



**VCOM-Carolinas
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RESEARCH ABSTRACTS

CLINICAL STUDIES

CLIN-1

THE EFFECTS OF ROUTINE EXERCISE ON ACUTE RHINOSINUSITIS

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Acute Rhinosinusitis is one of the most common medical conditions seen in the United States, frequently causing millions of adults each year to seek medical care for their symptoms. This not only presents a huge strain on the US healthcare system, but also leads to an unnecessary financial drain on afflicted individuals. The positive effect of physical activity on health has long been known, both intuitively and scientifically. Individuals who are more physically active are happier, healthier, and live longer; however, little research has been done to examine how levels of physical activity affect the course of illnesses. In examining the physical activity levels of individuals presenting with Acute Rhinosinusitis, we hope to determine if there is any benefit to higher habitual levels of physical activity in the severity and resolution of Acute Rhinosinusitis. This additional benefit to the exhaustive list of advantages provided by physical activity could aid in the important fight against obesity in the United States by convincing the population of the everyday benefits of exercise. We have found a significant decrease in IL-6 levels as exercise increases as well as a greater resolution in symptoms with higher levels of exercise. We have found that increasing physical activity levels can decrease the severity of symptoms in acute illnesses.

CLIN-2

KAWASAKI DISEASE: DO EARLY DIAGNOSIS AND TREATMENT IMPROVE OUTCOME AND PREVENT COMPLICATIONS?

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INTRODUCTION: Kawasaki disease (KD) is an acute, self-limited vasculitis of unknown cause that has an affinity for negatively impacting the coronary arteries of infants and young children. Common cardiac complications include coronary artery aneurysms, depressed myocardial contractility and heart failure may develop. If left untreated, about 25% of patients will develop coronary artery disease (CAD) or coronary lesions. Intravenous immunoglobulin (IVIG) treatment reduces morbidity and mortality related to cardiac involvement, however how quickly results are seen is unknown. This retrospective study looked at CAD outcomes for KD pediatric patients in a community based hospital in South Carolina who were treated with IVIG between 5 and 10 days of initial fever. Half the patients presented with CAD at diagnosis and half the patients were without CAD at diagnosis. Echocardiograms were taken at the initial diagnosis and after one year to determine CAD progression, regression, and/or prevention.

HYPOTHESIS: 1. Diagnosis and IVIG treatment prior to ten days of fever in KD patients (ages between 6 months and 5 years old) with associated coronary artery disease will have similar statistically significant outcomes to diagnosis and IVIG treatment prior to ten days of fever in KD patients (ages between 6 months and 5 years old) with no coronary artery disease at one year follow up via echocardiogram regardless of ethnicity. 2. Diagnosis and IVIG treatment prior to ten days of fever in KD patients (ages

between 6 months and 5 years old) with no coronary artery disease will not have statistically significant coronary artery disease at one year follow up via echocardiogram regardless of ethnicity.

METHODS: Retrospective chart review of ten consecutive pediatric patients admitted to a community-based hospital in South Carolina with diagnosis of KD over a six-year period from January 1, 2006 to January 1, 2012. IRB review was exempted for this study.

RESULTS: Ten patients diagnosed with KD; five had CAD at presentation in the form of coronary dilatation or ectasia (Group 1) and five did not have CAD (Group 2). No significant statistical differences exist between the two groups in age ($p=0.3$), length of hospital stay ($p=0.08$), and duration of fever before IVIG ($p=0.26$). All ten patients were treated with IVIG. At one-year follow-up; all patients in Group 1 showed complete resolution of their coronary artery disease, and none of the patients in Group 2 developed coronary artery disease.

CONCLUSION: Our consecutive case series adds to the medical literature that early, single-dose treatment with IVIG within the first 5-10 days of KD fever helps in the resolution of CAD for CAD positive patients, as early as one year. Additionally, pediatric patients who receive single-dose treatment with IVIG within the first 5-10 days of KD fever, are less likely to develop CAD even one year after treatment. Prompt diagnosis and treatment of KD is crucial for reducing the risk of coronary artery lesions and help prevent the development of coronary artery aneurysm.

CLIN-3

THIRD-GENERATION DNA SEQUENCING APPROACHES TO RAPID CHARACTERIZATION OF DRINKING WATER CONTAMINATION IN EL SALVADOR, HONDURAS, AND THE DOMINICAN REPUBLIC

