence grade, KOOS pain score at baseline, Tegner Activity Scale score at baseline, and number of knee quadrants affected by knee osteoarthritis pain. These findings suggest that demographic, clinical, and patient reported outcome factors may not act as reliable indicators of whether patients will or will not respond to PRP injections. Additional studies with larger cohort sizes are necessary to further explore these relationships.

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Madison Hart

Mentor: Dr. Ginny Bumgardner

Project Title: Investigating the role of CD4+ T cell subsets in the development of novel antibody-suppressor CD8+ T cells

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Antibody-mediated rejection is a major contributor to organ transplant failure. The Bumgardner Lab discovered a novel subset of CD8+ T cells (CD8+ Tab-supp cells) that express CXCR5 and suppress transplant-specific antibody (alloantibody), which prolongs transplant survival in mouse models. Previous reports suggest that both IFN-y cytokine and CD4+ T cells may be critical for the development of CD8+ Tab-supp cells, and we hypothesized that IFN-y+CD4+ T cells (Th1 cells) enhance the development of CD8+ Tab-supp cells. Mice without CD4+ T cells were adoptively transferred with various CD4+ T cell subsets and GFP-labeled naive CD8+ T cells and stimulated with allogeneic antigen. GFP+CD8+ T cells were isolated from spleens one week after stimulation and analyzed for phenotypic markers. The proportion of CD44+CXCR5+CD8+ T cells in mice receiving primed bulk CD4+ T cells was equivalent to mice receiving only Th1 or Th2 CD4+ T cells. However, only Th1 CD4+ T cells enhanced proliferation compared to primed bulk CD4+ T cells. These findings suggest a critical role of IFN-y from CD4+ T cells in CD8+ Tab-supp cell development and proliferation, and future studies will investigate additional cytokines and cellular interactions that optimize the effector function of CD8+ Tab-supp cells to prevent transplant rejection.

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Jordan Hill

Mentor: Dr. Deepak Gulati

Project Title: Brain and COVID: The Utility of Neuroimaging and Neurological Consults in Critically ill COVID-19 Patients at the Height of the Pandemic.

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: The COVID-19 pandemic has been surrounded by uncertainty in both society and medical centers worldwide. Studies have shown the coronavirus causing diverse neurological manifestations with diagnoses such as stroke or encephalopathy. Outcomes of critically ill patients with life-threatening COVID-19 and associated neurological symptoms have yet to be documented and assessing the efficacy of brain imaging and specific neurological expertise is a critical knowledge gap in improving outcomes. We hypothesize that patients will show improvements when imaging and consultation services are utilized and aim to assess the relationship of these interventions to discharge disposition and mortality. We also aim to identify demographic and clinical predictors of abnormal brain imaging in life-threatening COVID-19. In this single-center retrospective chart review, we utilized an ICU-COVID-19 database to identify patients with neuroimaging conducted during hospitalization. Patients' demographic, clinical, imaging, and outcome data were retrieved from the electronic medical records. Initial findings show that, among 1241 patients admitted to OSU ICUs between March 8th, 2020 and May 29th, 2021, 453 (36.5%) had completed brain imaging studies (CT/MRI). Further analysis is pending. Identification of prognostic factors in COVID-19-associated neurological disease will help improve clinically meaningful patient outcomes, patient safety, and resource utilization.

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Jason Hoang

Mentor: Dr. Ling-Qun Hu

Project Title: Comparison of Arm and Ankle Blood Pressures During Cesarean Delivery: A Blood Pressure Cuffs Study

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: For Cesarean deliveries (CD), complications after administering spinal anesthesia, or subarachnoid block (SAB), can lead to a decrease in blood pressure (BP). The detection of maternal hypotension is crucial to help avoid NICU admissions; however, BP measurements on the arm, which is the typical standard of care, may not reflect uterine perfusion pressure if the gravid uterus impedes flow. We are investigating the relationship between adverse neonatal outcomes and the BP readings from two different sites, arm and ankle, after administration of SAB in elective CDs. Our null hypothesis is that poor neonatal outcomes are not associated with maternal hypotension. The primary outcomes include incidence of maternal hypotension (SBP ≤ 100mmHg at the arm, 80% of the preoperative BP at the left ankle) after SAB and adverse fetal/neonatal outcomes. Parturients received SAB (1.6 mL 0.75% hyperbaric bupivacaine + 10 mcg fentanyl + 100 mcg morphine), crystalloid co-loading, and phenylephrine 50 mcg/min at time of SAB. The initial data shows that adverse neonatal outcomes were associated with maternal hypotension after SAB regardless of the BP cuff being placed at the arm or ankle. Our sample size is still inadequate, so continued data collection will be important to paint a broader picture.

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Sahana Holla

Mentor: Dr. Courtney Collins

Project Title: A National Review of Frailty Among Older Hernia Patients: Understanding Postoperative Quality of Life Following Elective Repair

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Ventral hernia repair (VHR) is a common elective general surgery, and older patients tend to face a greater number of risks compared to their younger counterparts. Many analyses do not cover the relationship between post-VHR outcomes, quality of life (QOL), and frailty. This study looked at a cohort of patients > 65 years of age undergoing specifically ventral hernia repairs. Patients were categorized based on their mFI-5 scores as not frail/pre-frail, frail, and severely frail. We hypothesized that frail patients would report smaller gains in QOL compared to the non-frail group. Our results found that the frail patients reported the greatest increase in QOL 1 year from baseline, showing that frail patients, when selected appropriately, can gain equal benefit and have similar surgical outcomes as their non-frail counterparts.

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Nassim Idouraine

Mentor: Dr. Benjamin Kaffenberger

Project Title: An analysis of malignant pathology initially managed through store-and-forward teledermatology (E-Consults)

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Studies have shown that teledermatology, especially store-and-forward teledermatology, can lead to improved patient outcomes and access to dermatological services for underserved patients (Fabrocini et al, 2011) (Wang et al, 2019). Although teledermatology consultations are not the gold standard, compared to standard face-to-face dermatology consultations, teledermatology consultations remain accurate and can be used for differentiating between benign and malignant pathology (Finnane et al, 2017) (Mahendran et al, 2005). However, there remain questions regarding the best method of using teledermatology, especially when considering patients with malignant pathology. To better understand this, a retrospective review of patients with malignant pathology seen in an outpatient setting between 2017 and 2021 was conducted. Patient data was requested through the OSUWMC Information Warehouse. This study will evaluate the current usage of store-and-forward teledermatology in an outpatient setting and lead to improved management of patients with malignant pathology.

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Amogh Iyer
Mentor: Dr. Christopher Kaeding
Project Title: Comparing Clinical Outcomes between Quadriceps Tendon and Hamstring Tendon Autografts for Primary Anterior Cruciate Ligament Reconstruction in the Pediatric Population
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Purpose: To evaluate clinical outcomes for quadriceps tendon (QT) autograft after primary anterior cruciate ligament (ACLR) compared to hamstring tendon (HT) autograft in the pediatric population. Methods: A retrospective chart review was conducted to identify patients who underwent ACLR with a QT or HT autograft under the age of 20 at a single institution between January 2019 and May 2020. Patients were included who underwent primary ACL reconstruction and had adequate follow-up. Further review was performed to determine whether any graft failure occurred and the maximum length of follow up in the chart was recorded. A 3:1 match was performed between the QT and HT groups. Results: 40 patients were selected for the final study, 10 QT autograft and 30 HT autograft patients. Time to follow-up in the HT autograft group was 1.93±1.54 yrs compared to 1.93±0.45 yrs in the QT group ($p = 0.771$). There were 10 patients who had a graft retear in the control group compared to only 1 in the case group ($p = 0.551$). Conclusion: Patients who underwent primary ACLR with QT autograft yielded similar outcomes with a low rate of failure or complications within a 2-year follow-up period as compared to HT autograft controls.

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Dana Jolley
Mentor: Dr. Electra Paskett
Project Title: Comparing the Effectiveness of Two Interventions on Adherence to Cancer Screening: Rural Vs Rural Appalachian Women
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Rural women experience higher mortality rates from breast, cervical, and colorectal cancers due to lower cancer screening rates. Remote interventions promote cancer screenings effectively and increase screening rates for rural women by removing access barriers. However, no previous studies have compared the effectiveness of screening interventions among geographically and culturally distinct regions, such as the Appalachian region. The purpose of this study was to compare the effectiveness of two interventions, tailored and interactive DVD (TIDVD) vs. TIDVD + patient navigation (TIDVD+PN) vs. usual care (UC), between rural and rural Appalachian women in Ohio by measuring the number of participants who became current with needed cancer screenings 12 months post-randomization. Screening status was collected by medical record review at baseline and 12 months post-randomization. Overall, both interventions increased the percentage of women who became current with screening, and TIDVD+PN resulted in women being 6.44 times as likely to become current with screening when compared to UC. No differences in intervention effectiveness were found by Appalachian status. Use of tailored intervention effectiveness for rural women and distinct rural subgroups like Appalachia provides support for increasing screening rates and decreasing mortality rates for breast, cervical, and colorectal cancer among these populations.

