LIBERTY UNIVERSITY

COLLEGE *of* OSTEOPATHIC MEDICINE

RESEARCH DAY

January 12, 2024

Program & Abstracts

Greetings and welcome to the 5th annual Liberty University College of Osteopathic (LUCOM) Research Day. LUCOM Research Day is designed to be a trainee-centric event providing students and early career professionals the opportunity to practice disseminating research and scholarly activity pertinent to the biomedical sciences.

I would like to thank you for your participation in this event. As an attendee, you will gain further insight into the scientific environment at LUCOM as you hear presentations from your colleagues and peers. Your participation and engagement will be an encouragement to our presenters as they continue to develop as professionals.

I would also like to acknowledge and thank Dr. Michael Price, Mrs. Barbara Lutz, and Mrs. Cassie Eubank for their tremendous effort in organizing the LUCOM Research Day event. Your efforts do not go unnoticed and we are thankful for your dedication to the mission and vision of LUCOM.

I wish you all a wonderful afternoon as we come together to support one another and build an exceptional academic environment at LUCOM.

"Therefore encourage one another and build another up, just as you are doing."
1 Thessalonians 5:11

Joseph C. Gigliotti, Ph.D.
Director of Research and Special Projects
Associate Professor and Chair
Department of Physiology and Pharmacology

Program Overview

12:00 PM	**Boxed lunch**	**Pick up in CMHS 1047**
12:30 PM	**Opening Prayer**	**Michael W. Neville, PharmD, BCPS, FASHP** **Asst. Dean for Admissions & Student Life**
12:35 PM	**Welcome & Opening Remarks**	**Michael S. Price, PhD** **Research Day Committee Chair**
	Oral Presentations*	
12:40 PM	**P01:** Prm1 Influences Ph Adaptation And Possibly Virulence In The Human Pathogenic Yeast Cryptococcus Neoformans.	Speaker: Rebekah Satalino (OMS-III) Mentor: Michael S. Price, PhD
1:00 PM	**P02:** The Prevalence Of The Persistent Median Artery In Living And Cadaveric Subjects: An Ultrasonographic Study	Speaker: Drew Thibault (OMS-III), Connor Ellis (OMS-III), Josh Lencke (OMS-III) Mentor: Laurieanne Hemric, PhD
1:15 PM	**P03:** Selective Activation Of M1 Muscarinic Receptors Attenuates Human Colon Cancer Cell Proliferation	Speaker: Oscar Chatain (OMS-II) Mentor: Jean-Pierre Raufman, MD
1:30 PM	**P04:** Receiving A Diagnosis Improves Patient Reported Health Among Children With Inborn Errors Of Immunity	Speaker: Rebekah Johnson (OMS-II) Mentor: Nicholas L. Rider, DO
1:45 PM	**P05:** Lower Extremity Somatosensory Evoked Potentials Predict Functional Outcomes In Complete Traumatic Cervical Spinal Cord Injury	Speakers: Sabrina Bustos (OMS-II) Mentor: Joseph Gigliotti, PhD
2:00 PM	**P06:** Time To Diagnosis Matters: Patients With Inborn Errors Of Immunity Display Improved Health Status With More Rapid Recognition Of Underlying Disease	Speakers: Sarina Nikzad (OMS-II) Mentor: Nicholas L. Rider, DO
2:15 PM	**BREAK**	
2:30 PM	**P07:** Evaluation Of Vaginal Microbiome To Estimate Vaginal Health In Gynecology Patients Presenting With Vaginitis	Speaker: Tiana Elisara (OMS-II) Mentor: James Mahaney, PhD
2:45 PM	**P08**: Development Of Techniques To Assess Acute Lethal Effects Of Blunt Tissue Trauma Extract On The Cardiovascular (Cv) System	Speaker: Shreya Nakkala (OMS-II), Sydney Richetto (OMS-II), Jakob Schneider (OMS-II), Tiffany Cho (OMS-II), Sima Lilly (OMS-II) Mentor: John R. Martin, PhD
3:00 PM	**P09:** Blunt Tissue Injury Mediated Intestinal Microvascular Leak Of Serum Inhibits Colonic Motility Via A Cox-2/Pge2 Mechanism	Speaker: Tiffany Cho (OMS-II) Mentor: Anthony J.M. Bauer, PhD
3:15 PM	**P10:** Effects Of Diet And Sugar On Behavioral Patterns And Metabolic Phenotypes In Young Male Rats	Speaker: Gina Lee (OMS-II) Mentor: Joseph Gigliotti, PhD
3:30 – 5:00PM	**Poster Presentations**	**CMHS Main Street & Lower Lobby**

***Oral presentations WebEx link:**

Join from the meeting link
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Oral Abstracts

P01: *PRM1* Influences Ph Adaptation And Possibly Virulence In The Human Pathogenic Yeast *Cryptococcus neoformans*.

Category: Basic Science Research

Rebekah A. Satalino (OMS-III)[1], Carleigh Warsing[2], Ryker Heller (OMS-III)[1], Kessange French (OMS-IV)[1], and Michael S. Price[1,3]

[1]Liberty University College of Osteopathic Medicine, Lynchburg, VA
[2]Department of Biology and Chemistry, Liberty University, Lynchburg, VA
[3]Department of Medicine, Duke University School of Medicine, Durham, NC

Cryptococcus neoformans is an opportunistic fungal pathogen that is responsible for 15% of AIDS-related deaths per year. Previous work at Duke University identified numerous genes displaying altered growth at alkaline pH in *C. neoformans*, including gene CNAG_05866, a homolog of *PRM1* in *S. cerevisiae* that is involved in plasma membrane fusion. It was our goal to verify whether this gene is involved in pH adaptation in and affects virulence of *C. neoformans.* First, *PRM1* was deleted in wild-type (WT) *C. neoformans* strain CM2049 using CRISPR-Cas9. To reconstitute the mutant to WT phenotype, the *PRM1* gene was cloned into plasmid pSDMA25 and transformed into the *prm1Δ* strain. The *prm1Δ* and reconstituted strains were then subjected to various phenotype/stressor testing. Spot assays on YPD pH 8 showed a difference in growth between the WT strain and *prm1Δ* strain, supporting the hypothesis that the *PRM1* homolog in *C. neoformans* affects its ability to adapt to alkaline pH. Additionally, a similarity in growth was seen in the *prm1Δ* and *rim101Δ* suggesting *PRM1* may respond to that pathway of pH adaptation. Virulence studies using a *Galleria* model showed no statistically significant difference in virulence between the WT and *prm1Δ* strains. Virulence of the *prm1Δ* mutant will be further evaluated using a murine inhalation model of *C. neoformans* disease. Overall, our data support the hypothesis that CNAG_05866 is the ortholog of *PRM1* and is involved in pH adaptation of *C. neoformans*, but the impact of *PRM1* on virulence of *C. neoformans* remains unclear.

P02 – The Prevalence Of The Persistent Median Artery In Living And Cadaveric Subjects: An Ultrasonographic Study

Category: Basic Science Research

Drew Thibault (OMS-III), Connor Ellis (OMS-III), Josh Lencke (OMS-III), and Laurieanne Hemric

Liberty University College of Osteopathic Medicine, Lynchburg, Virginia

The median artery is an embryologic artery, supplying the forearm of the developing embryo. It is replaced in the adult by the radial and ulnar arteries, the blood supply of the hand. In some people, it does not degenerate but instead remains as the persistent median artery (PMA). The palmar PMA travels through the carpal tunnel and may contribute significantly to the perfusion of the palm. Therefore, it should be considered prior to any surgical intervention of the hand. Few studies have investigated the use of ultrasonography (US) to visualize presence and size of the palmar PMA in an adult population. Our study has two aims: (i) to determine the prevalence of the PMA in the palm in living subjects detected by US, and (ii) to compare these results with cadaveric subjects by using handheld US to determine the presence of a palmar PMA, and then verify the findings by dissection. Out of 152 upper limbs from living subjects, a palmar PMA is present in 0.66% of the upper limbs. This is much lower than the prevalence reported in the literature for living or cadaveric subjects and may suggest US underestimates presence of PMA in living subjects, especially in smaller blood vessels. The cadaveric population has a much higher prevalence of palmar PMA than that found in live subjects evaluated with US. In the cadaveric population, a palmar PMA was identified in 43.8% of the 48 upper limbs imaged with US. However, our follow-up dissections reveal a palmar PMA in only 28% of the upper limbs. We expected agreement between US evaluation of palmar PMA prevalence in living and cadaveric subjects. Furthermore, the cadaveric results suggest that ultrasonography via a handheld probe may not be sensitive enough to determine the presence of a PMA prior to surgical intervention.

P03 – Selective Activation Of M1 Muscarinic Receptors Attenuates Human Colon Cancer Cell Proliferation

Category: Clinical Research

Margaret H. Sundel[1], Natalia Sampaio Moura (MS-IV)[2], Kunrong Cheng[3], Oscar Chatain (OMS-II)[4], Shien Hu[2], Cinthia B. Drachenburg[2], Guofeng Xie[3], and Jean-Pierre Raufman[3]

[1]Department of Surgery, University of Maryland School of Medicine, Baltimore, Maryland
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[4]Liberty University College of Osteopathic Medicine, Lynchburg, Virginia

M3 muscarinic receptor (M3R) activation stimulates colon cancer cell proliferation, migration, and invasion; M3R expression is augmented in colon cancer and ablating M3R expression in mice attenuates colon neoplasia. Several lines of investigation suggest that in contrast to these pro-neoplastic effects of M3R, M1R plays an opposite role, protecting colon epithelial cells against neoplastic transformation. To pursue these intriguing findings, we examined the relative expression of M1R versus M3R in progressive stages of colon neoplasia and the effect of treating colon cancer cells with selective M1R agonists. We detected divergent expression of M1R and M3R in progressive colon neoplasia, from aberrant crypt foci to adenomas, primary colon cancers, and colon cancer metastases. Treating three human colon cancer cell lines with two selective M1R agonists, we found that in contrast to the effects of M3R activation, selective activation of M1R reversibly inhibited cell proliferation. Moreover, these effects were diminished by pre-incubating cells with a selective M1R inhibitor. Mechanistic insights were gained using selective chemical inhibitors of post-muscarinic receptor signaling molecules and immunoblotting to demonstrate M1R-dependent changes in the activation (phosphorylation) of key downstream kinases, EGFR, ERK1/2, and p38 MAPK. We did not detect a role for drug toxicity, cellular senescence, or apoptosis in mediating M1R agonist-induced attenuated cell proliferation. Lastly, adding M1R-selective agonists to colon cancer cells augmented the anti-proliferative effects of conventional chemotherapeutic agents. Collectively, these results suggest that selective M1R agonism for advanced colon cancer, alone or in combination with conventional chemotherapy, is a therapeutic strategy worth exploring.

P04 - Receiving A Diagnosis Improves Patient Reported Health Among Children With Inborn Errors Of Immunity

Category: Clinical Research

Rebekah Johnson (OMS-II)[1], Sarina Nikzad (OMS-II)[1], Chrisopher Scalchunes[2], and Nicholas L. Rider[1]

[1]Liberty University College of Osteopathic Medicine, Lynchburg, Virginia
[2]Immune Deficiency Foundation, Hanover, Maryland

Background and Purpose: Patients with inborn errors of immunity (IEI) undergo a unique individual journey to diagnosis. Their symptoms of disease often appear well-before receiving a formal diagnosis. Importantly, patients have a perspective on their health status which can be quantified and tied to outcomes. We sought to understand how perceived health status changed between diagnosed and non-diagnosed patients.

Methods: We accessed the Immunodeficiency Foundation's (IDF) 2017 National Patient Survey dataset and stratified subjects by age at 5-year intervals, from 0-90. We then calculated the proportion of subjects in each age bracket with serious infections and determined temporal association between health status measurement and timing of their IEI diagnosis. We then compared reported health scores (RHS; coded on a 5-point scale; 1 = excellent; 5 = poor) among those suffering infections with and without a formal diagnosis. From this, we focused our analysis on the 0-5yr (n=564) age group, which had the largest number of diagnosed patients. Secondarily, we investigated burden of care by comparing RHS between subjects who had seen $\geq$ 5 physicians to those who saw fewer before diagnosis. A two-tailed t test was used to determine significant differences in mean RHS across groups.

Results: Of 564 patients with infections in the 0-5 age range, only 166 (29%) of them had received an IEI diagnosis. We found a significant difference in reported health scores when comparing diagnosed (dx) to undiagnosed (udx) patientswith infections, in this age group (dx=2.8±0.94 vs udx=3.5±0.92; $p < 0.0001$). We also found a significant difference between patients who saw <5 physicians(n=886) compared to those who saw $\geq$ 5 (n=252) prior to diagnosis (3.18±0.91) vs. 3.52±0.81 $p < 0.0001$).

Discussion: Patients with a diagnosis had significantly lower RHS. Our work suggests that patients receiving a diagnosis and appropriate care have improved reported health and likely better health outcomes.

P05: Lower Extremity Somatosensory Evoked Potentials Predict Functional Outcomes In Complete Traumatic Cervical Spinal Cord Injury

Category: Clinical Research

Anthony K. Chiu[1], Sabrina P. Bustos (OMS-II)[b], Ovais Hasan[1], Leah E. Henry[1], Brittany A. Oster[1], Amit S. Ratanpal[1], Richard Padovano[3], Parker L. Brush[3], Tyler J. Pease[1], Ryan A. Smith[1], Julio J. Jauregui[1], Louis J. Bivona[1], Daniel L. Cavanaugh[1], Eugene Y. Koh[1], Alexander R. Vaccaro[3], and Steven C. Ludwig[1]

[1] University of Maryland School of Medicine, Division of Spine Surgery, Department of Orthopedics, Baltimore, Maryland
[2] Liberty University College of Osteopathic Medicine, Lynchburg, Virginia
[3] Thomas Jefferson University and The Rothman Institute, Departments of Orthopedic Surgery and Neurological Surgery, Philadelphia, Pennsylvania

Background: Traumatic cervical spinal cord injury (tCSCI) is often a debilitating injury, making early prognosis important for medical and surgical planning. Currently, the best early predictors of prognosis are the physical examination, imaging studies, and patient demographics. Despite these factors, patient outcomes continue to vary significantly. The purpose of this study was to evaluate the prognostic value of somatosensory evoked potentials (SSEPs) with functional outcomes in tCSCI patients.