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About 2.1 million urban and 13.2 million rural inhabitants in the countries of the Central America have no access to safe drinking water, with the lowest level of water supply service correlated with the level of regional poverty. To avoid the undesirable consequences of the lack of access to safe drinking water, underserved groups in the countries of the region tend to pay more than 25% of their monthly-earned incomes to get drinking water from independent suppliers. Microbial contamination of drinking water supplies also poses a challenge to understanding infectious disease risks that VCOM faces at its mission sites across Honduras, El Salvador, and the Dominican Republic. Water-associated microbiota data are critical to determine if improved water sources, including tap water supplied to VCOM clinics, are in fact safe and do not pose infectious disease risks. With the advent of affordable third-generation DNA sequencing technology the opportunity exists to re-invent and perfect drinking water testing, and integrate it with other water quality diagnostics. We propose to establish practical workflows for integrated, comprehensive, portable, highly sensitive, and rapid analysis of microbiota in drinking water samples, based on Oxford Nanopore MinION sequencing devices. More rapid and improved diagnosis will result in more effective treatments for infectious diseases that often have similar initial symptoms but then resolve with dramatically different outcomes. Our innovative approaches and workflows will offer the ability to progress from environmental samples to potential patient-tailored antimicrobial treatments in just a few hours. This project will also provide a necessary proof of concept paving the way to a larger water monitoring system, for which extramural funding from such sources as Bill & Melinda Gates Foundation will be sought for.

CLIN-4

THE EFFECT OF PATIENT AGE AND GENDER ON THE EFFICACY OF FACIAL EFFLEURAGE

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Acute rhinosinusitis is a common complaint in family and urgent care settings affecting millions of people each year. Despite most infections being likely viral, antibiotics are prescribed to as many as 90% of patients. The antibiotics are prescribed based on symptom severity and how long they have been symptomatic, not based on laboratory testing to determine etiology. This overuse of antibiotics leads to unnecessary healthcare costs and contributes to the development of antibiotic resistance. There is a great need for treating acute rhinosinusitis symptoms without antibiotics. Facial effleurage is a soft tissue osteopathic manipulative technique (OMT) performed by applying pressure over the sinuses that promotes lymph drainage from the sinuses and head. It has been used to help alleviate patients' rhinosinusitis symptoms, but it has been understudied in medical literature thus far. We aim to determine both the efficacy and immunological underpinnings of facial effleurage by analyzing patient-reported symptom surveys and tracking serum immune markers, such as TNF- α , before and after treatment. In particular, we aim to evaluate the relationship between patient age, patient gender, and facial effleurage efficacy to understand what populations are benefitted by this treatment. We hope that facial effleurage will be used as a widespread first-line treatment of acute rhinosinusitis.

CLIN-5

A QUALITATIVE ANALYSIS ON THE USE OF STEP TRACKERS TO MEASURE PHYSICAL ACTIVITY IN CHILDREN

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CONTEXT: According to the Centers for Disease Control and Prevention, one in five school-aged children are obese. Additionally, children with a lower socioeconomic status (SES) are less physically active than children with higher SES, leading to unfavorable health risk factors at an early age. The PLAY (Promoting Lifelong Activity in Youth) Program was developed to increase physical activity levels in the low SES student population of Spartanburg, South Carolina. Previously, step tracking devices were used to measure the effectiveness of the PLAY program. While these devices have been shown to provide valid measurements of physical activity, most studies are short-term, and few studies demonstrate effectiveness and long-term adherence in the pediatric population. Additionally, few studies have qualitatively examined children's perceptions and attitudes regarding long-term step tracker use to measure and promote physical activity.

Objective: The purpose of this study is to qualitatively examine children's attitudes, perceptions, and challenges associated with step trackers in order to provide a better understanding of how to increase compliance, minimize missingness, and more effectively use step trackers to measure physical activity in this population.

METHODS: All third grade students enrolled at a low socioeconomic school where bi-monthly PLAY sessions are conducted were given step tracking devices (Garmin Vivoactive®) devices and were instructed to wear the devices at all times. Researchers reminded students to wear the devices at weekly data collections and bi-weekly PLAY sessions. Four months into the study, device data collection was stopped, and an open-ended questionnaire was used to engage students in individual interviews. Questions focused on students' likes and dislikes regarding the step trackers, how the step trackers changed students' physical activity levels, and students' perceptions on how the program could be

improved. Interviews were audio recorded, transcribed, and analyzed by researchers using thematic coding. Researchers identified common elements of participants' experiences with step-trackers. Codes were reviewed for possible connections, resulting in themes.

RESULTS: Of the 16 students who were given step trackers, 11 agreed to participate in the study. 6 of these students (55%) lost their device. Most commonly, students reported that the device had fallen off their wrist in a public place. Many students found locks on the bands of the devices to be frustrating and ineffective, with the devices frequently falling off their wrists. The students who still had their step trackers continued using them because they liked the time and date functions on the devices. Many students felt that the goal setting feature on the device motivated them to exercise.

CONCLUSION: Although step trackers provide a convenient measure of physical activity, they should be used with discretion in children, particularly because children have a hard time securing the bands, frequently misplace them, or forget to put them back on if they take them off. Children are motivated to exercise more and enjoy the many features on the devices.