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Anitra Karthic

Mentor: Dr. Vanessa Olbrecht

Project Title: Application of Behavioral Economic Strategies to Enhance Recruitment into a Pediatric Randomized Clinical Trial

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: One of the greatest obstacles faced in clinical trials is patient recruitment. Underenrollment results in underpowered studies, which prevent findings from being generalized. Behavioral economics (BE) offers "nudges" or strategies that may enhance recruitment. This study assessed the impact of BE strategies versus the standard biological approach on the recruitment of pediatric patients into a randomized clinical trial. This is a single-center, prospective, single-blinded and randomized clinical trial recruiting patients between the ages of 12 and 18 who are undergoing surgery requiring postoperative admission and narcotics administration. Patient-parent dyads were randomized to watch a BE-informed recruitment video or standard biological recruitment video. Information on the primary outcome and secondary outcomes were collected in a post-survey. There was no statistically significant difference in enrollment rates between those who watched the BE-informed video versus the standard biological video. There was no significant difference in median response scores to questions regarding intention adhere to therapy, acceptability of therapy, and perceptions of treatment burden, efficacy, and risk. The BE-informed video did not increase enrollment into a randomized clinical trial assessing the impact of a biofeedback-based virtual reality intervention for postoperative pain management. Either a BE or biological approach would be sufficient for patient recruitment.

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Lily Kaufman

Mentor: Dr. Tasha Posid

Project Title: Addressing Stereotypes in Healthcare: Insights for Designing an Implicit Bias Curriculum for Medical Students

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Implicit biases or unconscious stereotypes are formed on the basis of identity (e.g. gender, sexual orientation, race/ethnicity), influencing behavior and judgment when interacting with people across contexts. Within a physician-patient relationship, implicit biases held by physicians and patients may impact communication, decision-making, and medical treatment/outcomes, perpetuating healthcare disparities. Although some curricula and education around implicit bias have been developed, formal research and prospective interventions are limited, particularly at the medical trainee level. This project seeks to: (1) Identify what types of implicit bias education and training medical trainees have received to date and explore what type and how much more training about implicit biases trainees need to succeed in their position and careers via a formal needs assessment; (2) Assess a workshop-based implicit bias curriculum for resident physicians to provide insight for designing a similar curriculum for medical students. Overall, medical trainees indicated an interest in and need for cross-cultural and implicit bias mitigation training across training level. Internal Medicine residents who participated in a pilot implicit bias mitigation workshop demonstrated improvements in knowledge of implicit bias and implicit bias mitigation strategies and demonstrated an ability to use those strategies at delayed post-test evaluation of relevant clinical cases.

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Austin Keller
Mentor: Dr. Michael Root
Project Title: Quantitative Modeling of Multi-site Inhibition of HIV-1 Entry
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Viral fusion glycoproteins in their trimeric state mediate entry of enveloped viruses through a series of conformational changes that drive membrane fusion. Antiviral agents known as fusion-inhibitors target an intermediate conformation and block formation of the fusogenic structure. Because the three inhibitor binding sites on the protein are only transiently exposed, the antiviral potency depends on both equilibrium and kinetic factors describing inhibitor interactions and protein conformational transitions. A two-step mathematical algorithm was developed to quantitatively analyze three-site intermediate state inhibition of homo- and heterotrimeric fusion glycoproteins. First, Markov-analysis was employed to compute the probability that each trimeric species in the viral population achieves fusogenic conformation in the presence of inhibitor. Second, combinatorial statistics was utilized to account for variation in the number and distribution of trimeric species on viruses in a given sample. The method was applied to inhibition of the HIV-1 fusion glycoprotein Env to determine the number of 5-Helix fusion-inhibitors required to block trimer function. Data for analysis were obtained using HIV-1 generated from cells coexpressing inhibitor-sensitive and resistant Env protomers at various ratios. Results suggest that a single 5-Helix molecule is sufficient to block Env trimer function and that few are required to promote HIV-1 entry.

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Tricia Keller
Mentor: Dr. Robert Cooper
Project Title: Health Literacy of a Student-Run Free Clinic and Its Relationship with Successful Referrals: A Pilot
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: In 2018, our clinic assessed potential barriers to referral success and have adjusted the care model. We assessed our care model and if patients with lower health literacy have lower rates of referrals. We also hypothesized that patients presenting to a free clinic would score lower on health literacy surveys than the average population. Participants completed the Short Test of Functional Health Literacy in Adults (S-TOFHLA) and a demographic survey, and then a chart review was conducted to determine whether the participant received a referral and if that referral was successful. 70 patients completed the S-TOFHLA, 63 participants had adequate functional health literacy, 1 participant had marginal functional health literacy, and 6 participants had inadequate functional health literacy. 24 patients from the cohort received a referral, and 13 of these referrals were successful. Our free clinic population did not reflect the average health literacy of the United States, nor did it reflect our clinic's previous health literacy assessment in 2018. Our data did not support that health literacy impacts successful referral rates. Further studies on the demographics of free clinic patients and how patient populations may be changing could help us address and serve the needs of our communities better.

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Patrick Kennedy
Mentor: Dr. Prasanth Pattisapu
Project Title: Impact of Social Determinants of Health on Dysphagia and Aspiration Natural History
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Introduction: The rates of dysphagia and aspiration are increasing in infants. For undetermined reasons, these rates show inequity in outcomes of publicly insured infants. This study investigates the role that social determinants of health (SDH) play in the natural history of dysphagia and aspiration in otherwise healthy infants. Methods: This retrospective cohort chart review examined healthy, full-term (≥35 weeks) infants under 1 year old who received a Videofluoroscopic Swallow Study (VSS) with a Rosenbek Penetration Aspiration Scale score ≥3 from 2014 to 2021 at Nationwide Children's Hospital. Patients with cardiac abnormalities requiring surgery, genetic/syndromic diagnosis, cleft palate/lip, structural airway abnormalities, airway surgeries (non-diagnostic), cerebral palsy, stroke, history of traumatic brain injury, hypoxic-ischemic encephalopathy, moderate-severe seizure disorders, and history of ECMO were excluded. We collected demographic, resolution, and final VSS data, cross-referencing Geographic Identifiers (GEOIDs) to the Child Opportunity Index (COI), and examining the education, health and environment, and social and economic index sub-scores. A time-to-event analysis with Kaplan Meier/Cox regression was created to determine the relationship between COI sub-score and time-to-clinical resolution. Results: 230 patients met inclusion criteria; 172 had complete COI scores, clinical data, and GEOIDs. Of the 172 included patients, 108 (62.3%) were male, 33 (19.2%) had deep penetration of aspiration, and 134 (77.9%) had normalization of diet. Males were less likely to normalize compared to females (HR.45, 95 Confidence interval .31-.66). As compared to very high COI, patients with high, moderate, and low COI were less likely to resolve their dysphagia (High HR .48, CI .25-.92), (Moderate HR .46, CI .24-.91), (Low HR .26, CI .13-.53). As compared to very high COI, pts with very low COI approached significance (HR .55, CI .3-1.01).
Conclusions: This is one of the first studies to determine that there is significant inequity in the rates of resolution of dysphagia and aspiration in publicly insured infants. Further research to eliminate this disparity is needed to ensure the highest quality of care for publicly insured infants

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Mackenzie King
Mentor: Dr. Tamar Gur
Project Title: Prenatal Stress and Bifidobacterium dentium: Implications for Preventing Neuroinflammation and Behavioral Outcomes
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Prenatal stress has been linked to negative behavioral and neurodevelopmental outcomes for the offspring. The Gur Lab has shown that stress induces intrauterine inflammation in pregnant mice which has been associated with elevations in inflammatory cytokines and chemokines in the fetal placenta and brain, including a significant increase in the chemokine CCL2. Recent studies have shown that there is a complex relationship between stress-induced inflammation, changes in the microbiome, and tryptophan metabolism. Tryptophan is metabolized via three pathways: the indole, kynurenine, and serotonin pathways. Serotonin is a key neurotransmitter that is known to play an important role in neurodevelopment. Studies investigating the microbiome and gut-brain axis have shown that the probiotic Bifidobacterium dentium may play a role in mediating inflammation and tryptophan metabolism. Using a mouse model of prenatal stress and gavage with Bifidobacterium dentium, our research suggests a link between B. dentium treatment during the prenatal period and decreases in neuroinflammation and systemic inflammation in the fetus. This study also indicates a potential connection between B. dentium and certain components of tryptophan metabolism, which may ameliorate negative neurodevelopmental outcomes.