Methods: A retrospective study was conducted on prospectively collected data from two academic institutions. Patients 18 years and older who had tCSCI and underwent posterior cervical decompression and stabilization with intraoperative neuromonitoring were reviewed. The outcomes of interest were the American Spinal Injury Association (ASIA) Impairment Scale (AIS) grade and ASIA motor score at follow-up. Outcomes measures were assessed via student t-tests, chi-squared tests, and multivariable regression analysis.

Results: A total of 79 patients were included. In complete injuries, detectable lower extremity SSEPs were associated with higher ASIA motor scores at follow-up (p=0.002), greater increases in ASIA motor scores at follow-up (p=0.009), and a greater likelihood of clinically important improvement in ASIA motor score (p=0.024). Incomplete, AIS grade C injuries has higher rates of grade conversion (p=0.019) and clinically important improvement in ASIA motor score (p=0.010), compared to AIS grade A or B injuries.

Conclusions: The detection of lower extremity SSEP signals during initial surgical treatment of tCSCI is associated with greater improvement in ASIA motor scores postoperatively. The association is most applicable to patients with complete injury.

P06: Time To Diagnosis Matters: Patients With Inborn Errors Of Immunity Display Improved Health Status With More Rapid Recognition Of Underlying Disease

Category: Clinical Research

Sarina Nikzad (OMS-II) [1], Rebekah Johnson (OMS-II) [1], Chrisopher Scalchunes[2], and Nicholas L. Rider[1]

[1]Liberty University College of Osteopathic Medicine, Lynchburg, Virginia
[2]Immune Deficiency Foundation, Hanover, Maryland

Background: Patients with inborn errors of immunity (IEI) have lifelong distinct health complications including severe infections and physical impairments. Studies show that perceived health status is an important predictor of health outcomes. We hypothesize that diagnostic delay adversely impacts patient reported health status. The purpose of this study is twofold: first, we investigated the relationship between age at the time of diagnosis and the reported health status. Secondly, we studied the impact of time to diagnosis upon reported health status.

Methods: We accessed the Immunodeficiency Foundation's (IDF) 2017 National Patient Survey dataset and stratified subjects by age at the time of diagnosis: 0-12, 13-45, 46-55, 56-65, >65 years of age. The survey coded the health status of the patients on a 5-point scale, 1 for excellent and health and 5 for poor health. For the first analysis, we split patients into 6 groups based on their age at the time of diagnosis: 0-12, 13-45, 46-55, 56-65, >65 years of age. For the second analysis, we categorized the patients in 5 groups based on the duration of time to diagnosis: <1, 1-10, 11-25, 26-40, >40 years elapsed. A single factor ANOVA and Tukey-Kramer post-hoc test was used to compare groups, where $\alpha \leq 0.05$ was considered significant.

Results: Average health status score across age at diagnosis groups was significantly different ($p < 0.0001$). where those diagnosed youngest (0-12 years) differed most from others. Similarly, we found a significant difference in the average health status of the patients with the shortest time to diagnosis (<1yr) and the second group (1-10yrs), as well as first and fifth group (>40yr).

Discussion & Conclusion: This analysis suggests that better health status is associated with an earlier age at diagnosis and shorter diagnostic odyssey among patients with IEI.

P07: Evaluation Of Vaginal Microbiome To Estimate Vaginal Health In Gynecology Patients Presenting With Vaginitis

Category: Basic Science Research

Lisa Carroll[1,4], Sydney Achee[4], Nicolette Adderton[2], Braeden Bensch (OMS-II)[1], Alyssa Bevevino (OMS-II[1], Shweta Bhatnagar[1], Zachary Bowens (OMS-II)[1], Carrie Champine[2], Brett Cohen[1], Haley Cook (OMS-III)[1], Ashley Deer (OMS-II)[2], Breanna Dobberpuhl (OMS-IV)[1], Madison Dudick[1], Allison Dunne (OMS-III)[1], Tiana Elisara (OMS-II)[3], Caleb Glass[1], Martin Groke[1], Cole Harp (OMS-III)[1], Alexis Harris[1], Ashley Harvey[1], Katlin Hencak[1], Samantha Houston[1], Nicole Ivan[1], Summer Jackson[1], Meera Jairath[1], Sarah Johnson[1], John Kearney[5], James Mahaney[2], Sylvia Mast[2], Gloria McWhorter[4], Jessica Mercado-Ortiz[4], Kent Murphy[5], Brooke Nelson[2], Sonia Patel[1], Madison Pearson[2], Cailyn Pellegrino[1], Nitika Pentakota[2], Jamaeka Reid[4], Swathi Sambatha[2], Akshata Sastry[2], Mitchell Schwocho[1], Ashmeet Singh[1], Pragna Sutrave[2], Nichole Tackett[1], Duvani Tejiram[1], Ashley Thurstin[1], Sarah Tobin[1], Kathryn Vess[1], Nicole Villa[1], Brian Winebrenner[1], Alicia Yin[1], and Peggy Robinson[5]

[1]Edward Via College of Osteopathic Medicine, Spartanburg, South Carolina
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[5]Caza Health, Earlysville, Virginia

Background: Over 10 million women in the US are living in counties that are rural and lack even one OB/GYN. Women in these counties rely on primary care physicians in family medicine or ambulatory general internal medicine as well as OB/GYN subspecialties to address their gynecological health needs. This situation is compounded by the fact that current clinical and laboratory methods fail to provide the patient and physician accurate diagnosis of symptomatic vaginitis at least half the time (50% of cases are misdiagnosed), leading to 1) increased risks of sexually transmitted diseases, and 2) preterm births costing the USA billions in additional care. Vaginitis, which results in 10 million office visits per year, is the most common gynecological health complaint. Symptomatic and asymptomatic vaginitis are frequently evaluated during clinic visits. Diagnosis is crucial to treating vaginitis effectively. Current standard clinical diagnostic practices are either expensive and/or prone to human error. However, the use of artificial intelligence (AI) in this field has the potential to improve accuracy and subsequently, prompt treatment.

Objective: This study aimed to determine if AI assisted Caza Health's nCyte™ antibody fluorescent enhanced scanning microscopy can provide more accurate and time-efficient diagnosis of vaginitis compared to current standards.

Methods: Our goal was to test 400 women with symptomatic vaginitis and 100 asymptomatic controls collected in three residency clinics. Subjects were older than 18 and reported abnormal discharge, itching, and/or discomfort. Exclusion criteria included lack of informed consent, use of oral antibiotics in the past 14 days, use of vaginal products or lubricant, vaginal intercourse in the last 24 hours. Vaginal swab samples were collected from each subject. The vaginal swabs were used to prepare a wet mount microscopy slide and an immunofluorescence assay (IF) slide for direct comparison using artificial intelligence (AI) to identify the presence of clue cells, yeast pseudo-hyphae and trichomonads.

Results: In the preliminary data for 118 patient samples, the AI + Amsel Criteria as compared to physician health assessment had an overall accuracy of 83% for bacterial vaginosis (BV), 75% for candidal vaginitis (CV) and 78% for trichomoniasis (TV). After additional training of the algorithms the accuracy for BV was increased to 86%, CV to 83% and TV to 94%. Discordant analysis of samples by staining the wet mount microscope slide and comparing it to the results found on the IF slide, demonstrated that in 79% of the cases for BV the wet mount result was inaccurate; in 66% of CV samples and 64% of TV samples the IF slides were accurate.

Conclusion: Based on preliminary data, the AI + Amsel criteria has shown superior ability to diagnose common vaginal infections as compared to standard wet mount. This technology could provide a reliable source for primary care physicians to determine a quick and accurate diagnosis for women with symptomatic or asymptomatic vaginitis during the office visit, eliminating unnecessary repeat office visits.

P08: Development Of Techniques To Assess Acute Lethal Effects Of Blunt Tissue Trauma Extract On The Cardiovascular (CV) System

Category: Clinical Research

Shreya Nakkala (OMS-II), Sydney Richetto (OMS-II), Jakob Schneider (OMS-II), Tiffany Cho (OMS-II), Sima Lilly (OMS-II), Anthony J.M. Bauer, and John R. Martin

Liberty University College of Osteopathic Medicine, Lynchburg, Virginia

Background: Patient outcomes in crush injury or blunt trauma are poorly understood despite being associated with significant mortality. Damaged skeletal muscle, based on current research, has been suggested to be lethal due to myoglobin, but present research from our labs suggest lethality may be due to a large molecule referred to as "traumacidin". Our objective is to develop techniques to study the effects of blunt tissue trauma extract on the CV system.

Methods: Traumacidin, a blunt tissue trauma extract, is isolated from Fischer 344 rat skeletal muscle tissue that is blended and centrifuged. A 100 kDa - 1 million kDa filtrate is collected via HPLC chromatography. The isolate is added to normal saline to prepare the extract for IV injection. Fischer 344 rats weighing approximately 180 g are anesthetized with 2% isoflurane via inhalation and their left and right inguinal regions shaved. An incision is made to isolate the left femoral artery and a 4.5 cm catheter of a telemetry device is inserted into the vessel while the right femoral vein is catheterized for intravenous (IV) injections. The telemetry device communicates with a receiver to monitor MAP, systolic and diastolic pressure, and heart rate during the duration of the experiment. The rat is allowed to equilibrate for 30 minutes to establish a baseline prior to administration of a dose of traumacidin. Once the rat has expired, skeletal muscle is extracted for preparation of traumacidin for future experiments.

Results: A dose-dependent precipitous fall in blood pressure (BP) was evoked by traumacidin following IV administration. At a high dose, the traumacidin extract was lethal within several minutes (Fig. 1). At a sub-lethal dose, BP showed a bi-phasic response with the decrease followed by recovery (Fig. 2). The reasons for the decrease in BP is unknown but hypothesized to be due to potential cardiotoxicity of traumacidin. An isolated rat atrium placed in a tissue bath and perfused with traumacidin solution demonstrated no change in atrial contractions, suggesting traumacidin is not cardiotoxic. It is hypothesized that the decrease in BP may be due to vascular leak. To test this, an isolated atrium was again perfused with serum which also did not affect atrial contractions.

Conclusion: A method for collecting skeletal extract has been developed. This extract contains several proteins, one or more of which may affect the CV system of rats. A goal of this research is to isolate the protein responsible for the CV changes observed so it can be sequenced for further identification. Also, a technique for monitoring and recording BP, HR, and MAP with a telemetry transducer via the femoral artery has been developed. In future experiments, telemetry devices will be implanted for chronic collection of CV data from conscious, freely-moving rats. The techniques developed show traumacidin evokes a precipitous decrease in BP following IV administration. The techniques developed will be used in future experiments to determine the mechanisms involved in the observed CV changes, which can improve treatment methods of patients who have experienced blunt trauma injury.

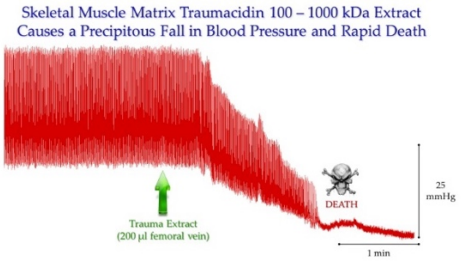

Fig. 1: 200 uL (lethal) dose of traumacidin.

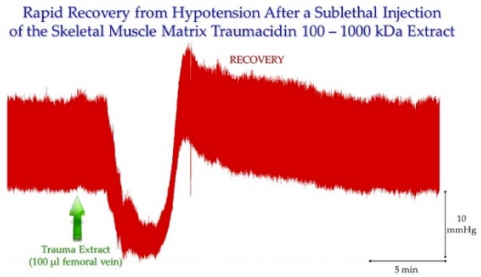

Fig. 2: 100 uL (sub-lethal) dose of traumacidin.

P9: Blunt Tissue Injury Mediated Intestinal Microvascular Leak Of Serum Inhibits Colonic Motility Via A COX-2/PGE2 Mechanism

Category: Basic Science Research

Tiffany Cho (OMS-II), Sima Lilly (OMS-II), and Anthony J.M. Bauer

Liberty University College of Osteopathic Medicine, Lynchburg, Virginia

Background: Vascular leak syndrome is a key feature of many gastrointestinal inflammatory disease states including blunt tissue trauma, sepsis, colitis, and postoperative ileus. Recently, we showed that microvascular leak potently suppresses jejunal and colonic circular smooth muscle contractility. The current objective was to elucidate the pathophysiological biochemical pathways underlying the vascular leak-induced colonic dysmotility observed in many disease states.