CLIN-6

ASSESSING HEALTHY EATING ATTITUDES AND BEHAVIORS OF CAREGIVERS AT A LOCAL PEDIATRIC CLINIC IN SOUTHWEST VIRGINIA

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CONTEXT: within the past ten years Virginia has had the nation's highest rate of obese children two to four years old enrolled in the federally supported Women, Infants and Children Nutrition program. Southwest Virginia consistently has higher rates of childhood obesity compared to the rest of the state. The researchers proposed that a discordance exists between caregivers' and parents' knowledge, attitudes and behaviors related to childhood nutrition.

OBJECTIVE: To identify challenges facing parents of children that lead to the high obesity rate in the region.

METHODS: This study used a cross-sectional study design and an anonymous 33 item survey administered to parents of children six years of age or younger in the waiting room of a local pediatric clinic.

RESULTS: Responses from parents (n=28) indicated that the majority were the parent, white, well educated, and most worked outside the home with incomes above \$50,000. Parents (86%) disagreed with the statement, "A fat child is a healthy child". Parents' responses regarding diet quantity were less consistent; 60% agreed with both statements, "I let my child decide how much to eat," and, "I am very careful not to feed my child too much". Participants' were conflicted regarding food quality, with 39% agreeing to, "A child should never eat fast food," while others were neutral (32%) or disagreed (29%). Most parents (68%) agreed with the statement, "I let my child eat fast food." Logistic regression confirmed relationships, e.g., parents that disagreed with, "I let my child eat sugary foods like candy, ice cream, cakes or cookies", were less likely (99% lower odds) to report agreeing with the statement, "I let my child eat junk food like potato chips, Doritos and cheese puffs," and less likely (97% lower odds) to agree with, "I let my child eat fast food" (p <0.001).

CONCLUSION: Parent knowledge, attitudes and behaviors indicated a need for nutrition education appropriate for the parent's style and child's development as a way to improve the nutritional status of children in southwest Virginia. Additional studies are recommended to 1) increase respondent numbers and demographic diversity, 2) assess children's nutritional status and 3) evaluate benefits of educational sessions for parents/caregivers.

CLIN7

CORRELATING PATIENT SYMPTOM SEVERITY USING THE VALIDATED 20-ITEM SINONASAL OUTCOMES TEST WITH SERUM IL-6 LEVELS AND TNF-A LEVELS

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Interleukin-6 (IL-6) and tissue necrosis factor- α (TNF- α) are pleiotropic cytokines that are produced in response to infection and tissue damage. IL-6 is widely known for many pro-inflammatory effects. It induces the production of acute phase proteins, promotes the differentiation of naïve CD4+ and CD8+ T-cells, the differentiation of B cells into plasma cells, and induces the production of IgG. TNF- α stimulates a cascade of inflammatory cytokine production and the activation of macrophages. The extensive effects of IL-6 and TNF- α directly contribute to the symptomology of acute rhinosinusitis (ARS). The severity of ARS symptoms can be quantified using the 20-item Sinonasal Outcomes Test (SNOT-20), a 20 domain, patient-reported, quality-of-life (QOL) questionnaire. IL-6 and TNF- α concentrations are often correlated with the severity of acute illness. There is a large body of anecdotal evidence supporting osteopathic manipulative therapies in reducing inflammation and symptom severity, but objective data is lacking. We hypothesized that IL-6 and TNF- α levels would be higher in patients with acute rhinosinusitis, and that osteopathic manipulative therapy would decrease the serum levels of IL-6 and TNF- α , helping patients resolve the infection. We sought to correlate serum IL-6 levels with patient-reported symptom severity at pre- and post-treatment timepoints of facial effleurage for patients with ARS. This correlation was investigated with the purpose of determining a causative role of pro-inflammatory cytokines in acute rhinosinusitis symptomatology and severity. Blood samples were taken from patients presenting with acute rhinosinusitis before having facial effleurage performed and after the treatment, and IL-6 and TNF- α serum levels were isolated and quantified via ELISA from these samples. We found that IL-6 serum levels correlated to TNF- α serum levels; however, levels of IL-6 and TNF- α did not correlate to patient reported severity scores. Therefore, the goals of pharmacologic and osteopathic treatment could be aimed at directly inhibiting IL-6 and TNF- α and reducing serum levels in order to reduce inflammation and improve patient QOL. However, the absence of correlation between symptom severity and concentration of cytokines in the serum suggests that systemic cytokine therapy is not a viable option for the treatment of sinusitis. Perhaps more localized cytokine therapy could prove useful.

CLIN-8

A RETROSPECTIVE ANALYSIS OF HUMAN PARAINFLUENZA VIRUS IN THE PEDIATRIC POPULATION

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CONTEXT: Human parainfluenza viruses (HPIVs) contribute to significant hospitalizations and emergency room visits for respiratory illness in the pediatric population. HPIVs are among the most common acute respiratory infections in children and are associated with croup, upper respiratory tract infections, bronchiolitis, and pneumonia. Each strain varies in presentation not only by clinical symptoms,

incidence, and disease severity, but seasonal occurrence and coinfection with other respiratory and enteric viruses.