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Lily Kreber

Mentor: Dr. Tendy Chiang

Project Title: Assessing the biocompatibility and regeneration of electrospun-nanofiber composite tracheal grafts

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Composite tracheal grafts (CTG) support the regeneration of host epithelium while maintaining graft structure. In this study, we examine the biocompatibility, graft epithelialization, vascularization, and patency of different electrospun, nanofiber CTG in our current PDTG model as a method for long segment airway reconstruction. PDTGs were implanted into syngeneic hosts using our model of orthotopic tracheal transplant, and then the electrospun splints made from PGA, PLCL, and PLCL/PGA were sutured onto PDTGs. Survival was maintained across all experimental groups and did not fall below 80%. None of the animals that survived until planned endpoint demonstrated any evidence of respiratory distress. Graft patency was maintained across all groups as demonstrated by microCT images. Grossly, PDTG+PGA degraded significantly, while PLCL+PDTG and PLCL/PGA+PDTG maintained their structure. Microvasculature was observed across the surface of the composite grafts. Histologically, no excessive cellular infiltration was seen in any groups nor any encapsulation of the splint. Visually, the microvasculature and epithelium are identical across all groups, suggesting that composite grafts did not hinder endothelialization and epithelialization.We found that all electrospun, nanofiber CTG are biocompatible and did not affect graft patency, endothelialization and epithelialization. Future directions will explore further methods of CTG to accelerate graft regeneration.

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Shannon Lavender

Mentor: Dr. Jenny Wang

Project Title: The Functional Role and Mechanism of S100A4 in Colon Cancer Metastasis

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: The Functional Role and Mechanism of S100A4 in Colon Cancer Metastasis S100A4 is associated with many disease states especially those related to inflammatory mechanisms and pathophysiology. 2 Due to the inflammatory mechanisms, S100A4 is an interesting gene to study in the field of oncology specifically colorectal cancer. In this study, a S100A4 overexpression plasmid and knockout plasmid were designed using primer and guideRNA software. The overexpression plasmid was digested, S100A4 was amplified by PCR, and the two were combined and cloned by ligation independent cloning. The overexpression plasmid was purified and confirmed by sequencing. The knockout plasmid was digested, the guideRNAs were annealed, and the ligation product was then used for a transformation reaction. The purified plasmid was confirmed by sequencing, used to transfect HEK293 cells, and then infect a MC38 cell line. The infected MC38 cells were harvested and confirmed S100A4 protein downregulation by western blot. The methods mentioned were useful in downregulating the target protein; however, the overexpression plasmid methods were unable to be fully investigated. These findings indicate that the techniques used for the downregulation of S100A4 was successful and will likely aid the cell culture and protein workflow for overexpression of the protein.

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Anna Leone
Mentor: Dr. Peter Lu
Project Title: Comparison of Colonoscopic Versus Fluoroscopic Colonic Manometry Catheter Placement in Children
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship
Abstract: Colonic manometry is an important tool to understand motility of the colon in pediatric patients. It measures intraluminal colonic pressure and coordination of movement through a high-resolution catheter. There are two methods of rectal catheter placement: colonoscopy (via gastroenterology) and fluoroscopy (via interventional radiology). We compared the two placement methods based on extent of colon studied and catheter displacement events. A review of colonic manometry studies was done from May 2015-May 2022. We recorded demographics, medical/surgical history, and catheter placement information, including route, location, and displacement. We included 492 studies performed in 448 children. 278 studies used colonoscopic placement in 254 children; 214 studies used fluoroscopic placement in 194 children. Results showed children who underwent colonoscopic placement were older, more likely to be male, and more likely to have FC. Children who underwent fluoroscopic placement were more likely to have a diverting ostomy. Colonoscopic placement led to more colon studied, with 3.34 average versus 2.92 average by fluoroscopy. There was no difference in catheter displacement. Colonoscopic catheter placement was superior to fluoroscopic placement in terms of extent of colon studied. However, there may be certain populations for whom fluoroscopic placement is preferred, particularly patients with a history of diverting ostomy.
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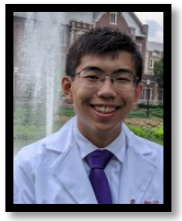

Max Liu
Mentor: Dr. Carol Toris
Project Title: Getting Eye Pressure Data Outside Clinic to Understand Variations in Glaucoma Drug Response
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship
Abstract: The only modifiable risk factor for glaucoma is intraocular pressure (IOP). Ophthalmologists monitor glaucoma patients by measuring IOP in clinic over time, but this produces an incomplete picture of disease progression because IOP fluctuates throughout the day. iCare Home is a tonometer that allows patients to measure their IOP at any time and can capture 24-hour variations in IOP. Patients were asked to measure their IOP for 1 week after enrolling in the study (baseline), 1 week on timolol or latanoprost, at least 1 week during washout, and 1 week on the second medication. Cosinor rhythymometry, which fits a cosine curve to a dataset, was used to model patients IOP throughout the day and night. Latanoprost and timolol treatment reduced mesor IOP, a rhythmically adjusted mean, compared to baseline. Mesor IOP during timolol washout was lower than baseline, but mesor IOP was not lower during latanoprost washout. There were no statistically significant differences in time of peak IOP and amplitude, a measure of variability for cosine-rhythmic data. The reduction in mesor IOP compared to baseline was persistent throughout the entirety of timolol washout. Mesor IOP hovered around baseline after one week of latanoprost washout.
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Bradley Loomis

Mentor: Dr. Esmerina Tili

Project Title: Role of lumbar drain placement for ischemic spinal cord injury prevention for patients undergoing open and endovascular thoracoabdominal aortic aneurysm repair: a single institution study

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Introduction: Paralysis after aortic aneurysm repair poses significant morbidity and mortality to patients. Historically, paralysis rates ranged upwards of 20-30% after open aortic aneurysm repair, and with thoracic endovascular (TEVAR) approaches, ranges from 5-20%. It is thought that changes in spinal cord perfusion pressure during open repair or deployment of the endovascular stent in TEVAR are involved in the pathogenesis of ischemic insult to the spinal cord. Methods: A single-institution retrospective cohort study analyzed 247 patients that underwent surgical repair for thoracoabdominal aortic aneurysms. The following groups were analyzed: open without spinal drain, open with spinal drain, TEVAR with spinal drain, TEVAR without spinal drain. Results: We found that 35 (14%) patients developed paralysis out of 247 patients. We did not find statistical significance in the treatment groups and did not find that lumbar drain placement reduced the incidence of paralysis. Notably, there was a significant difference in the mortality after aortic aneurysm repair. Conclusion: Our findings do not support the use of selective prophylactic lumbar drain placement to reduce the incidence of paralysis. We implore the future research into specific miRNA and biomarker changes within the cerebrospinal fluid of these patients to further understand the pathogenesis of ischemic injury.

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Srividhya Madireddy

Mentor: Dr. Lara McKenzie

Project Title: Pediatric injuries associated with martial arts treated in emergency departments in the United States, 2004-2021

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Background and Objectives: The objective of this study is to describe the epidemiology of martial arts-related injuries presented to US emergency departments (EDs) among pediatric patients. Methods: Data were obtained from the National Electronic Injury Surveillance System (NEISS) for patients 3 to 17 years of age treated in US EDs between 2004 and 2021. Cases were excluded if the injury could not be directly attributed to participation in a martial arts activity. A total of 5656 cases were included in the analyses. Results: An estimated 176,947 children were treated for martial arts injuries in US EDs from 2004 to 2021. The average injury rate was 2.22 per 10,000 children aged 12-17 and 1.15 for children aged 3-11. The second-most common mechanism of injury was other (17.5%) and being kicked (17.1%) for karate, being kicked for taekwondo (20.8%), twisting/bending for jiujitsu (17.0%), and being thrown for judo (22.9%). Conclusions: Older children were injured twice as much as younger children. The difference in second-most common mechanisms of injury may be attributed to the unique fighting approaches in each style. Recommendations for injury prevention support the restriction of injury-prone fighting moves and the use of protective gear in both formal and informal settings.