Methods: A C57Bl/6 model of blunt tissue trauma was constructed, *ex vivo* live colon imaged to assess vascular leak of intravenously injected 250kDa FITC-dextran using confocal microscopy, and gastrointestinal transit measured. Control mice were euthanized, colon removed, and mucosa stripped from the colonic muscularis externa. Colonic circular muscle strips were cut (2 mm x 15 mm) from the proximal colon and mounted in a 37°C Krebs-perfused organ bath, stretched to L_0 and spontaneous activity of each muscle strip was measured in response to increasing concentrations of human serum (0.05 – 5%). The role of nitric oxide, prostanoids, and COX-2 activation were investigated using L-nitroarginine (LNA, 300 μM), indomethacin (5 μM), valdecoxib (1 μM), and prostaglandin E2. (N=3-5 each)

Results: Confocal microscopy demonstrated a profuse transmural microvascular leak and an associated ileus in the blunt tissue trauma model, but no leak was observed in control mice. Exogenous human serum caused a dose-dependent decrease in spontaneous colonic circular muscle contractions (2.5% = 37.0±9.98% and 5.0% = 7.2±3.89% of control activity). LNA pretreatment increased activity and eliminated the inhibitory effect of low dose serum ≦ 1.0%, but not at ≧ 2.5% serum (36.5±5.14%). Indomethacin pretreatment did not significantly alter spontaneous activity but significantly blocked the 2.5% serum suppression of contractions (94.7±23.05% of control). Pretreatment with the selective COX-2 inhibitor valdecoxib caused a 5.2% increase in contractile activity upon addition of 2.5% serum. Confirming a serum-induced prostanoid role in the suppression of colonic circular muscle contractions, the administration of prostaglandin E2 (0.1 μM) markedly suppressed contractions (105.1±21.46 to 27.3±7.11 mg/min).

Conclusions: Disease-induced microvascular leak in relatively low concentrations causes a significant inhibition of colonic circular muscle spontaneous contractions. The serum triggered activation of COX-2 activity-produced prostaglandins, which excited an inhibitory neural nitrergic mechanism and directly suppressed colonic circular smooth muscle contractions. These data indicate that the pharmacological inhibition of COX-2 may alleviate ileus and dysmotility, which is observed in many disease states.

P10: Effects Of Diet And Sugar On Behavioral Patterns And Metabolic Phenotypes In Young Male Rats

Category: Basic Science Research

Gina Lee (OMS-II), Catherine Deuchler (OMS-II), Benjamin Knick (OMS-II), Kanwar Bhullar (OMS-II), Stephen Fischer (OMS-II), and Joseph C. Gigliotti

Liberty University College of Osteopathic Medicine, Lynchburg, Virginia

Background: It is well established that diets high in sugar and fat are a strong risk factor for metabolic dysfunction and exert an addictive effect on consumers. Metabolic dysfunction has been shown to manifest in the latter stages of life rather than in the earlier stages, in part due to the more efficient compensatory and regulatory mechanisms seen in adolescents. In this study, we set out to describe the metabolic phenotype of juvenile male rats exposed to various diets in the presence of a sweetened beverage.

Methods: All animal studies were performed according to animal protocols approved by the Liberty University IACUC. 30 Weanling male Wistar Kyoto rats were randomly assigned to receive 1) standard laboratory chow, 2) American Institute of Nutrition 93-G (AIN) diet, or 3) a commercially available high-fat diet (60% kcal). Each dietary group was then further subdivided to receive either distilled water (diH_2O) or 5% (w/v) sucrose solution (sucrose) *ad libitum*. Body weights were measured on a weekly basis. On the fourth week, the rats were individually transferred to metabolic cages for two days where urine output, fluid intake, fecal weight, and dietary intake were measured. Rats were then euthanized and blood and perigonadal adipose tissue were harvested. Total cholesterol, HDL-cholesterol, triglyceride, and glucose levels were quantified using a commercially available assay. Data were analyzed using General Linear Model Procedures in SPSS and significance determined with $\alpha < 0.05$ and a tendency at $\alpha < 0.1$.

Results: Diet significantly influenced body weight, with rats fed chow having the lowest body weights ($P < 0.001$), with sucrose solution tending ($P = 0.09$) to also reduce body weight. Both diet ($P < 0.001$) and sucrose ($P = 0.03$) also reduced perigonadal adipose tissue weight, but no significant interaction was observed ($P = 0.8$). Fluid intake significantly influenced by both diet ($P < 0.001$) and beverage ($P < 0.001$) was substantially higher in those fed sucrose solution compared to distilled water across all three diets. These data indicate a clear preference for the sucrose solution compared to the distilled water, attesting to the addictive properties of sugar. This was particularly true for those fed the standard laboratory chow which could possibly indicate a dietary influence on the behavioral effects of sugar. Although total caloric intake was greatest in rats fed the HFD ($P = 0.004$), calories from diet alone appeared to be lower in those consuming sucrose solution, especially in rats fed chow. Fecal output was also notably higher in those fed the chow diet compared to the high fat or AIN diet ($P < 0.001$). Lipid profile assays revealed higher HDL levels only for those on the chow diet. There was no statistical significance for triglyceride levels across the different diets. However, glucose was only statistically lower for the rats fed the chow diet and distilled water only. This further supports literature that correlates high fat diet with metabolic dysfunction and consequently increased glucose levels.

Conclusion: Results of the study indicate the type of diet may enhance the deleterious effects of sugar consumption by influencing the dietary behavioral patterns of juvenile rats. Furthermore, the lipid profile data indicate early signs of metabolic dysfunction after only 4 weeks of this study which may demonstrate that chronic exposure is not necessary for pathogenesis.

Poster Abstracts

P11: Left Sided Native Valve Mrsa Endocarditis With Subsequent Embolization To The Coronaries Presenting As Nstemi

Category: Case Report

Syed M. Z. Hasnain, Shahzeib Syed, Duncan McKinney, Noah Kosnik, and Gretchen Junko

LewisGale Medical Center, Salem, Virginia

Infective Endocarditis (IE) typically occurs with a higher occurrence on the left side of the heart in the general population. However, intravenous drug users are at increased risk of right-sided endocarditis. Embolic events are common in IE, affecting up to 50% of patients and targeting multiple organ systems.
Patient is a 34 year old male with a history of Intravenous drug use (IVDU), cocaine insufflation, and a recent hospitalization for Methicillin-Resistant Staphylococcus Aureus (MRSA) bacteremia presenting with febrile episodes and a septic picture. During this patient's previous admission, he was demonstrated to have MRSA bacteremia and a mobile mitral valve vegetation noted on transthoracic echocardiogram (TTE) after which he had left against medical advice. When presenting again after his prior leave, the patient had a complaint of chest pain and was treated for a Non-ST Elevation Myocardial Infarction (NSTEMI). He was placed on a heparin drip, along with other guideline directed medical therapy for acute coronary syndrome.
Patient was postulated to have thromboembolic cause for NSTEMI. The possibility of cocaine induced vasospasm was considered although the patient's urine drug screen was negative. The patient did have a patent foramen ovale on his prior TEE which also offers a likely explanation of how the patient developed a left sided endocarditis with strong IVDU history. Cardiology noted that given this patient had active bacteremia with known vegetation, coronary angiogram would be relatively contraindicated. Cardiothoracic surgery was consulted thereafter, however had recommended a higher level of care.
Earlier cardiothoracic intervention with techniques such as AngioVac, in addition to continued IV antibiotics, in the setting of infective endocarditis may lead to improved outcomes and clinical course, particularly in patients with high flight risk.

P12: A Systemic Literature Review Of Topical Jak-Inhibitor Safety For Atopic Dermatitis

Category: Systematic Review/Meta-analysis

Kushal Bera (OMS-II), Priyanka Srinivas (OMS-II), Pranav Pradhan (OMS-II), and Nicholas L. Rider

Liberty University College of Osteopathic Medicine, Lynchburg, Virginia

Background: Atopic dermatitis (AD) is a chronic pruritic rash that affects 1 out of 10 Americans(1). Topical therapies comprise first-line disease modifiers, and the topical JAKi (Janus Kinase Inhibitor) have emerged recently. Topical JAKi helps to reduce proinflammatory cytokines that can help in the treatment of AD. This review seeks to quantify topical JAKi safety for the treatment of AD.

Methods: In order to determine the safety of topical JAKi a systematic review was conducted using a PRISMA systematic review format. A PubMed search was conducted with the keywords of "JAK inhibitors" "Atopic Dermatitis" and "safety" yielding 187 publications. Articles were included from 2018-2023, with a focus on topical formulations for AD and primary study data. We utilized a control group consisting of patients administered with a vehicle topical formulation for comparison.

Results: Our inclusion strategy yielded 9 articles to be fully reviewed. The majority of AEs were detailed as mild to moderate and included erythema (1, 0.15%), worsening of AD (n=3, 0.45%), contact dermatitis (n=1, 0.15%), and Kaposki's varicelliform eruption (n=1, 0.15%). Study subject demographics consisted primarily of European and Asian descent.

Discussion: Topical JAKi have emerged as an effective treatment for AD which are safe and involve only mild and infrequent AEs. More inclusive studies are warranted as current research focuses upon European and Asian subjects.

P13: Acute Exacerbation of Previously Undiagnosed Idiopathic Pulmonary Fibrosis in a Young Individual

Category: Case Report

Duncan McKinney, Shahzeib Syed, Noah Kosnik, and Nelson Greene

LewisGale Medical Center, Salem, Virginia

Idiopathic Pulmonary Fibrosis (IPF) is a progressive disease characterized by gradual destruction and replacement of pulmonary parenchyma with fibrous tissue which occurs in conjunction with chronic inflammation. It is often considered a prototypical Interstitial Lung Disease (ILD), and is both the most prevalent and perhaps the most dangerous in its family. While the disease is not common in the general population, prevalence increases with age and is typically diagnosed at around 65 years of age. This does not preclude the development of IPF in younger individuals, and the mean survival is 2-5 years post-diagnosis regardless. Contemporary studies have assessed risk factors for and relationships between IPF and other pathologies, such as infection and immune reactions. These studies have provided insight into how altered pulmonary parenchyma results in increased susceptibility to opportunistic infections. It has also been demonstrated that pulmonary insults, such as pneumonia, which cause inflammation may accelerate the progression of IPF. Eosinophilic pneumonias are a collection of pulmonary diseases in which eosinophil-mediated inflammation results in respiratory compromise. Early recognition and appropriate intervention are imperative to minimizing the risk of residual pulmonary function deficits, a risk which is increased in individuals with separate pulmonary risk factors. While prompt diagnosis and pharmacologic interventions are associated with improved outcomes, IPF patients remain at risk of deterioration to the point of requiring lung transplantation. Early screening for those at risk continues to be a topic of interest. Despite the prevalence of IPF, its pathogenesis remains poorly understood and few management options are available.

P14: Analysis Of Sleep Habits In First And Second Year Medical Students And It's Relationship With Academic Success

Category: Educational Project

David Strum (OMS-II), Danielle Cabiran (OMS-II), and Scott Severance

Liberty University College of Osteopathic Medicine, Lynchburg, Virginia

Medical education exacts a heavy mental and physical toll on students, often associated with lost sleep, despite documented health risks associated with a chronic decrease in hours of sleep per night. Some of the associated effects of chronic sleep deprivation include: cognitive and emotional disturbance, as well as an increased risk of schizophrenia, Alzheimer's disease, addiction disorders, and anxiety disorders. The purpose of this study is to analyze whether the provision of educational materials in the form of scholarly article summaries and in-person educational sessions is sufficient to improve the sleep habits of medical students and their academic performance during the pre-clinical years of medical education.

Participants in this study were asked to complete a 36-question pre-study survey to gauge their sleep habits. Participants then recorded their daily sleep habits for five weeks using the Sleep Cycle App to track duration of sleep and any disturbances during the participants' sleep cycle. The participants were also asked to fill out a short daily survey to estimate daytime drowsiness, consistency of nightly routine, and the perceived quality of the participant's night of sleep. Each weekday, participants received a reminder e-mail to fill out the survey with a summary of a scholarly article describing healthy sleep habits. At the end of the five-week time period participants filled out a 20 question post-study survey to gauge the personal effects of the study. This study was conducted on first year students during the fall and spring semesters with an informational seminar on sleep and effective study habits at the beginning of each semester. Data from second year students will be collected only during the fall semester due to the shift in class schedules associated with boards studying during the spring semester. This study is ongoing and participants are still being recruited. Once data is collected it will be analyzed for patterns of sleep before and after the distribution of materials. During the course of data collection, participants will be incentivized by placement into anonymous five-person groups and placed into a raffle for gift cards if the whole group completes the full week of surveys. Results will be recorded publicly and anonymously. This process will be repeated each week.

This study aims to address the relationship between healthy sleep habits and perceived academic success in medical school. We predict that participants who prioritize sleep will have increased performance and better overall study habits. In the future the results of this study could be used to measure sleep habits during rotations and compare it to pre-clinical years.

P15: Assessing The Efficacy Of Prophylactic And/Or Active Treatment On Invasive Fungal Infections Using Anti-Fungal Therapy In Chronic Granulomatous Disease: A Systematic Review.

Category: Systematic Review/Meta-analysis

Oscar Chatain (OMS-II), Alexis Caccavale (OMS-II), Juan Cotton (OMS-II), and Nicholas L. Rider

Liberty University College of Osteopathic Medicine, Lynchburg, Virginia

Background: Chronic Granulomatous Disease (CGD) results from defects in the phagocyte NADPH oxidase (PHOX) system, thus hindering the generation of superoxide radicals. Accordingly, patients suffering from CGD remain susceptible to recurrent invasive fungal infections and associated sequelae. Although the mechanistic underpinnings driving these opportunistic infections are understood, there is a paucity of research highlighting the efficacy of prophylactic anti-fungal therapy and treatment of active invasive fungal infections for patients with CGD.

Methods: Following Cochrane/PRISMA guidelines, we completed a systematic review by screening pertinent articles relating to our topic across three databases (MEDLINE, PUBMED, PROQUEST) using Boolean operators in the search queries. The defined inclusion criteria limited articles to those who reported prophylactic and/or real-time use of canonically accepted anti-fungal therapy for CGD patients. Patients with active invasive fungal infections being treated with anti-fungal therapy were also included in the review if said infection was confirmed. Anti-fungal efficacy was stratified as either a “complete response” or “failed response”, the former labeled as a positive patient endpoint. Study types were not limited in our inclusion criteria to enhance statistical significance.