OBJECTIVE: To describe the pediatric patient population diagnosed with human parainfluenza viruses (HPIVs) at Spartanburg Regional Hospital and determine differences between strains 1-4. To ascertain a pattern of disease severity, intensive care requirement, length of stay, clinical symptoms, disease presentation or potential complications associated with specific strains.

METHODS: We performed a retrospective chart review on 40 pediatric patients admitted to Spartanburg Regional Medical Center with parainfluenza virus during a one-year period. Inclusion criteria included all patients less than 18 years of age admitted to the general pediatric ward or pediatric intensive care unit (PICU) with a diagnosis of parainfluenza strains 1-4 confirmed on respiratory FilmArray during the defined study period. Demographic and clinical data were collected and analyzed.

RESULTS: Of the 40 patients diagnosed with HPIVs 1-4 confirmed on respiratory FilmArray, 6 were diagnosed with HPIV-1 (15%), 12 with HPIV-2 (30%), 17 with HPIV-3 (42.5%), and 5 with HPIV-4 (12.5%). The average length of stay for HPIV-1 was 35.5 hours, HPIV-2 was 67.8 hours, HPIV-3 was 51.3 hours, and HPIV-4 was 84.8 hours. While 29 patients (72.5%) were able to be managed on the floor, 11 (27.5%) required PICU admission, and two patients required escalation to the PICU from the floor (one HPIV-2 and one HPIV-4). The most common co-infection diagnosed on FilmArray was Human Rhinovirus/Enterovirus (9 patients). 75% of patients across all strains experienced nonspecific upper respiratory, while only 35% of patients were described as having traditional croup-like symptoms. The majority of patients were discharged home (95%), while only two (5%) required transfer to an outside facility for higher level of care (one HPIV-3 and one HPIV-4).

CONCLUSION: Human parainfluenza viruses are traditionally associated with croup (laryngotracheobronchitis), which includes a range of symptoms such as a seal-bark cough and inspiratory stridor. However, 75% of patients experience more vague upper respiratory symptoms (non-barking cough, rhinorrhea, and congestion), while only 35% of patients experienced traditional croup symptoms. HPIV-2, as identified by prior literature, had the most patients who experienced croup symptoms (50%), however this strain also had 50% of its patients described as having upper respiratory symptoms. The most commonly diagnosed strain was HPIV-3, where 88.2% of patients experienced upper respiratory symptoms. Of the strains, HPIV-1 had the highest percentage of PICU admissions (50%), followed by HPIV-4 (40%), HPIV-2 (33%), and HPIV-3 (11.7%).

CLIN-9

WAIST CIRCUMFERENCE COMPLEMENTING BODY MASS INDEX MEASURES ASSESSED AS DISEASE RISK INDICATORS IN ADULT WOMEN; A COMPARISON STUDY IN THE DOMINICAN, HONDURAS AND EL SALVADOR

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International clinics providing medical services and supporting nutrition research are located in the Dominican Republic (DR), El Salvador (ES) and Honduras (HN). This study was conducted to determine

differences in the risk of nutrition sensitive, diseases leading to increases in morbidity, mortality and disability, placing great burdens on health care systems in each country. Study outcomes are intended to guide the development of culturally specific nutrition education materials for future intervention programs in each country. Anthropometric measures, including waist circumferences (WC), are useful in the early detection of risk for most non-communicable diseases (type 2 diabetes, hypertension, and cardiovascular disease) and even communicable diseases. Visceral adipose tissue is a greater metabolic risk than subcutaneous fat. Public health guidelines recommend WC to be half that of height. NIH recommendations for women are for WC of 35 inches or less. Methodology: Researchers completed training using videos, pilot testing, and practice measurements with consistent equipment and measurement protocols prior to data collection. Pre-testing occurred for one month at each location with an educational intervention provided and post-testing occurred 4 months later in each country. Pearson 2-tailed correlations and ANOVA tests were performed for significant findings. Results: Subjects, all non-pregnant, non-lactating women (n=126 DR, n=101 ES, n=132 HN), ranged in age from 18 to 78 years with 30% in their 30s'; mean ages (years) 32.9 DR, ES 37.0, HN 42.8 (all differed, $p \leq 0.05$). Most subjects selected their ethnicity as Hispanic/Latino-Americano and 13 subjects selected Native Americano (Lenco). Percent of subjects with normal BMI distributions were DR 5.6, ES 18.8, HN 15.9 and the percent obese or overweight were DR 88.8, ES 75.3, HN 62.9 (all differed, $p \leq 0.05$). Mean and standard deviation for waist circumferences (WC, inches) were DR 38.3 ± 5.6 , ES 37.4 ± 5.1 , and HN 36.3 ± 5.7 ; waist: height ratios were DR 61.2:1, ES 61.5:1, and HN 52.6:1. The waist to height ratio for HN was 14% lower than mean measures for DR and ES. BMI and WC were closely correlated ($r = 0.70$, $p \leq 0.01$). To conclude, from the preliminary analyses of data subjects, BMI and WC measures were convenient, noninvasive, inexpensive and available for comparative assessments. Accurate WC measures complementing BMI as part of a clinical exam provide valuable insight to identify those at risk of disease and enable clinicians to provide precision nutrition education. Subjects in the DR appear to differ from their contemporaries in ES and HN with respect to nutritional status. Our pre-testing findings support the need for country specific educational interventions in future nutrition education assessment programs in VCOM international service areas. These measures are a component of a comprehensive intervention study including pre- and post-data on demographic information, health (ICD-10 codes), food frequency intakes, and nutrition knowledge. This study highlights the valuable uniqueness of the international service area clinic model. Future research will focus on additional explanatory variables that contribute to risk of non-communicable and communicable diseases and guide the development of interventions.