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Amir Mafi
Mentor: Dr. Paul Stoodley
Project Title: Mapping of Bacterial Biofilms on Retrieved Implants
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship
Abstract: Periprosthetic joint infection (PJI) remains a challenge in orthopedic surgery impacting the lives of numerous patients with implants. Mapping the infectious bacterial biofilms on implants has been a major research topic in the past few years. In this project, we will be using scanning electron microscopy to locate common PJI bacterial biofilms in the gap between the metal tibial tray and polycarbonate component of knee implants. Our hypotheses are as follows: 1) bacterial biofilms are present, indicating that this gap provides a protective reservoir for bacteria by limiting the reach of antibiotics and host immune cells and 2) the biofilms grow on both the polycarbonate component and the tibial tray. The novelty of this study is the location of interest, the space between the polycarbonate component and the tibial tray from retrieved knee implants, which is less well studied. The ultimate goal of this study is to shed more light on implant infections to help find appropriate treatments targeting this gap. Additionally, this project can help design implants that are less prone to bacterial growth.
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Layna Mager
Mentor: Dr. Stacy Ardoin
Project Title: Analysis of C4B Gene Copy Number as a Predictor of Cardiovascular Disease in Systemic Lupus Erythematosus
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship
Abstract: Cardiovascular disease is a major cause of morbidity and mortality in patients with Systemic Lupus Erythematosus. Understanding the mechanism and progression of disease in this patient population is essential. Using the Ohio State University Lupus, Vasculitis, and Glomerulonephritis Registry and Biorepository and patient's complement genetic profiles, we will analyze the relationship between increased C4B GCN and cardiovascular disease in patients with SLE. More specifically, we will be looking for hypertension and markers of cardiovascular damage according to the Systemic Lupus International Collaborating Clinics/American College of Rheumatology Damage Index for SLE (SLICC/ACR DI). With this work, we hope to elucidate the role C4B GCN has on atherosclerotic progression. A better understanding of genetic predisposition may warrant earlier cardiovascular risk assessment and treatment in at-risk subpopulations.
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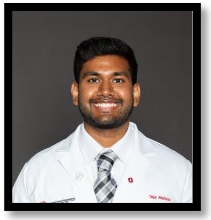

Teja Mallela
Mentor: Dr. Benjamin Kaffenberger
Project Title: DEMOGRAPHIC, COMORBIDITY, AND BACTERIAL ASSOCIATIONS OF HIDRADENITIS SUPPURATIVA
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Hidradenitis Suppurativa is a chronic skin disease characterized by reoccurring abscesses or nodules [1]. Hidradenitis Suppurativa is not a common disease and is not fully understood. This study is a retrospective cohort analysis using an established database of Wexner Medical Center 88 inpatient encounters with Hidradenitis Suppurativa from April 1, 2014, until December 31, 2021. In this study, the demographic, comorbidity, and bacterial factors of each patient encounter were collected. The goal of this study is to determine whether there is a correlation between patient demographics and comorbidities and the bacterial composition of their wounds. Additionally, this study also factored in the specific method of culture for each patient encounter to determine if that also played a role in the bacterial loads for each encounter. The results of this study may contribute to a better understanding of the many factors that affect Hidradenitis Suppurativa patients and hopefully shed some light on how to focus treatment for patients with this condition. The future goals for this project are to conduct an agreement of methodology analysis to see any potential differences in bacterial species based on the method of culture, and regression analysis to determine surgery predictors for this condition.

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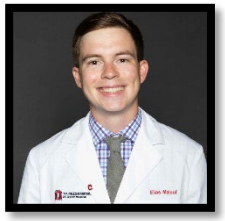

Elias Maloof
Mentor: Dr. Kate McCracken
Project Title: The Effect of Anorectal Malformations and Hirschsprung Disease on Body Image and Daily Life In Adolescents
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Anorectal malformations and Hirschsprung disease are congenital colonic conditions that have profound surgical and medical implications. The outcomes of medical management have been studied, but the impact of these conditions on the daily lives and body image of adolescents is not currently well described. This study hopes to describe the impact of ARM and HD on body image and the daily lives of children ages 8 to 18. Chart review was done to collect demographic, past medical, and surgical information. Surveys were sent on the REDCap database, and data was collected for 4 weeks. Descriptive analysis was done on the impact of ARM/HD on aspects related to the effect of the conditions on body image and daily life using statistical frequency. 36.5% of our population had HD, 63.5% had ARM. Of respondents, 75% stated they were somewhat or not at all concerned with the appearance of their body parts affected by their condition. 78% of participants stated mild to moderate distress, torment, or pain because of either ARM or HD, with just 8% reporting severe symptoms. The response rate was approximately 6%, but the data is still valuable, and we intend to model future, prospective studies on this research.

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Matthew Marquardt

Mentor: Dr. Carmen Quatman

Project Title: A Mixed-Methods Needs Assessment for a Longitudinal Surgical Preparation Course in Undergraduate Medical Education

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Objective: To assess the unmet needs associated with skills-based surgical education during the pre-clerkship years of medical school. Design: A mixed-methods design was employed that leveraged semi-structured interviews and quantitative surveys followed by qualitative analysis Setting: The Ohio State University Wexner Medical Center and The Ohio State University College of Medicine Participants: 18 participants were enrolled representing second year medical students with an interest in surgery, surgical residents and attending surgeons representing a diverse array of surgical specialties. Results: Unanimous support for the creation of a pre-clerkship surgical skills course emerged due to two main themes: 1) gaps in current surgical education offerings, and 2) the value of early exposure to surgery and surgical skills followed by longitudinal practice. The components that participants deemed essential to a well-designed course were also revealed. Each stakeholder group (medical students, residents, surgeons) would benefit across all factors uncovered. Conclusions: There is a significant unmet need across all stakeholder groups for the creation of a longitudinal surgical skills course for pre-clerkship medical students. Future studies should seek to design a curriculum based on these study results and assess a pilot version of the curriculum to understand its feasibility under application.

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Jasmine Mcmillan

Mentor: Dr. Shigeo Tamiya

Project Title: Role of extracellular matrix stiffness on myofibroblastic transformation of Muller glia

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: This project examined the mechanisms involved in extracellular matrix (ECM) stiffness-induced myofibroblastic transformation of Muller glia associated with proliferative vitreoretinopathy. Immunostaining and fluorescent microscopy were used to examine localization of alpha smooth muscle actin (a marker of myofibroblasts), EdU (a marker of cell proliferation), and glutathione synthetase (a marker of Muller glia). Results showed that higher PAG stiffness was associated with increased overall cell count and increased EdU-positive cell count. Additionally, cells positive for alpha smooth muscle actin (a-SMA) were more likely to express EdU than a-SMA-negative cells. Higher counts for both total and EdU-positive cell number were observed in cells stimulated with IGF-1 compared to the control condition, and there was a trend toward reduced a-SMA expression in IGF-1-stimulated cells compared to TGF-B1-stimulated or cells in the control condition. Surprisingly, a trend toward lower average a-SMA area per cell in higher PAG stiffness was noted but did not reach significance. The results suggest that MG cells that have transitioned to myofibroblasts as indicated by a-SMA expression experience increased cell proliferation compared to non-transformed Muller cells. Furthermore, there appears to be a complex relationship between ECM stiffness and growth factors in myofibroblastic transformation of MG cells that requires further study.

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Molly Meeker

Mentor: Dr. Jason Souza

Project Title: The Effect of an Integrated Orthoplastic Approach to Extremity Trauma on Efficiency and Outcomes

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Background: An orthoplastic approach to limb salvage consists of principles and practice of orthopedic and plastic surgery applied simultaneously to optimize outcomes in limb reconstruction. This approach is hypothesized to yield better outcomes and improve the efficiency of care. To document the efficacy of the orthoplastic approach over the conventional approach, we have assessed the current approach to limb salvage at Ohio State University. Materials and Methods: ICD10 codes were used to identify patients who had received treatment for open tibial or ankle fractures between 2018 and 2020. Subsequently, a retrospective chart review of these patients was conducted. Data characterizing the nature, timing, and clinical outcomes was abstracted. Results: A total of 104 records were identified. The average number of surgeries per patient requiring plastic surgery intervention was 4.32. In addition, the median days until soft tissue coverage was found to be 10 days. Conclusion: This retrospective chart review has supplied a foundational database of efficiency outcomes using conventional care methods in patients who required soft tissue management for their open tibial/ankle fractures. This data will be compared against the prospective data to be collected, yielding a deeper understanding of the outcomes an orthoplastic approach to extremity trauma can provide.

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Eric Min

Mentor: Dr. Gregory Pearson

Project Title: A Ten-Year Retrospective Review of Speech, Language, and Hearing Outcomes in Children with Craniosynostosis

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Craniosynostosis occurs when the sutures of a baby's skull merge too early in development. As surgical treatment is required for avoiding growth restrictions on the brain, this results in a poor prognosis. Therefore, the primary hypothesis of this project was that surgical treatment type and type of craniosynostosis will differentially influence the development of speech, language, and hearing disorders. To test this, data from 385 patients at Nationwide Children's Hospital for children diagnosed with craniosynostosis was analyzed. Information relating to these patients' demography, medical history, surgical history, clinical history, complications, and genetics were associated with variables related to speech, language, and hearing pathologies. Specifically, there was a focus on how surgical treatment type and type of craniosynostosis related to surgical outcomes and complications. Though the statistical tests are not yet complete, these results have shown preferences in surgical technique and preferred treatment timelines. The ultimate plan is to create surgical treatment recommendations for all types of craniosynostosis, detailing the benefits and differences among them. This is in-line with the overarching goal of this project: to establish the prevalence and identify the risk factors of speech, language, and hearing disorders in children surgically treated for craniosynostosis.