Results: Screening yielded 17 articles after exclusion, notably 7 clinical trials, 1 cohort study, and 9 case reports resulting in an analysis of 80 unique cases. Overall, CGD patients receiving anti-fungal prophylaxis remained free of serious fungal infections ranging from 3 months – 14 years. Previous infection, fungus strain, nor administration route of anti-fungal therapies influenced PFS.

Conclusion: Overall, CGD patients benefit from improved healing outcomes if receiving prophylactic and/or active anti-fungal therapy. Collectively, these results suggest that active treatment and preventative measures against mycotic pathogens in patients suffering from CGD is a therapeutic strategy worth continuing.

P16: Atypical Manifestation Of Primary Pulmonary Adenocarcinoma With Signet Ring Features: A Case Report

Category: Case Report

Noah R. Kosnik (PGY2), Syed M. Hasnain (PGY2), Duncan A. McKinney (PGY2), and Nelson Greene

LewisGale Medical Center, Salem, Virginia

Pulmonary malignancies are among the most common primary cancers worldwide. Adenocarcinoma of the lung is the most common form of primary pulmonary malignancy, however a range of specific genetic mutations which drive the development of these malignancies has resulted in an expanding array of molecular, histologic, and phenotypic presentations. Uncommon sequelae of primary pulmonary malignancy include the development of tracheal bronchial tumors (TBTs), and there have been no reported cases of secondary TBTs due to primary pulmonary adenocarcinoma. Greater than 95% of reported tracheal bronchial tumors are benign and thus are rarely biopsied. This case report will be the first to document a case of primary pulmonary adenocarcinoma which resulted in the development of tracheal bronchial tumors.

The authors received patient consent to use their data for this report.

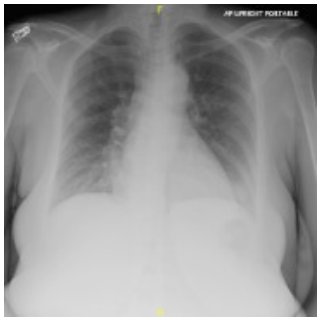

Figure 1. A/P Upright Chest X-Ray. Normal cardiomediastinal borders in size and contour. Negative for pneumonia, pneumothorax, or pleural effusion.

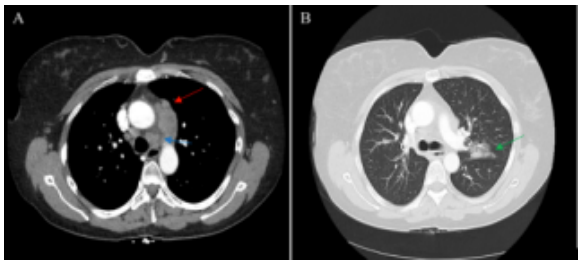

Figure 2. A. Transverse CT of chest showing preaortic lymph node (red arrow) and 4.8 x 2.6 cm mediastinal lymphadenopathy (blue arrow) including in the AP window node. No hilar or axillary adenopathy. B. Transverse CT within lung window of chest showing a ground glass consolidation 2.9 x 2.1 cm lesion in left upper lobe (green arrow).

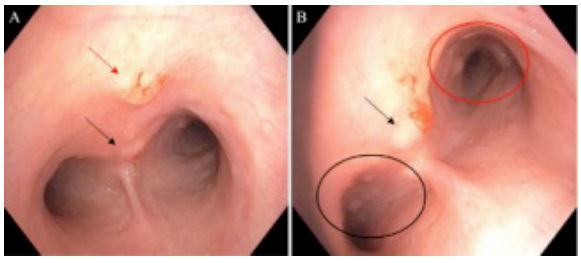

Figure 3. A. Visualization of airway in the subglottic and trachea region using flexible bronchoscopy. Anterior proximal tracheal polyp (red arrow) with distal tracheal polyp (black arrow) around the carinal bifurcation. B. Visualization of tracheal polyp proximal to the carina (black arrow) with multiple smaller polyps in the left mainstem bronchus (black circle) and multiple larger polyps (red circle) in the right mainstem bronchus.

P17: Cholinergic Agonists Prevent Renal Ischemia-Reperfusion Injury In Mice

Category: Basic Science Research

Tavin Smith (OMS-II), Kamil Potaczala (OMS-II), and Joseph C. Gigliotti

Liberty University College of Osteopathic Medicine, Lynchburg, Virginia

Background: The cholinergic anti-inflammatory pathway has received tremendous attention for its ability to decrease inflammation, notably in ischemic disease. Being able to take advantage of this pathway may be particularly helpful in reducing cardiac surgery-associated acute kidney injury (CSA-AKI), which is common and increases morbidity and mortality after cardiac surgery. Our lab has shown protective effects of cholinergic agonists in murine renal ischemia reperfusion injury (IRI), however, there are conflicting results in other literature. We set out to address two goals: first, to determine the effect of ischemia time and anesthesia on renal outcomes of IRI; second, to further investigate the efficacy of different cholinergic agonists on IRI.

Methods: All animal studies were performed following animal protocols approved by the Liberty University IACUC. 8-week-old male C57Bl\6 mice were purchased from a commercia vendor. Mice then underwent renal unilateral IRI (uIRI) using either isoflurane (3% in oxygen, n=9) or a ketamine/xylazine mixture (10/100mg/kg, n=11). The duration of ischemia consisted of 25, 35 minutes, or 45 minutes (n=3-4). Another cohort of mice underwent 30 or 35 minutes of uIRI within 60 minutes of receiving the alpha-7 nicotinic acetylcholine receptor specific agonist GTS21 (4 mg/kg) or nicotine (0.5 mg/kg). Mice were euthanized 16-20hrs later and kidneys harvested. Ischemic kidneys were processed for routine histology or the mRNA expression of tissue inhibitor of metalloproteinases (*Timp1*), an established marker of AKI.

Results: Preliminary results suggest anesthesia significantly influences renal injury following IRI, with mice receiving isoflurane having lower renal mRNA expression of TIMP1 at ischemia durations of 35 and 45 minutes when compared to ketamine/xylazine mixture. There was no difference at the 25-minute duration of ischemia between isoflurane and ketamine/xylazine mixture. Histological quantification showed evidence of reduced kidney injury with the administration of both GTS21 and nicotine at 30 and 35 minutes of ischemia as compared to animals receiving vehicle control.

Conclusion: Our data supports previous results that cholinergic agonists are protective against renal IRI. Our data further suggests that differences in outcomes from other laboratories may be due to the technical aspects of IRI, especially the type of anesthetic used and the duration of ischemia. Upcoming studies will further investigate the mechanism by which cholinergic agonists reduced IRI. With promising results in the kidney, we speculate that other organs that undergo ischemic damage may be targeted for study, namely the heart.

P18: Christ Across The Medical Curriculum

Category: Educational Project

James Grinols, Teresa Ramerth, Danielle St. Hilaire (OMS-II), Allison Aldridge (OMS-II), Irene George (OMS-II), and Sarah Booth

Liberty University College of Osteopathic Medicine, Lynchburg, Virginia

In all times and places, the inquiring mind seeks to understand the marvelous complexity and beauty in the people and environment that makes up our world. A particular balance of wisdom and passion is required to seek knowledge in both science and divine revelation. By compiling personal interest stories, metaphorical insights, and life testimonies into an anthology, we seek to encourage those starting the path of medicine to continue in their quest to know God, serve others, and relish the lifelong learning the medical and scientific life offers.

We've gathered 21 stories (and counting) from physicians and scientists from different medical specialties and levels of training. We have worked closely with these writers to compose a collection of essays highlighting the intersection of science and spirituality. The Christian physicians and scientists who contributed to our work have found truth in both the Bible and the careful scientific investigation of the world around them. These professionals have shared with us how being a follower of Christ has impacted their careers, clinical practice, and patient care.

The connection of mind, body, and spirit is a fundamental principle of osteopathic medicine, and our work highlights the importance of the *spiritual* connection not only within the patient, but with the physician themself. This book is written for those with an interest in science and medicine as a future career; the hope is to draw the reader to Christ, medicine, and science. Additionally, we wish to encourage Christian medical students, as well as practicing physicians and scientists, to be looking for novel ways to share their faith in Jesus with friends, family, and patients. We aspire to provide compassionate care today and premier research and education for tomorrow– all to the Glory of God in Jesus Christ. In doing so, we will be Champions for Christ.

Contributors:

Duane Anderson, MD, *Orthopedic Surgery*
Sophia Apple, MD, *Breast Cancer Pathology*
Greg Berglund, MDiv., MD, *Family Medicine*
Scott Cole, MD*, Pediatrics*

P19: Comparing Clinical Outcomes Among Pediatric Patients With Primary Immune Disease On Immunoglobulin Replacement Therapy By Route Of Administration

Category: Systemic Review/Meta-analysis

Michael Padron (OMS-II), Ishaan Dutta (OMS-II), Savannah Kane (OMS-II), Jake Holland (OMS-II), Harim Ok (OMS-II), and Nicholas L. Rider

Liberty University College of Osteopathic Medicine, Lynchburg, Virginia

Background: Children with primary immunodeficiencies (PID) often require immunoglobulin (IG) replacement therapy via either the subcutaneous (SCIG) or intravenous (IVIG) route. This systematic review (SR) aims to descriptively compare reported clinical outcomes between PID patients receiving SCIG and IVIG.

Methods: We conducted a systematic review following PRISMA guidelines. All citations were obtained from the PubMed database using search-terms such as "IVIG," "subcutaneous IgG," "efficacy," and "primary immunodeficiency in pediatrics." Major endpoints included annualized serious bacterial infection rates, hospitalization rates, sick days, IgG trough levels, antibiotic usage, and adverse reactions. Outcomes were reported as comparative descriptive statistics.

Results: Our final analysis included 7 clinical trials involving 151 patients using SCIG and 5 studies totaling 118 patients receiving IVIG. We found the following outcomes for SCIG vs. IVIG groups respectively: total infection rate (3.5 vs. 2.9 /patient-year), serious bacterial infection rate (0.03 vs. 0.06/patient-year), sick days (6.3 vs. 6.0/patient-year), mean hospitalization rate (2.4 vs. 0.23 days/patient-year), antibiotic use (94 vs. 44 days/patient-year) and IgG trough level (926 mg/dl vs. 939 mg/dl).

Conclusion: Since aggregated patient data was reported, we could not ascertain statistically significant differences between SCIG and IVIG subjects. However, our analysis suggests that IgG trough levels, non-serious infection rates, hospitalizations, and sick days were similar between groups. We also note that serious bacterial infection rates were two-fold in the IVIG group and that SCIG patients used antibiotics nearly twice as many days/year compared with IVIG subjects. These findings warrant further scrutiny in prospective studies of pediatric patients and may point towards unique healthcare utilization trends among children receiving IG by route.

P20: Determining The Effect Of Added Beverage Sugars On Hepatic Steatosis In Young Male Rats Fed Different Diets

Category: Basic Science Research

Kanwar Bhullar (OMS-II), Stephen Fischer (OMS-II), Benjamin Knick (OMS-II), Catherine Deuchler (OMS-II), Gina Lee (OMS-II), and Joseph C. Gigliotti

Liberty University College of Osteopathic Medicine, Lynchburg, Virginia

Background: High calorie diets have been shown to adversely affect various organs in the body, including the liver. Fatty liver (hepatic steatosis (HS)) is common in developed nations and its burden on the healthcare system is becoming increasingly appreciated. The goal of our study was to highlight the specific contributions of total caloric intake and dietary composition (total calories and fat vs sugar) on development of HS in young male rats.

Methods: 30 weanling, male Wistar Kyoto rats were purchased and acclimated for 1-week. Rats were then randomly assigned to receive 1 of 6 treatment combinations *ad libitum*: standard laboratory chow with regular water (n= 5), standard chow with 5% (w/v) sucrose solution (n=5), American Institute of Nutrition 93-G (AIN) diet with regular water (n=5), AIN with 5% sucrose solution (n=5), commercially available high-fat diet (HFD, 60% kcal) with regular water (n=5) and HFD with 5% sucrose solution (n=5). Animals were exposed to these conditions for 4 weeks, and then euthanized. Livers were collected and processed for paraffin embedding and H&E staining. An arbitrary scale was used to determine the extent of HS (0-5), 0 allocated for no observable evidence of lipid deposition and 5 was used for >75% of observable section consisting of HS. Each section was given a score and group average and standard deviation were calculated for each treatment group.

Results: Preliminary assessment suggests that both diet and the beverage influence histological assessment of liver morphology. For diet, rats fed the HFD had greater evidence of HS than was observed with water consumption whereas no evidence was observed in the other diet groups consuming water. Rats consuming the sugar solution also displayed evidence of HS regardless of diet; however, the greatest degree was observed in rats consuming the HFD and drinking sugar-sweetened beverage.

Conclusion: Historically, diets high in fat (particularly saturated fats) have been advertised as being the prime culprit for metabolic disorders and subsequent diseases. Recent work has suggested that not all high calorie diets are the same, and our study suggests that carbohydrates play a significant role in development of fatty liver in a young preclinical animal model. Further studies are needed to validate this finding and determine the mechanism(s) responsible.

P21: Opportunistic Empyema Due To Actinomyces Meyeri

Category: Case Report

Austin Forrester (IM PGY-1), Garrett Florey (IM PGY-1), Viraj Munshi (TY PGY-1), Duncan 'Alex' McKinney (IM PGY-2), Noah R. Kosnik (IM PGY-2), and Nelson Greene

LewisGale Medical Center, Salem, Virginia

Microbes of the oropharyngeal flora, such as *Fusobacterium spp.* and *Actinomyces spp.*, have been documented to present typically as an oral-cervicofacial mass or abscess, however, infections of the respiratory tract have been increasing in documentation. When infecting the respiratory tract, *Actinomyces spp.* rarely causes empyemas. For patients with history of diabetes, dental caries, gingivitis, alcoholism, and immunosuppression, Actinomycosis empyema should be ruled out as it has been associated with an increase in patient morbidity and mortality. We report the case of a gentleman who presented with primary complaints of cough and fatigue for 2 weeks in which a complicated case of *Actinomyces meyeri* empyema was diagnosed.