CLIN-10

AGE, PHYSICAL ACTIVITY, BODY MASS INDEX, AND WAIST CIRCUMFERENCE IN ADULT WOMAN OF EL SALVADOR

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Edward Via College of Osteopathic Medicine provides medical services and fosters research at the Shalom Clinic in San Salvador, El Salvador. Current guidelines from the U.S. Centers for Disease Control and Prevention and the World Health Organization define a normal BMI range as 18.5 to 24.9, an overweight BMI as 25.0 to 29.9, and obese BMI as over 30. National Institutes of Health recommend a waist circumference of 35 inches or less for women. The World Health Organization recommends adults aged 18-64 should do at least 150 minutes of moderate-intensity aerobic physical activity (PA) throughout the week (30 minutes 5 times/week). Studies consistently demonstrate that in many

countries lower levels of PA correlate with a higher BMI. The literature reports that Latin American doctors are less likely to discuss PA. The objective of this report focused on the relationships between age, PA, body mass index (BMI), and waist circumference (WC) in women volunteering to participate in a nutrition assessment study. During a 4-week data collection period at the clinic, 128 female participants completed a series of surveys regarding health, PA, food frequency, and nutrition information obtained from non-pregnant, non-lactating participants 18 years and older (n= 90). Pearson's correlation and single-factor ANOVA tests were performed to assess relationships between the variables with significance determined at $p \leq 0.05$. Prevalence rates of self-reported PA levels selected by subjects were 71% inactive, 18% light (walking less than 1 hour a day), 11% moderate (walking 1-3 hours a day), and 0% heavy (walking 3-5 hours a day). Subjects varied in age: 2% were below 20 years old, 31% were between 20-29 years old, 24% were between 30-39 years old, 30% were between 40-49 years old, 9% were between 50-59 years old, and 4% were greater than 60 years old. The average BMI among participants was 28.5. BMI distributions indicated that no subject was underweight, 21% were within normal BMI range, 42% were overweight, and 36% were considered obese. There was a very strong negative correlation for PA with age ($r = -0.999$, $p \leq 0.11$, $r^2 = 0.62$), and a strong negative correlation between PA and BMI ($r = -0.79$, $p \leq 0.001$, $r^2=0.997$). There was a very strong positive correlation between BMI and WC ($r = 0.98$, $p = 0.00$, $r^2=0.96$), a strong correlation with BMI and age ($r = 0.69$, $p \leq 0.02$, $r^2 = 0.48$) and a moderate positive, insignificant, correlation between age and WC ($r = 0.57$, $p \leq 0.26$, $r^2=0.329$). The outcomes of this study show the self-reported PA levels are less than recommended in this cohort of Salvadoran women, a risk factor for the higher than recommended weight status measures, BMI and WC. Based on the results, our data suggest that patients may benefit from physicians' assessments and discussions about PA during clinic visits. We propose future evidence-based research efforts to support recommendations, assess effectiveness and confirm implementation of PA behaviors in patients visiting the clinics to improve lifelong health.

EDUCATIONAL STUDIES

EDUCAT-1

THE IMPACT OF AN EDUCATIONAL PROGRAM ON MEDICAL STUDENTS TO ENHANCE KNOWLEDGE AND AWARENESS OF ELDER ABUSE

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CONTEXT: It is estimated that one in six adults sixty years and older have experienced one form of abuse in the community over the past year, a number that is likely under-reported due to lack of awareness and knowledge on how to recognize this form of abuse. Additionally, there is little to no education provided to caregivers about signs of elder abuse, the appropriate steps to report it, and the best way to support victims.

OBJECTIVE: The purpose of this study was to construct a STOP-DV educational program focusing on elder abuse for medical students. This study investigated if participation in this program would increase medical students' awareness and knowledge of how to approach and manage elder abuse.

METHODS: First and second year medical students were contacted via email for participation in this educational program. The initial email contained a link to an anonymous online survey to determine students' knowledge and awareness of elder abuse prior to participation in this study. There were then

five events that were each designed to educate medical students on recognizing and identifying the signs and risks associated with elder abuse. At the conclusion of these events, students were again sent an email containing the link to the post-survey. Results of the pre and post surveys were compared to determine if this educational program significantly increased medical students' knowledge and awareness of elder abuse.