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Logan Moews

Mentor: Dr. Christopher Kaeding

Project Title: Long Term Outcomes of Meniscus Repair Surgery

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: The purpose of this study was to quantify failure risk of meniscus repair surgery and assess patient reported outcomes at a minimum of 10 years post-operative. We hypothesize that failure risk is low and those who undergo additional surgery on the index meniscus will demonstrate poorer patient-reported outcome scores. Patient demographics and surgical data were retrieved from chart review of meniscus repairs performed at a single institution between 2006 and 2012. Patients were contacted via phone call to identify patients who underwent additional surgery on the index meniscus (defined as repair failure). Patient reported outcome scores (Knee Injury and Osteoarthritis Outcome Score [KOOS], Marx activity score, and the subjective International Knee Documentation Committee [IKDC] score) were also recorded. Thirty patients completed the follow up at a mean of 13.5 years following meniscus repair (Range 10.3 to 16.8 years). Seven patients (23.3%) reported a subsequent surgery on the index meniscus. There were no significant differences noted in outcome scores between those who underwent repeat meniscus surgery and those who did not. Meniscus repair surgery failure risk is relatively low at long term follow up. Further study with larger numbers is required to confirm these findings.

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Gabe O'hara

Mentor: Dr. Lluis Samaranch

Project Title: Assessing vector delivery and transgene expression for a novel, pro-drug gene therapy approach to substance-abuse treatment

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: The reward circuitry within the brain is composed of complex communication between the ventral tegmental area (VTA) and the nucleus accumbens (NAc). The neuroadaptation and irregular function of this system plays a major role in substance abuse, binge eating disorder, and other associated mental disorders. In this project, we utilized stereotaxic surgery to deliver an adeno-associated viral vector encoding human Aromatic L-Amino Acid Decarboxylase enzyme (AAV2-hAADC) into the NAc and VTA of rats. Four weeks following the bilateral infusion of the vector, brains were collected and analyzed via HPLC, histology, and immunochemical staining. Targeted overexpression of the enzyme, responsible to produce dopamine (DA) from the precursor levodopa (L-Dopa), will result in the at-site production of increased DA neurotransmitter following systemic administration of the DA precursor L-Dopa. Through this pro-drug approach, we hope to control how much and when DA is produced in target areas. Accumulating evidence suggests that modulating the DA signaling circuitry of the reward pathway can alleviate symptoms of substance abuse and substance use-associated disorders. Characterizing novel gene therapy approaches to modifying this brain circuitry could lead to new, long-lasting, stable therapies for addiction and pave the way to identifying new treatments for other brain disorders.

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Cassandra Pasadyn

Mentor: Dr. Katherine Brownlowe

Project Title: Risk Factors for Repeated Involuntary Sedation of Patients in Psychiatric Crisis in the Emergency Department: A Retrospective Chart Review

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Involuntary medication of agitated mental health patients in the ED is a practice for medical assessments of patients and safety of staff. Consequences of chemical sedation, especially repeated involuntary medication, are substantial, and rates are little reported. We aim to obtain baseline data on treatment disparities so ED staff can better identify when intervention is needed. A retrospective chart review was conducted on adults who present to large EDs for mental health care 01/01/2020-12/31/2021. Patients who received a psych-consult during the study timeframe qualified with involuntary medicated inclusion criteria. A list of data variables was extracted from patient charts. Outcomes were seclusion room use, security calls, and additional IM/IV chemical sedation type. Of 960 patient charts screened, 17.5% received involuntary sedation, 33% of which received repeated involuntary sedation. Mean sedation was 2.5 rounds. 35.1 years was the mean age. 57% male, 39% female were involuntary medicated. 43.5% of our patients were white, 42.9% black. 1/2 patients were brought in by police. ED security was called for 79.6% of patients. There are many factors contributing to the use of involuntary sedation. It is critical to study the rate of chemical restraint, its outcomes, and uncover strategies that reduce its use.

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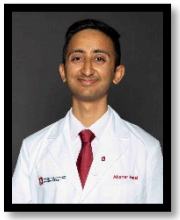

Akshar Patel

Mentor: Dr. Ryan Rauck

Project Title: Does Decreased Physical Therapy Adversely Affect Outcomes after Arthroscopic Rotator Cuff Repair?

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Introduction: We investigated whether patients who received an arthroscopic rotator cuff repair (RCR) in early 2020 had a difference in outcomes compared to patients who received it the previous year. Methods: Patients were divided into cohorts based on year of surgery. Demographic information, range of motion (ROM), and physical therapy were analyzed. Results: This study identified 23 and 35 patients in Cohorts 1 and 2, who had a minimum of 1 year follow-up. 2020 patients did not have improvements in forward elevation (151Âº to 156Âº; p-value=0.62), external rotation (50Âº to 50Âº; p-value=0.70), and internal rotation (L2 to L2; p-value=0.20) while the control group did (FE: 140 to 146; p-value=0.15; ER: 57Âº to 55Âº; p-value=0.05; IR: L3 to T10; p-value=0.02). Patients in 2019 completed more physical therapy sessions (2019: 25.2; 2020: 17.8; p=0.11) in a shorter duration of time (2019: 145.3 days; 2020: 162.6 days; p-value=0.74). Patients in 2020 also experienced a significant delay from date of surgery to date of first physical therapy session (2019: 23 days; 2020: 42 days; p-value=0.05). Discussion: Patients who underwent arthroscopic RCR in early 2020 had a longer delay to starting PT, did less PT overall and had more limited ROM at final follow-up.

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Samuel Paul

Mentor: Dr. William (David) Arnold

Project Title: Electrical Impedance Myography as a Biomarker in Adults with Spinal Muscular Atrophy

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Background: Spinal muscular atrophy (SMA) is an autosomal recessive motor neuron disorder that is caused by insufficient levels of survival motor neuron (SMN) protein. Electrical impedance myography (EIM) has shown promise in pediatric SMA populations but hasn't been explored in adults with SMA or in patients undergoing SMN restoring treatments. Design: Data were analyzed from 12 ambulatory and 23 non-ambulatory adults with SMA enrolled in two open label nusinersen studies. EIM parameters of phase, reactance, and resistance at 50 kHz were used for analyses. Results: Phase and resistance were significantly different between ambulatory and non-ambulatory groups in the wrist extensors, biceps, and tibialis anterior. Biceps resistance was correlated with elbow flexion strength on handheld dynamometry. The revised upper limb module was correlated with wrist extensor phase and bicep phase. There was a moderate to strong negative correlation with tibialis anterior resistance and the 6 minute walk distance. EIM also correlated with motor unit electrophysiology. Conclusions: EIM is a simple, non-invasive, and entirely painless assessment. EIM was able to detect significant changes between ambulatory and non-ambulatory patients. Furthermore, EIM was correlated with other assessments of muscle strength, physical function, and electrophysiological assessments of motor unit number and function.

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Jordyn Puccio

Mentor: Dr. Brittany Dulmage

Project Title: Investigation of clinicopathological, molecular, and immune profile characteristics of Primary Cutaneous B-Cell Lymphomas (PCBCL).

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Primary cutaneous marginal zone lymphoma (PCMZL) and primary cutaneous follicle center lymphoma (PCFCL) account for a significant portion of all cutaneous lymphomas. Although data is available on the diagnostic and clinical features of PCFCL and PCMZL, the relevance of clinical and pathological features with disease management needs to be further explored. Because there are significant barriers to some populations in seeking dermatological care(10,11), creating a standardized protocol for treatment of PCBCL would be beneficial to both patient and provider. A retrospective chart review of patients with PCMZL and PCFCL treated at The Ohio State University was conducted to analyze how factors such as, positive autoimmune labs of ANA, SSA, SSB and H. Pylori and bone marrow biopsy and BCL6 staining pertain to patient prognosis, as defined by need of systemic treatment (chemotherapy and rituximab). Findings reveal that the majority of patients that received systemic treatment had a PET scan and ANA labs performed. Patients with PET scans indicating lymph nodal involvement received systemic treatment more than those without lymph nodal involvement. H.pylori, SSA/SSB and bone marrow biopsies were not performed for the majority of patients needing systemic treatment. These findings provide background for treatment guidelines for PCFCL and PCMZL patients.

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Jack Redick

Mentor: Dr. Zhiwei Hu

Project Title: Targeting Triple Negative Breast Cancer Cells with L-ICON Proteins for Photodynamic Therapy (PDT)

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: The advent of immunotherapy has improved breast cancer outcomes in ER+, PR+ and Her2+ breast cancer subtypes. Triple negative breast cancer (TNBC), which has no immunotherapy targets, has the worst prognosis. To address this issue, identifying and targeting a specific receptor through photodynamic therapy could revolutionize the treatment protocols. To explore our aims, the TNBC cell line MDA-MB-231was used as a model. First, it was shown that TF is highly expressed on these TNBC cells by flow cytometry and ELISA using several commercial antibodies against TF (anti-CD142). Then, ELISA was used to show that a derivative of TF, L-ICON3-R435H (patented by Hu lab) bound to TF very strongly, with even greater binding than the positive control. Once we confirmed the binding of L-ICON3-R435H to the TNBC cells, we constructed a conjugate of L-ICON3-R435H to a photosensitizer (verteporfin) using a previously established chemical conjugation method. We tested the binding of L-ICON3-verteporfin conjugate using a cancer cell ELISA and confirmed that the L-ICON3-verteporfin conjugate retained the binding activity to the TNBC cells. In follow-up experiments, we will evaluate the ability of L-ICON3-R435H-PS conjugate to induce cancer cell killing in vitro and in vivo mouse models, separately via photodynamic therapy and immunotherapy effects.