The authors received patient consent to use their data for this report.

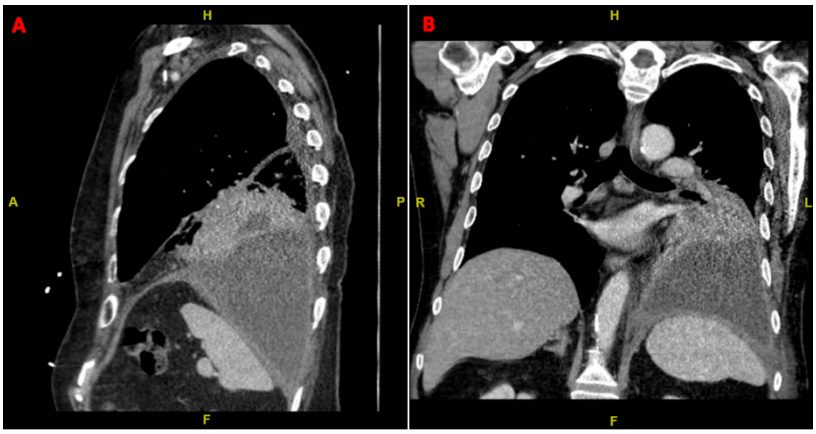

Figure 1. A. Left Parasagital view of thorax in bone window. Left lower heterogenous pleural effusion noted. Atelectatic Left lower lobe appreciated below the oblique fissure. B. Coronal view of thorax with heterogenous pleural effusion extending distally past the left main bronchus.

P22: Determining The Effects Of Diet And Acute Voluntary Exercise On Myokine Expression In Male Mice

Category: Basic Science Research

Catherine Deuchler (OMS-II), Gina Lee (OMS-II), Thuy-Linh Nguyen (OMS-III), and Joseph C. Gigliotti

Liberty University College of Osteopathic Medicine, Lynchburg, Virginia

Background: There is a well-known relationship between diet and exercise in morbidity and mortality; however, the interaction between these factors is unclear. Diet is a commonly overlooked or oversimplified experimental variable in preclinical animal studies and several formulations exist. Myokines, cytokines secreted by contracting skeletal muscle, regulate metabolic processes of the larger myotome and other organ systems. Therefore, with the release of myokines, notably through exercise, contracting skeletal muscle plays a much larger role in body-wide metabolism, inflammatory and anti-inflammatory pathways, stem cell activation, and immune system modulation. IL-6, MG53, and Irisin were the myokines of interest in this project. Previous research established that the expression of these myokines were induced by exercise. Therefore, the objective of the current study was to determine how different diets influence mRNA expression of myokines in male mice following acute voluntary exercise.

Methods: 30 3-week-old male C57BL/6 mice were purchased from the Jackson Laboratory and given one week to acclimate to the lab vivarium and a pelleted diet. Mice were then given ad libitum access to 1 of 3 diets (n=10): (a) standard laboratory chow (CHOW) - the control diet, (b) American Institute of Nutrition 93-Growth diet - the HFD, or (c) American diet (AD). Mice were then randomly assigned to 1 of 6 interventions for 2 weeks: 1) CHOW-No Exercise, 2) CHOW-Exercise, 3) AIN-No Exercise, 4) AIN-Exercise, 5) AD-No Exercise, and 6) AD-Exercise. Mice in the "Exercise" groups were given access to an exercise wheel thrice weekly for 16 hours during the night. The mice in the "No Exercise" groups were placed in a new environment thrice weekly without an exercise wheel. After 2 weeks, the mice were fasted for 4 hours. Mice were then euthanized for the collection of gastrocnemius and soleus muscles which were processed for total RNA collection. The mRNA expression of IL6, FNDC5, and Trim72 was determined using gene specific primers designed using Primer3 software. Data were analyzed using multivariate ANOVA in SPSS with significance identified with $P<0.05$.

Results: Diet did not significantly influence the expression of any of the myokines. Exercise significantly increased the expression of FNDC5 ($P=0.02$) and TRIM72 ($P=0.03$). Exercise also increased the expression of IL6 in a diet specific manner ($P=0.047$), with mice consuming the AD having a 10-fold increase in IL6 expression with exercise while mice fed chow only experienced a 2.5-fold increase.

Conclusions: This study demonstrates that outcomes related to muscle health with exercise are dependent upon the diets fed. Our data further suggests that preclinical studies utilizing current commercially available diets do not adequately recapitulate humans and lead to misleading mechanistic insights.

P23: Diet Influences The Expression Of Renal Sodium-Glucose Cotransporters In Juvenile Male Rats.

Category: Basic Science Research

Benjamin Knick (OMS-II), Kanwar Bhullar (OMS-II), Catherine Deuchler (OMS-II), Stephen Fischer (OMS-II), Gina Lee (OMS-II) and Joseph C. Gigliotti

Liberty University College of Osteopathic Medicine, Lynchburg, Virginia

Poor nutrition and metabolic dysfunction are becoming increasingly prevalent among children, as evidenced by increasing childhood obesity in recent years. The kidney sodium-glucose cotransporter 2 (SGLT2) is a significant contributor to overall metabolic homeostasis, with inhibition of SGLT2 significantly reducing circulating glucose and lipids. The objective of this study was to determine if diet influences the expression of renal glucose transporters in young rats. All animal studies were performed according to animal protocols approved by the Liberty University IACUC. Weanling male Wistar Kyoto rats received 1) standard laboratory chow, 2) American Institute of Nutrition 93-G (AIN) diet, or 3) a commercially available high-fat diet (60% kcal). Each dietary group was then further subdivided to receive either filtered water or 5% (w/v) sucrose solution *ad libitum*. Four-weeks later, animals were euthanized and kidneys collected and processed for total RNA isolation or immunohistochemistry. mRNA expression of *Sglt1*, *Sglt2*, *Sqstm1*, and *Nlrp3* was determined using gene specific primers and RT-PCR. Renal SGLT2 protein expression was visualized using immunohistochemistry and quantified using ImageJ software. Data were analyzed using GLM procedures in SPSS with significance determined at $P<0.05$. Diet significantly influenced the renal expression of both *Sglt1* ($P=0.005$) and *Sglt2* ($P=0.046$), while beverage did not have a significant effect on either ($P=0.7$ and $P=0.4$, respectively). Mice fed the HFD had greater than 30% reduction in *Sglt1* expression as compared to rats fed chow, and ~20% reduction in *Sglt2* as compared to mice fed AIN. Preliminary data suggest that diet and beverage significantly altered renal protein expression of SGLT2, with rats fed chow having the lowest renal expression, which was slightly increased with sugar consumption (1.5% versus 2.7%, respectively). Mice fed AIN had the greatest expression that was drastically reduced in rats consuming sugar (4% versus 1.2%, respectively). To determine if autophagy or inflammasome activation is responsible, we also quantified the expression of *Sqstm1* and *Nlrp3* by RT-PCR. Similar to the SGLT data, mice fed HFD also had the lowest expression of both *Sqstm1 (*$P<0.001$) and *Nlrp3 (*$P=0.03$). Interestingly, the effect of diet on Sqstm1 and Nlrp3 expression was influenced by the beverage provided, where the expression of both genes decreased with sugar consumption in rats fed chow and AIN. Interestingly, there were significant increases in *Sqstm1* ($P=0.01$) and *Nlrp3* ($P<0.001$) when rats fed HFD drank sugar. Our data suggest that diet significantly influences renal glucose transporter expression in juvenile rats in a manner that may be mediated by autophagic impairment. Rats fed a high-fat diet had significantly lower *Sglt* mRNA expression, which could be explained by the differences in *Sqstm1* and *Nlrp3* expression. Previous research has shown renal lipid overload and subsequent autophagic impairment induces tubular stress that could mediate a reduction in SGLT1/2 expression. The modulatory effect of sugar consumption on SGLT2 protein, *Sqstm1,* and *Nlrp3* was diet-dependent, highlighting the importance of nutrition to renal physiology as early as weaning.

P24: Diet Influences The Mrna Expression Of Intrarenal Renin-Angiotensin System In Juvenile Male Rats.

Category: Basic Science Research

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Introduction: Poor nutrition is increasingly prevalent in the pediatric and adolescent population. Existing research suggests that both high fat and high fructose diets lead to increases in intrarenal renin-angiotensin system (rRAS) activation in adult rats. rRAS has been implicated in the development and maintenance of hypertension and renal injury. To determine the role of different diets in juvenile health, we quantified mRNA expression of the rRAS in juvenile rats.

Methods: All animal studies were performed according to animal protocols approved by the Liberty University IACUC. 30 weanling, male Wistar Kyoto rats were purchased and then randomly assigned to receive 1 of 3 diets *ad libitum*: standard laboratory chow (n=10), American Institute of Nutrition 93-G (AIN) (n=10), or a commercially available high-fat diet (60% kcal, HF)(n=10). In each diet group, rats were randomly assigned to receive deionized water (diH_2O, n=5) or 5% (w/v) sucrose solution (sucrose, n=5) *ad libitum*. Four weeks later, animals were euthanized and the kidneys were collected and processed for total RNA isolation and histology. mRNA expression of *Ren*, *Ace*, *Ace2*, *Agt*, *Agtr1a*, *Agtr1b*, *Mas1,* and *Mme* were determined using gene specific primers and RT-PCR. Kidneys' morphology was assessed in H&E sections. Data were analyzed using General Linear Model Procedures in SPSS and Tukey's post hoc multiple comparison procedures with significance determined at $P<0.05$ and a tendency identified with $P<0.1$.

Results: Although there were significant differences in kidney weight due to diet (P<0.001) and [diet*drink] (P=0.039), after adding body weight as a covariate, kidney weights were no longer significantly affected by diet (P=0.956) or [diet*drink] (P=0.351). There was still a trend between kidney weight and drink (P=0.063). Diet significantly influenced renal expression of *Ren* (P=0.01), *Ace* (P<0.001), *Agtr1a* (P=0.028), and *Agtr1b* (P=0.009), but was not significant for *Agt* (P=0.194). Drink and [diet*drink] did not significantly influence renal expression of *Agt*, *Ren*, *Ace*, *Agtr1a*, and *Agtr1b*; however, pair-wise comparison revealed *Agtr1a* expression was significantly different in rats eating AIN and drinking diH_2O or 5% sucrose (P=0.044). There was also a trend (P=0.095) in *Agt* expression in Chow fed rats drinking diH_2O or 5% sucrose. Rats fed HF diet had 50% lower *Ren* expression than rats fed AIN diet (P=0.006) and tended to be 39% lower than Chow fed rats (P=0.085). Rats fed HF diet and AIN diet had 58% and 50% lower *Ace* expression (respectively) than Chow fed rats (P<0.001). HF diet rats had 36% lower *Agtr1a* expression than rats fed Chow diet (P=0.018). HF diet rats had 56% lower *Agtr1b* expression than Chow diet rats (P=0.007) and 49% lower expression than AIN diet rats (P=0.047).

Conclusion: Results of this pilot study suggest that diet significantly affects rRAS mRNA expression in juvenile rats, particularly high fat diet rats which had much lower rRAS expression compared to Chow. This appears to conflict with past research in adult rats in which high fat diet led to significant increases in rRAS. Future studies using a larger study size, with subgroups ending at 4, 8, and 12 weeks could help determine whether rRAS mRNA expression changes with age/duration of diet. Future studies could also examine more direct measures of diet's impact on juvenile health such as blood pressure and renal blood flow and more direct measures of rRNA activation like protein levels.

P25: Diet Significantly Influences Renal Outcomes And Markers Of Er Stress In Male Mice With Tunicamycin

Category: Basic Science Research

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Previous studies have associated endoplasmic reticulum stress (ERS) with different forms of kidney diseases, but it is unclear whether ERS influences renal physiology in normal, non-diseased states. Previous work has suggested that an interaction exists between diet and ERS in other organs. Therefore, this study aimed to determine if diet alters the severity of tunicamycin (TUN)-induced ERS in male C57Bl/6 mice. Weanling male C57Bl/6 mice were randomly assigned to receive one of three diets: chow, commercially available Western Diet (WD), or a novel Americanized diet (AD) formulated to match 50th-percentile nutrient intake in humans. After 6 weeks, mice were injected with TUN (1 mg/kg, IP), or saline, to induce ERS. Twenty four hours later, mice were euthanized, and plasma and kidneys were collected. Blood urea nitrogen (BUN) and creatinine were quantified using commercially available assays and mRNA expression of ERS-related genes was quantified using commercially available PCR arrays. All data were analyzed using GLM procedures and significance identified with $P<0.05$. Mice fed the WD had the greatest body weight and adiposity ($P\leq0.002$). TUN alone did not influence either measure, but a significant diet-TUN interaction was observed where only mice fed WD had a 20% reduction in body weight and adiposity ($P\leq0.01$) with TUN. TUN reduced ($P<0.001$) BUN (20.6±0.7 mg/dL) as compared to control mice (28.0±0.0.8), and a diet-TUN interaction was observed with mice fed AD having lower ($P<0.001$) BUN with TUN. Diet alone had no effect on BUN ($P=0.3$), but plasma creatinine was higher in mice fed AD regardless of TUN (0.65±0.04 mg/dL, $P=0.005$). Neither diet or TUN influenced renal inflammation by $CD45^+$ mRNA expression. Diet alone significantly ($P<0.05$) influenced the expression of 30% (26 of 84) of the quantified ERS-related genes, and a significant diet-TUN interaction was observed in 14 genes. Generally, mice fed the AD had greater change in ERS-related genes with TUN. These data highlight an interaction between diet and ERS on renal function in a non-disease setting. Our data suggest that diet, formulated to model typical American intakes, modulates the expression of ERS-related genes. Further studies are needed to validate these findings and understand their physiologic significance.