RESULTS: Prior to starting the educational seminars regarding elder abuse, second year medical students (Class of 2022) were found to be significantly more aware of recognizing elder abuse in comparison to first year students (Class of 2023). However, at the conclusion of this educational program, there was not a significant difference in awareness and knowledge of elder abuse between the Class of 2022 and 2023, but there was a significant difference between mean scores of pre and post surveys in students' overall knowledge and awareness of elder abuse.

CONCLUSION: The use of informative seminars and lectures about elder abuse helped medical students increase their knowledge and awareness of this type of abuse. Use of these educational programs can help better enable future caregivers to recognize and understand the signs of elder abuse as well as being able to offer support to these victims.

EDUCAT- 2

TIKTOK IN DERMATOLOGY

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TikTok has taken the social media world by storm since 2018 where it reached upwards of 660 million downloads within its debut year.⁽¹⁾ The mobile app has made huge strides in popularity due to its short-form mobile video capabilities, made by the likes of Snapchat and Instagram Stories, while preaching its mission to “inspire creativity and create joy”.⁽²⁾ More than 500 million people access TikTok on a monthly basis, with 66% of users younger than the age of 30 and its reach highest among females ages 18-24 (24.5%).⁽¹⁾ With an overwhelming amount of information available and distributed amongst social media platforms these days, it begs the question as to what kind of information people are being subjected to that may impact their personal health decision-making. This study assessed the type of content, viewership, and relevant demographical data on a broad scope of dermatology related content on TikTok. First, the top ten dermatology related terms were searched on TikTok according to views (#dermatology #dermatologist, #acne, #alopecia, #rosacea, #psoriasis, #vitiligo, #eczema, #melanoma, #skincancer). Next, the 100 most recent videos of each dermatology related term were studied in detail using descriptive statistics. Overall, the results included 972 videos with over 346.6 million viewers. Education/Awareness was the most prevalent content type at 82% of the total search results, with the remaining 18% related to promotional/testimonial related content. These 972 videos were “liked” a total of 8,467,194 times, “commented” on a total of 87,374 times and “shared” a total of 296,659 times. Of the total videos, 19% were uploaded by a health care provider or worker (including an MD/DO in Dermatology, mid-level providers, nurses and estheticians), 1% were uploaded by third party businesses and 80% by “other” users. This study contributes to a growing body of data that there is a relative absence of established dermatology organizations and advocacy groups on newer social media platforms. Although TikTok doesn't see as much global traffic as Instagram or other long-standing social media avenues of communication, it can still be a valuable resource for dermatologists, physicians across other specialties, and the general public to share their dermatology or medical-related content.

1. TikTok: How Fast Is It Growing in the US, And Who's Using It? (2019, May 7). Retrieved from <https://www.marketingcharts.com/digital/social-media-108342>
2. www.tiktok.com

EDUCAT-3

STUDENT TRAINING ON PREVENTING DOMESTIC VIOLENCE (STOP-DV)

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BACKGROUND: Domestic violence is a serious public health issue that affects one in four women and one in seven men in the United States. Student doctors, physicians, and allied healthcare professionals need domestic violence training to overcome barriers in identifying, examining and treating survivors of domestic violence.

HYPOTHESIS: This experimental research study will examine if exposure to domestic violence topics through Student Training on Preventing Domestic Violence (STOP-DV) significantly raises knowledge and awareness in medical students compared to medical student controls who do not participate in STOP-DV.

METHODS: STOP-DV used a quasi-experimental study design. Students were split among two groups, treatment (VCOM-Carolinas) against controls (VCOM-Virginia and VCOM-Auburn) groups. Data was collected over two years. Initially, both treatment and control groups were given the same pre-survey to assess baseline domestic violence (DV) knowledge, awareness and health seeking behaviors to note statistical differences between the groups. Over the course of months, the treatment group participated in up to five educational experiences including talks about human trafficking, domestic violence and child abuse. The control group had no DV learning opportunities provided to them by the STOP DV team. At the completion of all events, a post-survey was sent to both treatment and control groups. The STOP-DV survey was adapted from Suicide Prevention Exposure, Awareness, and Knowledge (SPEAKS) survey. The sample population was based on a convenience sample of first and second year VCOM students, but individual participation was nonrandomized and voluntary. The only inclusion criteria was that they must be a current OMS-I or OMS-II VCOM student. There was no limit for participant enrollment, and continuous entry into the study was available until the study concluded. Within this participation sample, there were no exclusion criteria. Surveys were anonymously administered on Qualtrics software.