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Carson Rogge

Mentor: Dr. L Eugene Arnold

Project Title: Trainer Fidelity and Intervention Efficacy in ADHD Neurofeedback

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Neurofeedback, the use of live EEGs to help train individuals to modify brain activity, is a tool being used and investigated as a treatment for Attention-Deficit Hyperactivity Disorder (ADHD). The International Collaborative ADHD Neurofeedback (ICAN) study investigated the efficacy of using neurofeedback compared to 'sham' neurofeedback for pediatric ADHD in a randomized controlled trial (Arnold et al., 2021). This study seeks to characterize a potential mechanism for the reduction in ADHD symptoms: the fidelity of execution of the trainer-led session goals. We hypothesized that the fidelity of instruction given to a participant and other therapeutic activity would positively correlate with inattention improvement at the end-of-treatment. Quality differences in neurofeedback delivery through self-reported fidelity ratings were used to measure goal completion. Each participant was given a combined fidelity score from every session report. Trainer adherence to teaching methods was significantly related ($p=0.0056$) to inattention ratings from parents and teachers at the end of the study. We therefore concluded that there is a positive relationship between trainer compliance and the participant's inattention ratings. By characterizing and quantifying interactions that are more efficacious, we may subsequently be able to investigate possible explanations for the significant large pre-post effect of the control treatment.

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Claire Ruben
Mentor: Dr. Jason Bischof
Project Title: Immune-Related Adverse Events in Patients on Immunotherapy Presenting to the Emergency Department: A Retrospective Cohort Study
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship
Abstract: Immunotherapy is a preferred line of treatment for a wide array of hematologic and solid-tumor malignancies. Although these therapeutics are generally well tolerated, serious complications are possible and pose significant threat to patients. The aim of this study is to describe the incidence, timing, type, rates of misdiagnosis, and relevant clinical characteristics of immune-related adverse events (irAEs) in patients on immunotherapy presenting to the emergency department (ED) at a large, academic medical center associated with a comprehensive cancer center. In our cohort of 1,148 patients on ICIs, 391 had at least one irAE (34.1%). Among patients with irAEs, 169 presented at least once to the ED during the 3 months preceding or following the diagnosis of an irAE (43.2%). The most common irAEs included dermatitis/rash/pruritis (n=140, 35.8%), colitis/diarrhea (n=113, 28.9%), and thyroid abnormality (n=109, 27.9%). IrAEs were suspected by the ED treating team in 47.8% and 53.5% of irAE-related encounters preceding and following an oncologist's irAE diagnosis, respectively. Providers initiated treatment for irAE in 39.1% of ED encounters. Identification of irAEs in the ED remains poor, despite an ED's association with a large, academic medical center affiliated with comprehensive cancer center.
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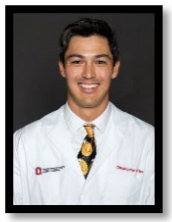

Christopher Rutter
Mentor: Dr. Carmen Quatman
Project Title: Assessing a Surgical Preparation and Skills Curriculum for Preclinical Medical Education
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship
Abstract: Undergraduate medical education has traditionally been extremely limited in the surgical opportunities it provides to preclinical medical students. A pilot of the SurgPrep Program, a longitudinal preclinical curriculum with 6 sessions on high-value surgical topics, was proposed. Pilot results indicated improvements in all areas of the curriculum following sessions with an average improvement in skills / knowledge of +1.35/5 from before to after the course, demonstrating the effectiveness of the curriculum. Lessons from the pilot were used to design a full-year, 12-session version of SurgPrep, which currently has 60 first-year medical students enrolled.
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Nathalie Sackey
Mentor: Dr. Michael Baria
Project Title: Effect of Patient History Factors on Meniscus Repair Outcomes
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Contributions of Socioeconomic Factors on Meniscal Repair Outcomes Nathalie Sackey BS1, Michael Baria MD2, David C. Flanigan MD2 The Ohio State University College of Medicine, The Ohio State University Wexner Medical Center Department of Orthopaedics, Sports Medicine Introduction: Meniscal tears are among the most common knee injuries. Successful meniscus repair is vital to avoid articular cartilage damage and osteoarthritis. There are many factors that contribute to the outcome and prognosis of meniscus repair including patient and injury factors. The goal of this study is to identify and evaluate demographic and socioeconomic factors that may influence patient outcomes after meniscus repair and establish appropriate expectations and tailor interventions based on patient history. Methods: Knee Injury and Osteoarthritis Outcome Score (KOOS) and International Knee Documentation Committee (IKDC) was used for analysis. Data was retrieved from chart review of an existing database and scores were compared between two groups: patients from the 16 wealthiest zip codes and the 16 poorest zip codes in the Columbus Metropolitan area. Results: The patients from the poorer zip codes had significantly lower KOOS and IKDC scores compared to patients from the wealthier zip codes. Future Plans: Work with a larger dataset to allow for controlling confounding variables.

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Paige Santee
Mentor: Dr. Maged Costantine
Project Title: Retina Vascular Biomarkers and Preeclampsia Outcomes
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Preeclampsia (PE) causes significant maternal morbidity and mortality and is classified as mild or severe depending on the degree of hypertension and end-organ damage. PE can cause serious vision threatening conditions, and prior work has shown associations between PE and retinal vascular changes. Improvements in PE related outcomes are limited by a knowledge gap on the mechanisms of PE vascular pathophysiology and progression to severe disease. This study will enroll 20 admitted patients with severe PE and 10 normotensive patients matched by gestational age who will be followed up to 2-4 months postpartum. The goal is to identify retinal vasculature signs of hypertension in pregnant women with PE as potential biomarkers for disease severity to fill the knowledge gap on PE-associated mechanisms of vascular pathophysiology and improve the outcome for these high-risk patients. Patient recruitment, data collection, and data and imaging analysis are still in progress. Currently, 2 cases and 1 control patients are enrolled and eligible with all imaging available. Recruitment and enrollment will continue as planned. Retinal imaging outcomes will be assessed on digital fundus photographs and optical coherence tomography and compared between case and control groups across the imaging timepoints specified.

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Divyaam Satija

Mentor: Dr. Mathew Henn

Project Title: Surgical and transcatheter bicuspid aortic valve replacement

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Recently, TAVR has emerged as a feasible alternative to SAVR for patients with severe AS. While TAVR has been extensively studied in patients with TAV, patients with BAV are less studied. BAV is the most common congenital-heart-defect, and these patients are susceptible to early degeneration of the valve and require intervention earlier than those with TAV. In studies evaluating TAVR, patients with BAV have been excluded in this younger population (2,3). Short term outcomes after SAVR and TAVR for patients with BAV have been evaluated in smaller European registries, but the long-term durability has not. We compared both short- and long-term outcomes of those who undergo TAVR vs SAVR with BAV. We hypothesize that the outcomes for SAVR would be better over the long term while TAVR can achieve similar short-term results. With this, we'd be able to further delineate who would most benefit from this exciting new technology. While we do not have the finalized results ready yet, we do plan to have them ready by the symposium. Once the final results have been analysed, we plan to apply to obtain data to compare national outcomes for TAVR vs SAVR in patients with bicuspid aortic valves.

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Karlee Schultz

Mentor: Dr. Vidu Garg

Project Title: A Novel Murine Model of Congenital Aortic Stenosis Displays Associated Aortopathy

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Valvular heart disease affects individuals of all ages and arises from both congenital and acquired causes. Among of the four valves, aortic valve disease contributes most significantly to mortality. A novel mouse model haploinsufficient for NOTCH1 and deficient for GATA5, two genes implicated in human aortic valve stenosis (AVS), was generated. Time course analysis demonstrated aortic valve leaflet thickening from late embryonic stages consistent with congenital AVS (CAVS). Additionally, aortic valve flow velocity was significantly increased in mutant models consistent with functional stenosis and these mice survived into adulthood with nearly 90% of mice exhibiting AVS by 16 weeks of age. Furthermore, the morphology of the aortic valve was also found to be bicuspid in a high percentage of these mutants. We hypothesized the mutant mouse models of CAVS exhibit dilation of the ascending aorta at 16 weeks of age. Examination of the ascending aorta by echocardiography demonstrated a subset of mice had a dilated aortic sinus. There was a moderate positive correlation between aortic velocity and aortic sinus diameter suggesting aortic dilation is a result of altered flow hemodynamics. Our data supports that aortopathy found in CAVS is due to altered hemodynamics but genetic contributors require additional investigation.