P26: Drug-Induced Palmoplantar Keratoderma In A Patient With Stage Iiib Sigmoid Adenocarcinoma Started On Pembrolizumab

Category: Case Report

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Immune checkpoint inhibitors (ICIs) have revolutionized modern medicine and transformed approaches in the management of advanced malignancies. Pembrolizumab (Keytruda) is an ICI with approval for the treatment of multiple malignancies including triple negative breast cancer (TNBC), colorectal cancer, melanoma, non-small cell lung carcinoma (NSCLC), renal cell carcinoma (RCC), bladder cancer, cervical cancer, esophageal cancer and squamous cell carcinomas (SCC). Pembrolizumab is a selective humanized IgG4 kappa monoclonal antibody that binds the PD-1 receptor blocking its interaction with PD-L1 and PD-L2, which restores the immune response, specifically via T cells. Despite the benefits of ICI utilization, nonspecific immune activation has also been associated with a multitude of immune-related adverse events (irAEs), many of which are cutaneous in nature. As ICIs are becoming more frequently employed in the expanding field of oncology, it is important that dermatologists and oncologists can identify irAEs and inform patients of potential irAEs to gain valid consent and manage these medication side-effects while treating patients. We present the case of a 44-year-old male with history of stage IIIb sigmoid adenocarcinoma currently managed with pembrolizumab who presented with an acquired palmoplantar keratoderma alongside an erythematous, pruritic, scaly rash on the right lower extremity. Histopathologic examination demonstrated findings best classified as a lichenoid and spongiotic dermatitis of both lesions favoring a drug reaction when considering clinical presentation. To date, only one case has been reported of pembrolizumab-induced PPK as an irAE and this was in a patient with lung cancer. PPK may also manifest as a paraneoplastic syndrome, in which a dermatosis appears in a location distant from the internal malignancy. In our case, the timeline of pembrolizumab initiation and discontinuation coinciding with PPK appearance and resolution, which also recurred upon a repeat trial and cessation of pembrolizumab at a later date, emphasizes the likelihood that this was in fact an irAE from pembrolizumab treatment. This is strengthened also by the well-documented cutaneous irAE of lichenoid eruptions, similar to the histopathological findings in this case, associated with anti-PD-1/PD-L1 therapy.

P27: Dupilumab Safety And Efficacy In Moderate To Severe Atopic Dermatitis In Children Ages ≥6 Months To 17 Years: A Systematic Review

Category: Systematic Review/Meta-analysis

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Background: Dupilumab is an anti-interleukin-4/interleukin-13 receptor α monoclonal antibody treatment indicated for moderate-severe atopic dermatitis (AD). Evidence exists for Dupilumab safety and efficacy; however, few studies look specifically at the pediatric population.

Purpose: We aimed to systematically assess the safety and efficacy of Dupilumab in pediatric AD patients via currently published clinical trial data.

Methods: We searched PubMed using the terms: "safety, Dupilumab, children, and AD". Included articles were evaluated for safety outcomes and analyzed across the total aggregate patient population. Criteria for inclusion included published clinical trials using Dupilumab for AD containing or focusing upon pediatric subjects. Proportional efficacy across all was harmonized with all outcomes being reported as percentages.

Results: From 48 articles we did an initial screen and included 20 articles. From there we included 11 articles with data from six different clinical trials, which met our criteria for inclusion. The total aggregate patient population across all included studies totaled 1954 subjects. Most prevalent adverse events (AEs) were: nasopharyngitis (3%), AD exacerbation (2%), conjunctivitis (1%), injection site reactions (1%), with rare instances of headache, and asymptomatic, abnormal serologic findings (eosinophilia (2 cases), neutropenia (1 case), and leukocytosis (1 case)). Using various quantitative scoring tools across population (e.g. EASI, IGA, S-NRS and cDLQI), measurable AD improvement was noted in 14 assessments.

Conclusions: Dupilumab is safe and effective for the treatment of AD in individuals under the age of 18. Minimal AEs were noted and were generally mild. Our analysis is limited by overlap in participants between studies.

P28: Epigenetic Regulation of Pathogenicity

Category: Systematic Review/Meta-analysis

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Histone modification via acetylation and methylation are two major ways that fungi regulate their growth, replication, and ability to respond to stress. Additionally, histone modifications regulate vital pathogenic features necessary for opportunistic fungi to cause disease. This is especially important as these genes can be potential targets for drug therapies in these difficult-to-treat pathogens.

For fungi to rapidly respond to changes in their environment, they must quickly and efficiently adapt to their surroundings. Epigenetic control mechanisms such as histone modification are one means to do this, allowing the fungus to adapt to conditions without altering its DNA. As in other eukaryotes, fungal DNA is tightly packaged into chromatin and wound around histone proteins. As these histone proteins are modified by methylation or acetylation, specific sections of DNA can become more or less accessible to transcriptional machinery. In this way, histone modifications allow for the organism to modify its gene expression and rapidly respond to its environment.

Some examples of this can be seen in typical model fungi. One of the most studied model fungi, *S. cerevisiae* displays examples of the three main kinds of histone modifiers. For example, a specific histone methyltransferase (HMT) is responsible for vegetative growth in the yeast. Various histone acetyltransferases (HATs) affect the ability for the yeast to complete the cell cycle. Multiple histone deacetylases (HDACs) control yeast response to environmental stress and pathogenicity. These modifications are similarly seen in *Neurospora crassa*. Likewise, an HDAC has been discovered that is vital for growth and sporulation in *Aspergillus nidulans*, whereas another HDAC is responsible for regulating response to oxidative stress. It has also been found that certain HATs can be activated when fungi encounter specific bacteria, leading to the creation of secondary metabolites.

Additionally, we see examples of histone modification in pathogenic fungi. In *Candida albicans*, HDACs facilitate the yeast to hyphae transition as well as enable biofilm formation allowing for increased drug resistance. Various HATs allow the pathogen to grow and replicate, and one HMT aids in defense against oxidative stress. Furthermore, HDACs are vital in *Cryptococcus neoformans* to facilitate growth, reproduction, and capsule formation. Certain HATs in *C. neoformans* are involved in the formation of the cell wall. Additionally, a HAT in *A. fumigatus* is in part responsible for the virulence of this pathogen, and a HDAC allows the fungus to respond to environmental stress. While this is not an exhaustive list, it is an important step in the characterization of how these histone modifications regulate pathogenicity in these organisms.

In this review, we will summarize how histone modifications affect the reproduction and growth in both model and pathogenic fungi. Additionally, we will explore the role of epigenetic regulation in virulence factor expression, toxin formation, and disease. Developing an understanding of the role of epigenetic regulation in fungal disease is a crucial first step in exploiting this critical lynchpin for novel antifungal treatments of these important human pathogens.

P29: Evaluating Methods Of Encouragement For First And Second Year Medical Students

Category: Educational Project

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Medical School is known as a challenging time for aspiring Doctors. As such, the overall well-being of Medical Students can be greatly diminished which further leads to burnout. This study intends to evaluate the efficacy of in-person encouragement sessions , videos, and one-on-one texts from fellow students to bolster the well-being and motivation of first-year (OMS-I) and second-year (OMS-II) medical students who attend Liberty University College of Osteopathic Medicine (LUCOM). For both the OMS-I and II classes, participants were recruited by being invited via email to the first encouragement session for each respective class; after receiving encouragement from the speakers, attendees were introduced the study and those who wanted to participate signed consent forms. To understand how effective different styles of encouragement are, the project is administered differently to the OMS-I students than to the OMS-II students. For the OMS-I students, three encouragement sessions are provided during the Fall 2023 semester; each featuring either two second-year (OMS-II) medical students or teaching assistants (fellows). Each speaker gave brief talks intended to encourage the participants in attendance, but the content and style of encouragement were left to the discretion of the speakers to allow for various approaches. In between each encouragement session, the participants were sent a video of encouragement from a LUCOM alumni. The efficacy of these sessions and videos will be evaluated with a survey at the end of the semester, when this phase of the study ends. The date of each session was intentionally chosen to occur during what were identified as high-stress periods of the Fall semester. For the OMS-II students, a single encouragement session is provided at the beginning of the study during which OMS-III and OMS-IV students give brief words of encouragement. In addition to the encouragement session, the OMS-II students are also paired together and serve as one-on-one encouragement partners for 5 weeks. During these 5 weeks, the participants will, once a week, receive and view an e-mail or text with an encouraging message from their encouragement partner. They will also, once a week, send an e-mail or text with an encouraging message that matches a weekly theme given by the researchers conducting the study. The encouragement can be sent in any form the participant likes, such as a GIF, video, or text. Halfway through the 5 weeks the participants are also asked to watch an encouragement video from a faculty member or Alumni. After the 5th week, a survey is sent out to the participants to evaluate participation, levels of discouragement, and levels of encouragement throughout the study. This process is then repeated for another 5 weeks; however, the participants are given new encouragement partners. To incentivize attendance to the encouragement sessions and participation in survey responses, both OMS-I and OMS-II participants were entered separately into their own raffles to receive Starbucks gift cards. The study is currently in progress and no data has been collected. The anticipated outcome of this study is that there will be increased feelings of encouragement and motivation among students, with the hope of bolstering a participants resolve to overcome the many challenges in medical school. If the response to this project is positive; future directions for it could include expanding the project into the spring semester, trying different formats for the OMS-I and II classes, and finding ways to encourage OMS-III and IV students who are on their clinical rotations.

P30: Evaluation Of The Vaginal Microbiome To Estimate Vaginal Health In Gynecology Patients Presenting With Vaginitis

Category: Clinical Research

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Background: Over 10 million women in the US live in rural counties and lack even one OB/GYN. Women in these counties rely on primary care physicians in family medicine or ambulatory general internal medicine as well as OB/GYN subspecialties to address their gynecological health needs. This situation is compounded by the fact that current clinical and laboratory methods fail to provide the patient and physician accurate diagnosis of symptomatic vaginitis at least half the time (50% of cases are misdiagnosed), leading to 1) increased risks of sexually transmitted diseases, and 2) preterm births costing the USA billions in additional care. Vaginitis, which results in 10 million office visits per year, is the most common gynecological health complaint. Symptomatic and asymptomatic vaginitis are frequently evaluated during clinic visits. Diagnosis is crucial to treating vaginitis effectively. Current standard clinical diagnostic practices are either expensive or prone to human error. However, the use of artificial intelligence (AI) in this field has the potential to improve accuracy and prompt treatment.

Purpose: This study aimed to determine if AI-assisted Caza Health's nCyte™ antibody fluorescent enhanced scanning microscopy can provide a more accurate and time-efficient diagnosis of vaginitis compared to current standards.

Methods: Our goal was to test 400 women with symptomatic vaginitis and 100 asymptomatic controls collected in three residency clinics. Subjects were older than 18 and reported abnormal discharge, itching, and/or discomfort. Exclusion criteria included lack of informed consent, use of oral antibiotics in the past 14 days, use of vaginal products or lubricant, or (and?) vaginal intercourse in the last 24 hours. Vaginal swab samples were collected from each subject. The vaginal swabs were used to prepare a wet mount microscopy slide and an immunofluorescence assay (IF) slide for direct comparison using artificial intelligence (AI) to identify the presence of clue cells, yeast pseudo-hyphae and trichomonads.

Results: In the preliminary data for 118 patient samples, the AI + Amsel Criteria as compared to physician health assessment had an overall accuracy of 83% for bacterial vaginosis (BV), 75% for candidal vaginitis (CV) and 78% for trichomoniasis (TV). After additional training of the algorithms the accuracy for BV was increased to 86%, CV to 83% and TV to 94%. Discordant analysis of samples by staining the wet mount microscope slide and comparing it to the results found on the IF slide, demonstrated that in 79% of the cases for BV the wet mount result was inaccurate; in 66% of CV samples and 64% of TV samples the IF slides were accurate.

Conclusion: Based on preliminary data, the AI + Amsel criteria has shown superior ability to diagnose common vaginal infections as compared to standard wet mount. This technology could provide a reliable source for primary care physicians to determine a quick and accurate diagnosis for women with symptomatic or asymptomatic vaginitis during the office visit, eliminating unnecessary repeat office visits.

P31: Expression Of The Aspergillus Flavus Putative Rho-Gdp Dissociation Inhibitor Rdia In The Human Fungal Pathogen *Cryptococcus neoformans*.

Category: Basic Science Research

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Aspergillus flavus is an important post-harvest pathogen as well as the 2nd leading cause of invasive aspergillosis. *A. flavus* is known to produce aflatoxin, which is the most potent naturally occurring carcinogen known and is linked to asexual development. A previous study determining genes correlated with expression of the aflatoxin biosynthetic cluster identified a putative Rho-GDP dissociation inhibitor (Rho-GDI) whose expression clustered with the aflatoxin transcription regulator *aflR*. The protein encoded by this gene, RdiA, shares 45% identity with Rdi1p in *S. cerevisiae* and 43% identity with Rdi1 in *Cryptococcus neoformans*, which has been shown to be important for virulence in this human pathogen. Deletion of *rdiA* results in marked inhibition of both colony growth and aflatoxin production compared to the wild-type *A. flavus* strain 3357. In order to positively identify this putative Rho-GDI, we have cloned the *rdiA* gene into plasmid pSDMA57 to create the plasmid pSCB1. The pSCB1 plasmid will be transformed into an *rdi1*Δ mutant of *C. neoformans* to express the *A. flavus* gene and complement the *C. neoformans* mutant.

P32: HORNERS SYNDROME PRESENTING AS A RARE COMPLICATION AFTER POSTERIOR CERVICOTHORACIC SPINAL SURGERY.