RESULTS: SPSS analysis of the data is currently being done. Data will be analyzed for significant ($p < .05$) differences between groups (gender, age, ethnicity, etc.). Once variables (v1: knowledge and awareness on domestic violence, v2: self-efficacy in discussing domestic violence, v3: perception of health seeking behaviors related to domestic violence) values are calculated both pre-and post-treatment, the difference between post and pre-scores will be calculated. Two sample t test (or Wilcoxon rank sum test) on the score differences (post-pre) and see if the mean difference for the treatment group is significantly higher than that of the control group. Qualified survey were those who completed >50% of the survey. Of the 2017-2018 data there were 288 pre-survey, 95 post-survey, and 47 matched pairs. Of the 2018-2019 data there were 226 pre-survey, 163 post-survey, and 103 matched pairs.

CONCLUSION: Outcomes include increasing knowledge and awareness of general and medical DV, improving confidence in ability to identify survivors of DV, reducing stigma of DV health seeking behaviors and improving self-efficacy in discussing DV with patients.

EDUCAT-4

OUTCOMES OF AN EDUCATIONAL AND CLINICAL INTERVENTION IN A FOUR MONTH MULTIPHASE NUTRITION ASSESSMENT OF SALVADORAN WOMEN

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Worldwide, misinformation and low levels of knowledge about food and nutrition are a common problem. Malnutrition is an important risk factor contributing to risk for disease. At the VCOM international service areas, preliminary data has indicated socioeconomic differences warrant attentiveness to culturally appropriate educational materials. In El Salvador (ES), national data reports prevalence of overweight among the adult population to be 37.9%, obesity 27.9%, hypertension 37%, and diabetes 12.5%. In this communication we report the results of a nutrition education intervention with a focus on weight management on female participants at the VCOM ES Shalom Clinic. Subjects were recruited to participate in an approved multicounty, multiphase weight management study. This communication reports the findings of a nutrition knowledge intervention and discussion with providers. The 10-item general nutritional knowledge pretest was given to 127 adult, non-pregnant, non-lactating, female visitors to the Shalom Clinic in El Salvador, during the month of January. The subjects were provided handouts in Spanish and instructed on the relationship to healthy eating and health, portion control and physical activity and returned 4 months later for post-testing. The overall pretest average score was 62% with no change in post-test results (Student's t-test, $t(61) = 0.26$, $p > 0.05$). Pearson correlations for correct scores did not show association with age, $r = -0.137$, physical activity, $r = -0.012$, household income, $r = 0.057$ and level of education $r = -0.01$. The two questions "What dietary factor is most responsible for raising serum cholesterol?" and "What is the best way to lose weight?" both had a correct response rate $> 93.5\%$ in the post test. Selected questions with responses trending toward improved correct answers were; "What dietary factor is most responsible for raising serum cholesterol?", "How much weight is healthy to lose in one week?" and "What is the healthiest type of fat to cook your food?" Responses to other questions were less consistent between pre- and post-testing. Our findings in El Salvador will be compared to nutrition knowledge responses in the Dominican Republic and Honduras. The brief nutritional education program was the first to be implemented in multiple countries for patients visiting VCOM-ISA clinics to encourage healthful eating and identify cultural preferences to guide future public policies and interventions. Suggestions for future nutrition knowledge assessments include; providing more time to discuss educational materials, strengthen the integration of healthy eating discussions and personal and family health, engage subjects in food and nutrition demonstrations in support of translational education. This study prompted the reconstruction of teaching kitchens in VCOM-ISA clinics. The results and lessons learned are providing important contributions for the design and implementation of next generation interventions, current grant proposals, agency reports and peer-reviewed publications.

EDUCAT-5

TEACHING EFFECTIVE DELIVERY OF HEALTHCARE FOR RURAL AND UNDERSERVED AREAS: A MULTIDISCIPLINARY APPROACH

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BACKGROUND: South Carolina and Appalachia have high rates of chronic disease and limited access to medical care. Geography, poverty, poor nutrition, and inadequate education contribute to the health disparities. Traditional medical education has limited emphasis on nutrition, health disparities, and health systems; yet, patient centered care and precision medicine require clinician understanding of the world in which the patient lives. Cherokee County, SC meets all the criteria for an underserved area where delivery of effective healthcare could make a tremendous impact on the health of its citizens.

OBJECTIVE: To describe and evaluate a teaching model in medical education that incorporates Medical Nutrition Therapy (MNT) in the Early Clinical Experience (ECE) during the 2nd year of medical school. Skills that medical students develop in this setting should enhance future collaboration with interdisciplinary teams and improve patient care.

METHODS: The Cherokee County Free Medical Clinic (CCFMC) embraces a multidisciplinary approach to the health care of its clients. It has been built on the foundation of combining health care for the underserved with education of health care professionals in all fields, especially physicians. MNT is provided on-site, and, disease focused group classes are provided. This ECE model integrates nutrition, lifestyle modification, and chronic disease management into the formal training of medical students. Collaboration between a dietitian/diabetic educator, nurse, social worker, senior center staff, and free clinic physicians enhances this training.

CONCLUSION: We describe quantitative and qualitative benefits of this multidisciplinary approach for clinic patients, senior center attendees, and medical students. To date 874 patients have been served at CCFMC, and 400 medical students have gained valuable experience working with individual patients, small groups, and with community providers.