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William Schwartzman
Mentor: Dr. Christopher Breuer
Project Title: Preclinical Evaluation of Tissue Engineered Vascular Grafts
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: This study aims to characterize differences in calcification between tissue engineered vascular grafts (TEVG) and the clinical standard of polytetrafluoroethylene (PTFE) in an established ovine model. We implanted TEVGs (N=14) and PTFE grafts (N=9) as IVC interposition grafts in an established ovine model. 5-6 years after graft implantation, CT images were acquired at the levels of the graft in each subject with a slice thickness of 0.625 mm at 450 mA, and 120 kVp (Discovery PET/CT 690, GE Healthcare). Each slice was quantitatively assessed for calcium burden using calcium mass, only considering locations calcified if pixels met an established Hounsfield Unit (HU) CT image threshold of >130 HU. Calcium mass was then calculated as a product of mean density (HU) and volume of calcification within the graft. TEVGs showed resistance to calcification while PTFE grafts showed a tendency to calcify heavily. The difference in mean calcification scores was statistically significant between the two cohorts ($p = 0.0002$). The resistance of TEVGs to calcification when compared to the clinical standard of PTFE grafts is of major clinical interest since ectopic calcification is the major contributor to late-term graft failure.

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Anamika Shah
Mentor: Dr. Bimal Chaudhari
Project Title: Parental Benefits and Burdens of Rapid Genomic Profiling in the Pediatric Acute and Critical Care Settings
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Previous work regarding rapid genome sequencing (rGS) in children in acute and critical care settings has found rGS to be an effective and useful first-tier diagnostic test. It is not known how rGS affects psychosocial outcomes of parents when patients in the US healthcare system are selected at the discretion of the treatment team rather than by the explicit inclusion/exclusion criteria of a clinical trial. Using the Decision Regret Scale (DRS), Psychological Empowerment Scale (PES), and Parent-Child Bonding Questionnaire (PBQ), a survey was administered to 113 parents enrolled in the parent study. The survey also consisted of scales measuring parents' perceived knowledge (PK) and actual genetic literacy (GLAC). Half of parents reported no decision regret (median DRS=2.08, IQR=0-16.7). Median PES score was high (6.25 out of 7) and median PBQ score was low (1.33 out of 70). Neither diagnosis nor clinical utility were significantly associated with any of the three psychosocial outcomes. Most parents did not regret choosing rGS for their child, consistent with previous literature. Given that parents' positive psychosocial outcomes regarding rGS even when there are no actionable results, we propose this as an independent outcome for future prospective studies of the value of rGS.

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Hannah Shenton
Mentor: Dr. Creagh Boulger
Project Title: Ultrasound-Guided Pain Control for Patients with Rib Fractures and Chest Wall Trauma
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Opioids are first line treatment for chest wall trauma and are associated with increased risks of respiratory depression and addiction. Ultrasound-guided regional nerve blocks have shown better acute pain control for chest wall trauma, but data regarding long-term patient outcomes is lacking. These pain control procedures are under-utilized in the acute setting due to lack of training for providers. A training program teaching serratus anterior (SAPB) and erector spinae plane blocks (ESPB) was implemented for emergency medicine and acute care surgery providers at OSUWMC. After, residents and staff were encouraged to perform these procedures for pain control on patients presenting with chest wall trauma. Patient data will be obtained from the trauma database at OSUWMC. A retrospective chart review for 3 months prior to, and after the implementation of this program will be performed. Patients treated with opioids, pre-intervention group, will be matched based on injury pattern to patients treated with SAPB or ESPB, post-intervention group. Adequacy of pain control, need for opioids, and the incidence of respiratory events will be evaluated. It is hypothesized that the use of ultrasound-guided nerve blocks in the ED will reduce respiratory events, decrease opioid use, and improve pain control in this population.

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Adam Smith
Mentor: Dr. Charles Elmaraghy
Project Title: Using a Wearable Posture Monitoring Device to Quantify Intraoperative Ergonomic Risk During Tympanostomy Tube Insertion
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: This study evaluated correlations of ergonomic risk measurement between a novel, direct assessment method and popular, observational tools. It was hypothesized that positive correlations would be found. Pediatric otolaryngology attendings were observed while performing tympanostomy tube insertions (TTIs). Ergonomic risk assessments included the craniovertebral angle (CA), Rapid Upper Limb Assessment (RULA), and the novel percent of time in Red Zone (PTRZ). CA was quantified using the mean value of lateral images of operating surgeons collected at each minute of the procedure; RULA was scored at time of tube insertion; PTRZ, or the percentage of overall procedure time that trunk flexion exceeded an upright range (UR), was recorded from PMD output. Thresholds for ergonomic risk included CA < 50ï,° and RULA scores > 2. Two UR settings were used, UR1 and UR4, which permitted forward bend limits of 4 and 15 degrees, respectively. While observational methods (RULA/CA) assessed elevated ergonomic risk in most cases, median PTRZ was found to be just 2% (UR1, IQR = 11%) and 0% (UR4, IQR = 1%). Significant correlations were not found. Previous studies observing otolaryngology procedures performed without microscope, unlike TTI, found positive correlations between metrics. Further research is required to optimize PTRZ usage.

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Ronald Thompsopn
Mentor: Dr. Colleen Cebulla
Project Title: Impact of COVID-19 Pandemic Response on Uveal Melanoma Diagnosis, Stage, and Treatment
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: The purpose of this study was to investigate the effect of the COVID response on the diagnosis, staging, and treatment of uveal melanoma (UM) patients. It was hypothesized that the response to the lockdowns led to a delay in patients seeking eye care, resulting in higher stage tumors, and more enucleations were required to be performed as opposed to globe sparing treatments. A retrospective chart review was performed on new UM patients at The Ohio State University Wexner Medical Center (OSU). Pre-lockdown and post-lockdown groups were established, with equal number of days and spanning every month. Information was gathered on time to diagnosis and treatment, tumor prognostic markers, tumor staging information, treatment, and demographics. No significant differences were found between the two groups in any of the variable in the study. However, there was a clear trend that showed an increase in enucleations and AJCC T category in the post-lockdown group. These findings lead to the conclusion that the COVID-19 response did not lead to any significant diagnostic delays in UM patients. However, it is important to further investigate the effects of the pandemic response on UM patients and continue to prioritize primary eye care and regular screenings.

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Neha Vazzalwar
Mentor: Dr. Jun Liu
Project Title: Using Ultrasound Imaging to Assess Eye Fluid Drainage in Glaucoma
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Glaucoma is characterized by optic nerve damage with vision loss that can lead to blindness if not effectively treated. The only treatable risk factor is lowering intraocular pressure (IOP. There is a critical barrier to measure uveoscleral outflow which limits the ability to quantify the mechanism of action of glaucoma drugs that lower IOP by enhancing uveoscleral outflow. This project will improve our knowledge and address this critical barrier by developing a protocol to segment out the ciliary body and anterior sclera from high-quality ultrasound images. This will test the hypothesis that variations in pixel intensity in ultrasound images of the ciliary body and the anterior sclera represent tissue alteration due to pathology. The researchers went through the FORUM research database to select images of patients who had ultrasound images taken in the angles relevant to this project and used predetermined inclusion/exclusion criteria and image quality to select images for analysis. The results supported the hypothesis and showed a statistically significant difference between the pixel intensity of the sclera and the ciliary body (p-value= 0.03 < 0.05=alpha). Future studies would aim to increase the sample size and complete image analysis with control images.

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Vamsee Vemulapalli
Mentor: Dr. Fatoumata Yanoga
Project Title: Evaluation of Retinal, Choroidal, and Optic Nerve Head Perfusion Changes in Presumed Ocular Histoplasmosis Using Swept-Source OCT Angiography
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Presumed ocular histoplasmosis syndrome (POHS) is an ocular disorder endemic to the Ohio and Mississippi River Valleys and related to Histoplasma capsulatum infection. Infection can classically lead to chorioretinal scars and peripapillary atrophy of the retina through fundoscopic imaging. A small subset of these patients may develop choroidal neovascularization through an unknown mechanism, which can eventually lead to central vision loss. We propose a cross-sectional study to image the macula and optic nerve head of approximately 30 patients diagnosed with POHS and 10 control patients in clinic using Swept Source Optical Coherence Tomography to calculate perfusion density of specific regions of the eye. The aim of this study is to further describe POHS to provide more insight into the role of retinal, choroidal, and optic nerve head perfusion in the disease process of POHS. Additional insight of the pathogenesis may allow for more accurate clinical tracking of disease progression and evaluation of the risk for vision loss.