Category: Case Report

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Horner Syndrome is described in literature as a constellation of symptoms consisting of ptosis, miosis, and anhidrosis. This disease typically arises due to disruption of the lateral horn of the hypothalamospinal tract and subsequent disruption of the sympathetic trunk. The manifestation of this syndrome can serve as the presentation for a variety of different findings including lung or thyroid cancers or cluster headaches. In addition, there could be direct trauma to the trunk as can be seen as an infrequent complication of anterior cervical discectomy and fusion. The anatomical location of the sympathetic chain alongside the longus colli muscle carries a risk for damage to the trunk as it tends to course over the anterior surface of this muscle. Here we present a 73-year-old man with a history of metastatic thyroid cancer which had been treated previously that presented to our hospital with severe kyphotic deformity and a T2 compression fracture which was later revealed in his hospital course via pathology to be multiple myeloma. Patient was treated with tumor debulking and vertebrectomy at T2 with decompression of T1-T3 with fusion from C4-T6. He had subsequently developed miosis, ptosis, and anhidrosis which had subsided as hospital course progressed. He was subsequently followed by oncology and radiation oncology. To this author's knowledge, new onset Horner Syndrome has not been documented in the setting or as a complication of a posterior cervicothoracic fusion and fixation.

P33: Identifying Features Of Immune Dysregulation Among Type 1 Diabetics Via An Unsupervised Machine Learning Approach

Category: Clinical Research

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Background: While Type 1 Diabetes (T1D) is a prevalent disease, a subset of T1D patients display additional immune dysregulation features stemming from an underlying monogenic disorder. These patients may have insidious organ damage which goes unrecognized. Machine learning (ML) may offer an opportunity to identify clinical features that distinguish monogenic forms immune dysregulation with T1D leading to more precise and sooner treatments. Our goal is to elucidate clinical features of T1D associated with immune dysregulation and monogenic immune disease.

Methods: We identified 170 patients with T1D and clinical features of immune dysregulation from Columbia University Medical Centers and accessed their de-identified electronic health record (EHR) data. Unsupervised ML, via K-means cluster analysis, was applied to the data. Hyperparameters were optimized by experimenting with varying numbers of clusters followed by comparing cohort clinical variables.

Results: Our cohort consisted of 170 individuals with T1D and other clinical features of immune dysregulation. Subjects ranged in age from 4 to 23 years consisting of 89 (52%) males and 81 (48%) females. Ultimately, we found that the number of clinical encounters, hemoglobin A1C (HbA1c) at diagnosis, and age were informative variables for visualizing distinct K-means clusters.

Discussion: While preliminary, our findings may inform additional prospective studies which include clinical visit frequency by age and presenting HbA1c. These variables, identified through unsupervised ML, could potentially be used to identify subjects with T1D who have underlying monogenic immune dysregulation. We did not recognize additional patterns in other variables. Future work will include comparative statistical analyses of variables between T1D with dysregulation and T1D without.

P34: Lemierre Syndrome: Consequences Of Gram-Negative Bacteremia In A Previously Healthy Young Adult

Category: Case Report

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Lemierre syndrome, a rare thrombogenic and thromboembolic disease, is described in literature as a septic thrombophlebitis or thrombosis commonly involving the internal jugular vein as a result of oropharyngeal infection. *Fusobacterium necrophorum* is a gram-negative bacilli often implicated in oropharyngeal infections and the development of Lemierre syndrome. Patients affected tend to be young adult males who initially present with a constellation of symptoms suggestive of infection. Sore throat, fever, fatigue and malaise are all common, but non-specific indicators of the precipitating bacterial infection have also been described. Patients who develop Lemierre syndrome often display progression to severe illness, a feature commonly associated with gram-negative bacteremia. SGram-negative sepsis has been observed to induce a greater magnitude of inflammatory response when compared to that of gram-positive organsims. Septic shock remains a dangerous pathologic process despite advances in evaluation, diagnosis and treatment. Providers must not only be aware of the direct risks of sepsis, but also the nuances of care for virulent pathogens and their potential complications. This article will present a case reporting the development of gram-negative bacteremia, severe sepsis, and the subsequent complications. The discussion portion will cover contemporary knowledge of severe sepsis, *Fusobacterium necrophorum* and its relevance, Lemierre syndrome, as well as the current recommendations for diagnosis and management of these disease processes.

P35: Determining The Effect Of Igf1 On Expression Of Components Of The Growth Hormone Axis In Murine Adenocarcinoma Cell Line.

Category: Basic Science Research

Gurgen Grigoryants (OMS-II), Dhruv Ahuja (OMS-II), Jeffrey Houghton, and Joseph C. Gigliotti

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Background: Insulin-like growth factor-1 (*Igf1*) is a polypeptide hormone that plays a role in cell growth and proliferation largely by activating the PI3K/Akt and Ras signaling pathways. It is overexpressed in many types of cancer, including colon cancer, one of the most prevalent forms of cancer worldwide. The aim of this study was to investigate the role of *Igf1* in the mRNA expression of mitogenic processes associated with cancer in a murine adenocarcinoma cell line.

Methods: Murine MC38 colon adenocarcinoma cells were purchased from a commercial vendor and grown using Dulbecco's modified MEM supplemented as recommended by the vendor. Recombinant murine *Igf1* was purchased and administered at different physiological concentrations (0-1250 ng/mL) once cells reached 80% confluency. Additional studies were performed to determine the effect of IGF1 (100 ng/mL) on MC38 count. After 24-hours, live cells were counted using trypan blue exclusion method and cells collected and processed to isolate total RNA. mRNA expression of *Akt1, Igf1, Igf1r, Myc, Mapk1, Vegfa, Gh, and Ghr* was determined by RT-PCR using custom designed gene-specific primers. The final data consisted of averages from 3 experimental replicates where the average and standard deviation was calculated for each dose.

Results: All custom-designed primers successfully replicated the target genes with the exception of *Igf1* and *Igf2*. In general, mRNA expression of genes related to the IGF1-GH axis and related signaling cascades were influenced by the concentration of IGF1 administered. At typical concentrations similar to normal circulating mouse values (less than 250 ng/mL), the expression of these genes increased 2-3-fold over baseline. The expression levels returned to baseline (or even lower) at concentrations greater than 250 ng/mL. The *Igf1r* was unique in that its mRNA expression was down-regulated at *Igf1* concentrations less than 200 ng/mL. These data suggest that pathways related to proliferation were increased at *Igf1* concentrations of less than 200 ng/mL. This data was supported in additional studies where administration of 100 ng/mL for 24-hours caused a doubling of the cell-number ($8.8x10^6$ cells/mL) as compared to vehicle-treated cells ($4.5x10^6$ cells/mL).

Conclusion: The results of this study suggest that *Igf1* is a potent stimulator of cell growth and proliferation in the murine MC38 adenocarcinoma cell line and may be a promising therapeutic target for the treatment of colon cancer. Further studies are needed to investigate the effects of *Igf1* inhibition on tumor growth and survival in animal models of colon cancer.

P36: Sars-Cov-2 Induced Guillain-Barré Syndrome: A Case Report and Literature Review

Category: Case Report

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Guillain-Barre syndrome (GBS) is an acute immune-mediated polyneuropathy characterized by progressive and symmetric muscle weakness, absent deep tendon reflexes, and antecedent infection or vaccination. The most common cause of GBS is *Campylobacter jejuni* infection, but in recent years, there have been reports of SARS-Cov-2 infection induced GBS. The diagnosis of viral induced GBS is supported by clinical exam findings, CSF analysis, and electromyography with nerve conduction studies. In this case report, we are presenting a 73-year-old female with a presentation consistent with GBS, but was only preceded by infection with the novel COVID-19. The patient's electromyography/nerve conduction study (EMG/NCS) confirmed diagnosis of GBS. This report aims to highlight this unique presentation of GBS preceded by infection with the novel COVID-19 and bring awareness to and facilitate early diagnosis and treatment of GBS as well as further characterize potential complications of COVID-19.

The authors received patient consent to use their data for this report.

Side	Muscle	Nerve	Root	Ins Act	Fibs	Psw	Amp	Dur	Poly	Recrt	Int Pat
Left	FDIP	Lat Plantar	S1-2	Decr	1+	Nml	Iner	Nml	0	NR	Nml
Left	Ext. Dig. Brev.	Dp Br Peron	L5, S1	Nml	Nml	Nml	Nml	Nml	0	Nml	Nml
Left	Med Gastroc	Tibial	S1-2	Nml	Nml	Nml	Nml	Nml	0	Nml	Nml
Left	Ant Tibalis	Dp Br Peron	L4-5	Nml	Nml	Nml	Nml	Nml	0	Nml	Nml
Left	Vastus Med	Femoral	L2-4	Nml	Nml	Nml	Nml	Nml	0	Nml	Nml
Right	FDIP	Lat Plantar	S1-2	Nml	Nml	Nml	Nml	Nml	0	Nml	Nml
Right	Ext Dig Brev	Dp Br Peron	L5,S1	Nml	Nml	Nml	Nml	Nml	0	Nml	Nml

Figure 1. Table 1. EMG results indicating atypical evidence of predominant motor peripheral polyneuropathy with some features of demyelination. Ins Act = insertional activity; Fibs = fibrillation; Psw = positive sharp wave; Amp = amplitude; Dur = duration; Pol = polyphase; Recrt = recruitment; Int Pat = interference pattern.

P37: Seminal Role of Endothelial TLR4 Signaling in Causing Ileus Via a Profuse Vascular Leak

Category: Basic Science Research

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Background and Purpose: Septic shock remains one of the leading causes of death globally with a mortality rate of 20–60%. We have shown that endotoxin activation of Tlr4 triggers ileus via two independent mechanisms that differ in the time of onset. At the early time point of 6 h, signaling via the Tlr4/MyD88 pathway in cells of non-hemopoietic and non-myogenic origin drives ileus. In contrast, the later activation of Tlr4 signaling in primarily hemopoietic-derived cells results in an additional time-delayed onset of dysmotility. Currently, the early non-hemopoietic mechanism of Tlr4-triggered ileus remains elusive.

Methods: Male C57BL/6, $Tlr4^{-/-}$, $Tlr4^{flox/flox}$, and endothelial $Tlr4^{flox/flox\text{-}Tie2CRE\text{-}/+}$ mice were used. Gastrointestinal transit distribution histograms with calculated geometric centers (GC) were generated with orally fed FITC-dextran (70 kDa) after 80 min. Confocal microscopic imaging of i.v. injected fluorophores examined colonic microvascular leak. Colonic circular muscle contractions were recorded in organ baths.

Results: Endotoxemia induced an early 6-hour ileus after LPS intraperitoneal injection (5 mg/kg)(GC control=10.5 vs. LPS=4.9), which was present in $Tlr4^{flox/flox}$ (GC=5.9), eliminate in $Tlr4^{-/-}$ (GC=9.9) and significantly improved in $Tlr4^{flox/flox\text{-}Tie2CRE\text{-}/+}$ mice (GC=7.9). The role of endothelial Tlr4 was further demonstrated by intravenous injection of LPS (10 mg/kg), which demonstrated an even greater motility improvement in $Tlr4^{flox/flox\text{-}Tie2CRE\text{-}/+}$ mice (GC=9.1) compared to i.v. LPS in C57Bl6 (control=10.7 vs. LPS=4.3). Imaging of LPS-injected B57Bl6 mice demonstrated a profuse transmural microvascular leak. Interestingly, serum itself caused a dose-dependent decrease in colonic circular muscle *in vitro* contractions (1.0%=29.7±8.68, 2.5%=16.0±1.75%, and 5.0%=7.2±3.89% of control activity). Purified IgG (50 mg/dl) decreased contractility to 5.1±4.46% of control. LNA (300 μM) increased activity and eliminated the inhibitory effect of low-dose serum ≦ at 1.0%, but not at ≧ 2.5% serum (36.5±5.14%). Indomethacin (5 μM) significantly blocked the 2.5% serum inhibition (205.8±31.05% of control). Dual LNA and indomethacin pretreatment increased activity (219.8±41.60%) and converted the 2.5% serum inhibition to excitation (302.9±56.45%) compared to control.

Conclusions: Early sepsis-induced ileus is caused by a Tlr4-endotheliopathy resulting in the vascular leak of IgG into the muscularis interstitium triggering the acute secretion of prostaglandins and activation of nitrergic inhibitory motor neurons.

P38: Spontaneous Aortic Dissection In Myosin Heavy Chain 11 Gene Mutation: Critical Manifestation Of A Rare Connective Tissue Disorder

Category: Case Report

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Aortic dissection is a cardiovascular pathology made infamous for its association with numerous complications, many of which carrying significant risks for morbidity and mortality. The risks associated with these processes have led to comprehensive classification schemes for aortic dissections, including the well-known Stanford and DeBakey classifications, which focus on dissection location with associated management protocols. Appropriate management is thus heavily influenced by location, as the anatomic structures involved play a significant role in potential complications of the process. Type A dissections are defined by the involvement of the ascending aortic arch and thus have the potential for involvement of the aortic root, which conveys the potential for bleeding into the epicardial space causing cardiac tamponade. Dissections in this anatomic region also carries an elevated risk for rupture and mortality as the proximal aorta receives blood flow with a high degree of pressure and shear forces. Risk factors for aortic dissection include hypertension, trauma, atherosclerosis, connective tissue diseases, anatomic anomalies, aneurysm and tobacco use. Myosin heavy chain-11 (MYHC11) gene mutations are an extremely rare genetic abnormality resulting in a connective tissue disorder phenotype. This report will describe a case of spontaneous aortic dissection in a previously healthy young male with the MYHC11-mutation genotype involving both the ascending aorta as well as the carotid bifurcation dissections, among other vascular involvement.