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Christian Wong
Mentor: Dr. Colleen Cebulla
Project Title: Proteomics of Proliferative Vitreoretinopathy
College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Proliferative Vitreoretinopathy (PVR) is a medical complication occurring in about 10% of patients following retinal detachment (RD) surgery and is the most common cause of failure of the surgery. In the current landscape of PVR, there are very limited treatment options aside from surgery. The purpose of this project was to identify and verify altered protein levels in PVR vitreous and assess these proteins for future therapeutic potential. In collaboration with the Walter Reed Army Institute of Research, iTRAQ proteomics was performed on human vitreous and retina samples to identify preliminary targets. Using Ingenuity Pathway Analysis software, a comprehensive analysis of these targets was performed, and the top canonical pathways were determined. The retinoid X receptor pathway was one of the top canonical pathways shown to be altered in PVR vitreous. After a literature review of the top candidates was performed, the final protein targets were determined. These targets were validated for presence and expression level using a combination of ELISAs and Meso Scale Discovery Assays. Though data collection is ongoing, if validation experiments match preliminary findings, potential therapeutic approaches could emerge that would target altered protein expression.

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Megan Wong

Mentor: Dr. Debra Zynger

Project Title: Can Glomerular Involvement in Renal Pelvic Urothelial Carcinoma Be Used to Redefine pT3 to Improve Correlation with Survival?

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Renal pelvic pT3 is the largest pT category with notable survival heterogeneity. Using glomeruli as a boundary, this study compared survival of renal pelvic pT3 tumor based on the extent of renal parenchyma invasion and determined whether redefining pT2 and pT3 improves pT correlation with survival. Primary renal pelvic urothelial carcinoma was identified by review of nephroureterectomies performed at our institution from 2010-2019. Cases were stratified by renal medulla invasion versus peripelvic fat and/or renal cortex invasion. Overall survival was compared using Kaplan Meier and Cox regression multivariate analyses. pT2 and pT3 tumors had similar overall survival. pT3 tumors invading the peripelvic fat and/or renal cortex had a 3.25-fold worse prognosis than those with renal medulla invasion. Furthermore, pT2 and pT3 tumors with renal medulla invasion had similar overall survival, whereas pT3 tumors with peripelvic fat and/or renal cortex invasion had a worse prognosis. Notably, moving pT3 tumors with renal medulla invasion to pT2 reduced overlap between survival curves and hazard ratios for pT2 and pT3, improving pT correlation with survival. Thus, we recommend using glomeruli as a landmark to stratify renal parenchyma invasion as they are easily identifiable, and our proposed modifications improve prognostic accuracy of pT classification.

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Alice Wu

Mentor: Dr. Creagh Boulger

Project Title: Impact of patient sex on the quality of point-of-care cardiac ultrasounds performed in the emergency department

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Cardiac ultrasound imaging is utilized extensively in many United States emergency departments. Given the growing evidence that female patients receive inferior cardiovascular care compared to males, it is important to investigate potential sex disparities in cardiac ultrasound quality, which may impact diagnosis. This retrospective study evaluated the hypothesis that female patients receive lower quality point-of-care cardiac ultrasound, especially in the apical 4-chamber (A4C) view. We examined two hundred point-of-care cardiac ultrasound scans performed at the Wexner Medical Center Emergency Department in 2019. Ultrasound fellowship-trained physicians scored the quality of the images using a standardized rubric. Male patients were observed to have a greater omission rate of the parasternal short axis view based on chi-square tests of independence. An ordinal logistic regression on the image scores found that female patients were less likely to have a higher quality apical 4-chamber view. A low quality A4C image was also associated with higher BMI, although this effect was markedly diminished among female patients. Our findings highlight the need for complete point-of-care ultrasound scans and for improvements in A4C acquisition technique to overcome anatomical obstacles.

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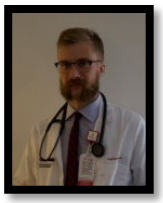

Zachary Wykoff

Mentor: Dr. Yin Ren

Project Title: A Single-Center Study of Microsurgery Versus Gamma Knife Stereotactic Radiosurgery for Medium to Giant Sized Vestibular Schwannomas

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Vestibular schwannomas (VS) may be treated with microsurgery (MS) or stereotactic radiosurgery (SRS). Few studies to date have directly compared clinical outcomes between these two modalities. We hypothesized that time to MS would be significantly shorter than time to SRS. A retrospective review of large VS > 20 mm treated with MS or SRS at a tertiary referral center was performed. Clinical outcomes were similar for both cohorts, with excellent tumor control rates following MS (93.2%) and SRS (94.1%, p = 0.967). There was a higher incidence of poor FN function (House-Brackmann grade 4-6) after MS than SRS (31.8% vs. 0%, p < 0.01). The time to intervention was longer for MS patients (median 67 days, range 5 days to 1.2 years) than SRS (median 21 days, range 13 to 63 days, p < 0.01). Both MS and SRS achieve good tumor control. MS patients with post-operative FN paralysis have significantly larger tumors, likely excluding them from undergoing SRS. SRS patients were less likely to undergo observation after diagnosis and may undergo intervention sooner than MS patients after VS diagnosis. These findings warrant further investigation into outcomes after VS treatment, especially for medium and small-sized tumors.

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Jason Yang

Mentor: Dr. Zihai Li

Project Title: Characterizing GARP-targeted strategy for cancer immunotherapy

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: TGFβ decreases T-cell function and promotes tumor progression in a variety of cancers. Platelets release TGFβ largely through the expression of glycoprotein A repetitions predominant (GARP), and regulatory T-cells exert contact-dependent inhibition of immune cells through GARP activation and subsequent production of active TGFβ. Therefore, GARP is an attractive target for cancer immunotherapy. We hypothesized an anti-GARP monoclonal antibody (GARP mAb), which blocks the production of active TGFÎ², inhibits the immunosuppressive activity of platelets and regulatory T-cells to promote antitumor response. We demonstrated that GARP mAb efficiently binds GARP expressed on platelets and reduces co-expression of latency-associated peptide (LAP) in vivo. Furthermore, we showed that antibodies against GARP induced tumor regression in a syngeneic MB49 tumor model. Mechanistically, the anti-immunosuppressive function of GARP mAb resulted in dampened platelet immunosuppression of cytotoxic T-cells in vitro. Collectively, our preclinical data demonstrate that GARP monotherapy can elicit antitumor activity and suggest a mechanism via inhibition of platelet immunosuppression. GARP mAb warrants further clinical development as a promising immunotherapeutic agent. Further studies will expand on the mechanistic role of GARP mAb in regulatory T-cells and explore the potential for combination strategies of Î±GARP mAb paired with immune modalities that synergize with its antitumor response.

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Matthew Yoder

Mentor: Dr. Scott Hickey

Project Title: Measuring the Impact of Patient Outreach Interventions on Management of Cleft Lip and Cleft Lip and Palate

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: An estimated 30-50% of patients with cleft lip (CL) and/or cleft palate (CP) have an associated genetic syndrome contributing to their presentation. Given this rate, we hypothesized that the genetics department at Nationwide Children's Hospital should expect to see a similar rate of genetic diagnosis in this patient population. Chart reviews were conducted for patients seen by the genetics department who presented with CL/CP or CPO. Outreach in the form of a phone call or voicemail was performed for patients who were considered of high clinical suspicion for associated genetic syndrome. Statistical analysis was performed to identify factors correlated with outreach outcomes. 57 of 272 patients (21%) already had a confirmed genetic diagnosis, and 90 of 272 patients (33%) were targeted for outreach. There was a statistically significant difference (p value < 0.0001) between speaking directly to patients and leaving a voicemail on receiving a decision from the patient. All other factors did not statistically significantly influence the outcome. This represents a realistic approach and expectation of re-evaluation rates departments should consider when determining the effectiveness of outreach campaigns for their clinic. There is reason to believe this will translate to increased rates of genetic diagnoses for the affected patients.

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Jane Yu

Mentor: Dr. Tendy Chiang

Project Title: Preservation of Tracheal Extracellular Matrix After Partial Decellularization

College of Medicine Research Award: Samuel J. Roessler Memorial Scholarship

Abstract: Decellularization is an approach of creating tissue-engineered scaffolds for organ replacement but is often complicated by losses in graft mechanical properties. We developed a partially decellularized tracheal graft (PDTG) and that maintain graft patency and support host-derived epithelialization. Using mass spectrometry, we quantify the effect of partial decellularization on individual and global protein integrity of the tracheal matrisome. Native trachea (NT) were harvested from 6~8-week-old C57BL/6J mice and PDTG were created. PDTG were compared to NT histologically for decellularization efficiency and major protein preservation. Protein integrity was quantified by mass spectrometry and the calculation of individual protein integrity scores (iPIS) and global protein integrity numbers (PIN). NT and PDTG were then implanted in syngeneic hosts to evaluate in vivo performance. Partial decellularization was found histologically to remove all cellular components except for chondrocytes, and preserved collagens and glycosaminoglycans. Mass spectrometry of PDTG revealed preservation of major ECM proteins, with concurrent removal of intracellular proteins. The global proteomic integrity was preserved in PDTG as PIN and iPIS were similar in NT and PDTG. Animals with PDTG also showed similar survival rates and graft patency. These findings demonstrate that partial decellularization provides a possible route for future tissue engineering in trachea regeneration.

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