P39: Spontaneous Retroperitoneal Hematoma Inducing Ureter Dysmotility

Category: Case Report

Noah Kosnik (PGY2), Shahzeib Syed (PGY3), Duncan 'Alex' McKinney (PGY2), and David Killeen

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Spontaneous retroperitoneal hematomas (SRH) are rare, non-traumatic intra-abdominal bleeds that have no discernible inciting events. Documentation regarding the complications for SRH are scarce, largely in part to the high mortality rate of 20%. Symptoms vary, but mass effect can induce significant dysfunction to surrounding structures, even after appropriate treatment. This case describes a patient who developed ureteral dysmotility following formation of a stable spontaneous retroperitoneal hematoma.

The authors received patient consent to use their data for this report.

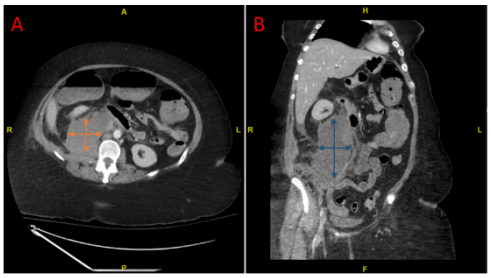

Figure 1. A. Transverse CTA A/P of right retroperitoneal hematoma inducing lateralization of kidney anteriorly (orange arrows). B. Coronal CTA of right peritoneal hematoma with cephalization of right kidney and medialization of small bowel (blue arrows).

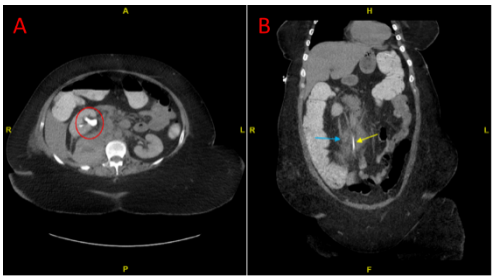

Figure 2. A. Transverse CT A/P of right retroperitoneal hematoma with contrast retention noted in the renal pelvis (red circle) . B. Coronal CTA of right peritoneal hematoma with iliopsoas muscle (blue arrow) pushing the right ureter anteriorly (yellow arrow).

P40: Sublingual Immunotherapy For The Treatment Of Allergic Rhinoconjunctivitis Caused By The Betulaceae (Birch) Family: An Efficacy Focused Systematic Review

Category: Systematic Review/Meta-analysis

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Background: Sublingual immunotherapy (SLIT) is an effective treatment for reducing allergic rhinoconjunctivitis symptoms. Numerous systematic reviews have been conducted to evaluate the efficacy of SLIT for various allergens, but a gap exists related to efficacy of SLIT for tree pollen induced allergic rhinoconjunctivitis. Thus, our goal was to systematically analyze Pubmed citations to better understand SLIT efficacy for tree pollen induced rhinoconjunctivitis.

Methods: A systematic search of Pubmed for studies addressing the efficacy of sublingual therapy for tree pollen was conducted using the following search terms: “rhinoconjunctivitis”, “sublingual”, “birch”, “sublingual immunotherapy”, “tree”, “allergic rhinoconjunctivitis”, “efficacy”, and “tree pollen antigens”. We included articles meeting the following criteria: SLIT for allergic rhinoconjunctivitis, tree allergens from the *Betulaceae* family, randomized clinical control trial or prospective study, and analysis via symptom medication scores and/or daily medication score.

Results: Ten studies (randomized control and prospective) were analyzed with a total of 2,741 patients sensitized to allergens from the *Betulaceae* family. Efficacy of SLIT was analyzed based on symptom medication scores, daily symptom scores, and/or serum IgE and IgG4 levels. SLIT therapy showed an average symptom score reduction of 44.3% from baseline amongst subjects from included studies.

Conclusion: SLIT is an effective treatment option for the reduction of tree pollen-induced allergic rhinoconjunctivitis. A significant improvement in symptoms and symptom management was found in those treated with SLIT. We note that varying assessment methodologies from study to study limited direct comparisons. Although not conclusive, the compiled data additionally points to a beneficial effect of SLIT treatment on other parameters such as medication use, serum antibodies, and quality of life. These findings suggest that tree pollen SLIT could help many patients if approved for use in the United States.

P41: The Mouse Mammary Tumor Virus Drives Mouse Mammary Tumor Growth and Is Possibly A Target Of Decitabine

Category: Basic Science Research

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Endogenous retroviruses (ERV) are repetitive genetic elements that are structurally similar to retroviruses. ERVs are actively expressed in early embryonic development and many cancers. Human ERV genes are known to promote cancer development and metastasis. The mouse mammary tumor virus (MMTV) is strongly associated with mouse mammary cancers and is known to initiate cancer. On the other hand, an antineoplastic agent, decitabine (DAC), is known to enhance ERV expression in cancer cells which, in turn, induces expression of interferon beta (IFNB) by the same cells, which halts cell proliferation. This is known as the viral mimicry hypothesis. The above two lines of findings pose a dilemma in potential cancer treatments. Shall we endeavor to suppress ERVs to slow down tumor growth, or shall we activate ERVs to induce an antineoplastic immune response?

This project used recombinant DNA technology and synthetic viruses to engineer cancer cells. The cells were inoculated into mice in the fat pad under the nipple to model mammary cancers. Some of the mice were treated with DAC. Tumor growth was monitored. When the mice were sacrificed, their lungs were minced to culture metastatic cancer cells, which were quantified by counting colony growth.

Using a lentiviral vector, we successfully knocked down MMTV in a mouse mammary cancer cell line, 4T1. In mice, knockdown cells developed into smaller tumors and resulted in significantly less metastasis in the lungs. MMTV Env gene expression was positively correlated with tumor mass size. DAC enhanced MMTV expression on the RNA level in both control and knockdown tumors. DAC inhibited tumor growth of knockdown tumors to a lesser extent than that of control tumors, but the final masses of DAC-treated tumors were comparable with or without MMTV knockdown.

We plan to consolidate the role of MMTV in cancer development by overexpressing MMTV Env in a cancer cell line with a low level of MMTV activity. This cell line is the MC38 colon cancer cells that grow into tumors in the C57BL/6 mouse. We will knockdown the interferon beta gene, IFNB1, in 4T1 cells and observe tumor growth in BALB/c mice from which 4T1 was derived. Knockdown cells should be resistant to DAC if the viral mimicry hypothesis is correct.

P42: Use Of Intravenous Immunoglobulin For Severe Relapsing Clostridium Difficile Pseudomembranous Colitis

Category: Case Report

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Chronic diarrhea has multiple etiologies, but in the healthcare field, one of the most prevalent causes is infectious colitis caused by Clostridium difficile (CDI). Once contracting CDI, the patient is at an increased rate of developing recurrent or relapsing CDI. Treatment for CDI is based on the severity and prevalence of recurrence within the last 8 weeks. For patients that are refractory to traditional CDI therapies, there has been successful treatment with intravenous immunoglobulin G (IVIG) containing anti-C. difficile antibodies. Today, we are presenting a case of a patient with severe relapsing CDI pan-pseudomembranous colitis refractory to oral vancomycin, metronidazole, and fidaxomicin that responded to IVIG.

P43: Very Early Onset Inflammatory Bowel Disease Care: An Assessment of Biomarkers And Disease-Specific Severity Scores Across Ethnic Groups

Category: Clinical Research

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Background & Purpose: Very Early Onset Inflammatory Bowel Disease (VEO IBD) manifests before 6 years of age and often results from a monogenic etiology. Common laboratory biomarkers may prove useful for tracking VEO IBD disease activity and assessing disease severity. Furthermore, the Pediatric Ulcerative Colitis Activity Index (PUCAI) score can help quantify disease activity in affected children. Using PUCAI scores and common biomarkers, we sought to understand whether disease activity differences exist across ethnic groups within a large single-center VEO IBD cohort.

Methods: We obtained demographic and longitudinal clinical data on a cohort (n=110) of VEO IBD patients from the Texas Children's Hospital in Houston Texas. Data were filtered and analyzed by ethnicity. We then compared variables between one distinct ethnicity against the remaining groups. Comparison of mean lab values and PUCAI scores was accomplished via a two-sample t-test assuming unequal variances. Significant differences were identified by a p value < 0.05.

Results: We found a significant difference in Albumin levels and PUCAI scores between White and Non-White patients. After correcting for data sparsity, albumin differed between Asian and white populations (6.447 ± 5.664 g/dL vs. 4.246 ± 4.2095; $p<0.001$). In addition, PUCAI was found to differ between White with zeros and Latin pediatric populations with VEO IBD(7.994 ± 12.765 g/dL vs 17.85 ± 18.346;$p<0.001$). PUCAI between White and Latin pediatric patients without zeros (16.993 ± 13.89 g/dL vs 25.89 ± 16.96;$p<0.001$).

Discussion & Conclusions: From this focused study, we propose trending PUCAI scores and albumin levels at all visits for patients with VEO IBD. Calprotectin and C-reactive protein levels were also analyzed and may be useful markers but did not display a significant difference between ethnic groups. Findings from this study could help improve clinical outcomes for children affected by VEO IBD and shed light on disparities in care.

P44: Workup and Discovery of Disseminated Cryptococcal Infection in an HIV-negative Individual

Category: Case Report

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Cryptococcosis is a disease caused by encapsulated yeasts of the genus *Cryptococcus*. The two species most commonly recognized for their ability to cause infection in humans are *Cryptococcus neoformans* and *Cryptococcus gattii*. *C. neoformans* is well known for its role in causing infection, though this typically occurs in the immunocompromised, whereas *C. gatti* is paradoxically associated with immunocompetent individuals. The vast majority of cases are attributed to *C. neoformans* and the disease process is typically limited to the lungs as infection occurs via inhalation of spores. Immunodeficient and immunosuppressed individuals are at risk of disseminated disease which carries a much higher risk of mortality. Incidence of cryptococcal infections has dramatically increased since the 1970s. Along with this increase in incidence, global disease burden and mortality related to cryptococcal infection has risen [1]. Impaired cell-mediated immunity is an important factor in the development of cryptococcal meningitis, a serious manifestation of disseminated infection. Data from 2020 shows that in an estimated 152,000 cases of cryptococcal meningitis that year, 112,000 resulted in death [2]. As the mortality rates from disseminated cryptococcal infection remain elevated, recognizing those with risk factors and understanding the appropriate testing is critical for timely diagnosis and treatment. This report will describe a case of disseminated cryptococcal infection and meningitis in an HIV-negative individual.

P45: Differentiating Vascular Dementia from Neurodegenerative Dementia (Alzheimer's Disease) using Arterial Spin Labeling MRI - a Feasibility Study

Category: Clinical Research

Jason Badelita (OMS-II), Lucy Conser (OMS-II), Irene George (OMS-II), Bryant Hartman (OMS-II), Harrison Kline(OMS-II), Davis Melin(OMS-II), Pranav Pradhan (OMS-II), Lindsay Kate Wanner (OMS-II), and Charles Joseph

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47 million people worldwide live with dementia, and that number is expected to triple over the next 30 years. Small vessel ischemic changes and neurodegenerative changes are two causes of dementia that are difficult to differentiate with conventional MRI. Both types exhibit loss of capillary integrity and decline in mental function but are mechanistically different. The pathophysiology of vascular-related dementia results from major changes in the perfusion paradigm resulting in both reduced arterial mean transit time (aMTT) and capillary mean transit time (cMTT), while neurodegenerative-related dementia has normal aMTT, but prolonged cMTT. Therefore, the primary aim for this study is to further develop a sensitive, noninvasive, and inexpensive 3D Arterial Spin Labeling (ASL) MRI biomarker detection technique to assess the transition of mild cognitive impairment (MCI) to progressive dementia (PDe), and to distinguish vascular and neurodegenerative dementia before significant progression of disease. Seven subjects were recruited for each of the Alzheimer's and Vascular Dementia groups who had no exclusionary health conditions and met certain Montreal Cognitive Assessment (MoCA) scores from the CENTRA Memory Disorders Clinic. Subjects completed a 3T Skyra magnet MRI scan at CENTRA Health Lynchburg General Hospital using 3D ASL sequencing. The data collected includes early and late phases of perfusion, time to max arterial peak perfusion and amplitude, and late phase linear clearance rate for both study groups. A comparison of results will be used to determine if there is a significant perfusion difference that can be utilized to differentiate between vascular and Alzheimer's dementia at an early stage of disease. Early differentiation will enable tailored pharmaceutical and medical treatment that is maximally beneficial to each patient. Alternatively, this study may shift the pathophysiology paradigm of dementia by demonstrating a spectrum of related neurodegenerative conditions where patients may have combined pathogenesis, leading to more specific treatment approaches.

P46: Prevalence and Characteristics of the Persistent Median Artery in an Adult Population: A Cadaveric Study

Category: Basic Science Research

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The median artery is an embryologic artery originating from the brachial artery around the 5th embryonic week. This artery is known to degenerate around the 8th week of development as it is replaced first by the ulnar, then the radial, arteries. However, this degeneration does not always occur. This persistent median artery (PMA) may be present in either a palmar or an antebrachial pattern, both of which may have clinical consequences in surgical patients. When present in the palmar pattern, the PMA may contribute significantly to the vascular supply of the palm. This study seeks to illuminate the prevalence of the PMA in the adult population, as well as describe the anatomic consequences secondary to the presence of this artery. Antebrachial and palmar dissections were performed on 34 cadavers between the ages of 62 and 100 years of age. Prevalence of PMA was determined within the antebrachium, and the diameters of radial, ulnar, persistent median arteries were recorded. Eleven upper limbs were excluded from this study due to confounding factors. A PMA was present in 56% of the 57 upper limbs included in this study. Of these, 28% (*n*=9) were of the palmar type, while 65% (*n*=21) were of the antebrachial type. The average diameters of the radial, ulnar, and median (where present) arteries entering the palm were 3.12 mm (SD 0.49), 2.89 mm (SD 0.61), and 1.53 mm (SD 0.56), respectively. Preliminary analyses have not shown a decrease in the radial and ulnar arterial diameter commensurate with the presence of the median artery, however, we predict these arteries will decrease in diameter as our sample size increases