EDUCAT-6

SIMULATING EARLY CLINICAL EXPERIENCES WITH SURGICAL PROCEDURES IN THE ANATOMY LAB
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There is evidence to suggest that early exposure to clinical experiences could bolster a medical student's education and preparation to tackle the problem-based learning encountered during clinical rotations. We propose that by incorporating surgical procedures into the gross anatomy lab during preclinical years, students would have an enhanced and more comprehensive anatomical learning experience. Furthermore, we believe that these procedures would not be disruptive to the normal conduct of the anatomy lab. Seven surgical procedures including intraosseous needle insertion, venous cut down, chest tube insertion, surgical cricothyroidotomy, core needle liver biopsy, appendectomy, and hysterectomy were taught as a part of this study. Video instructions on each of the surgical procedures were provided before each corresponding lab. Surveys were provided to students and faculty who participated in the study to gauge their satisfaction of the procedures and how it was incorporated into the allotted lab time. Both students and faculty who were sampled in the study reported that they were satisfied with the procedures, that the procedures did not interfere with lab times, and that the procedures facilitated clinical learning. In addition to providing a novel approach to teaching surgical skills to medical students,

with the potential to expand to medical programs across the country, this exercise further facilitates an osteopathic education by displaying how structure and function organize surgical practice.

EDUCAT-7

TWITTER MENTIONS AND ACADEMIC CITATIONS WITHIN RADIOLOGY CENTERED LITERATURE

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CONTEXT: The internet, and specifically social media, has brought a front of change within the academic and medical community. Through several different well-established social media platforms, professionals and students alike are able to communicate and share publications without many of the barriers previously faced by the medical community. The impact of this force on publications in various fields though is not clear. Similar research has been conducted within the fields of Urology and Surgical subspecialties, but never Radiology.

OBJECTIVE: The purpose of this study was to measure the impact that one of these social media platforms, Twitter, has on the number of citations that literature within radiology receives and its effect on impact factors, specifically Google Scholar Scores and Altmetric Scores.

DESIGN: A retrospective study on publications within radiology centered literature was performed to determine the number of citations and Tweets (social media shares) each paper received within a time frame. These were to be then evaluated against each other to determine the impact. Citations and Impact scores were measured through freely available data from Google Scholar and the Altmetric Bookmarklet.

INCLUSION AND EXCLUSION CRITERIA: 183 publications from the top 20 radiology journals (derived from h-5 scores via Google Scholar metrics) were selected. All publications were from the 20 journals and from the same time period of 2016/11/01 – 2017/01/15. Journals with fewer than 5 publications within this period were excluded.

Main Outcome Measures: It was expected that publications that had received more Tweets would have larger audiences and thus higher numbers of citations and corresponding impact factors and citation scores (measured through Google Citation Scores and Altmetric Scores).

RESULTS: Paired T-Tests were performed between publications with at least 1 tweet recorded and those without any tweets. The results were clinically significant with the P-value's for both falling less than 0.01 under analysis. Linear regression data and derived R values were 0.2174 for the Google citation score plotted against tweets and 0.2806 for Altmetric score plotted against tweets. The data showed a positive correlation between the number of Tweets an article had received and its resulting impact score.

CONCLUSION(s): The data showed that articles that had been Tweeted at least 1 time were more likely to receive a higher number of citations and thus had higher Google Scholar Scores and Altmetric Scores. To be specific, articles that had received Tweets were cited 2.2 times more on average than those that had not received any Tweets.

EDUCAT-8

RESIDENT NON GRATA: OSTEOPATHIC GENERAL SURGERY RESIDENTS CONSPICUOUSLY ABSENT FROM THE MAJORITY OF UNIVERSITY PROGRAMS

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BACKGROUND: The 2020 transition to single GME residency accreditation allows medical school graduates to apply for all residency programs, including former osteopathic-only and allopathic-only programs. Some residencies, like general surgery, have traditionally been regarded as hostile to osteopathic students, and many students and physicians wonder whether osteopathic students will be given a more equal opportunity within the merged accreditation system.

METHODS: To closer review the current composition of general surgery programs in the United States, 303 programs were analyzed for the array of residents and faculty members at each program. This array was then compared to the three- and fifteen- year American Board of Surgery pass rates.

RESULTS: The number of DO residents was significantly different between University, University-Affiliated, and Community programs ($p = 0.0004$). Only 32.7% of University programs had a DO resident, compared with 58.0% of University-Affiliated programs and 60.9% of Community programs. Multiple regression analysis revealed the presence of DO residents at a program was related to the type of program (Affiliated vs University OR= 3.68, 95% CI 1.645-8.234; Community vs University OR=5.417, 95% CI 1.688-17.39) and the presence of DO faculty (OR = 2.145, 95% CI 1.184-3.886). Linear regression analysis did not reveal significant correlations between the presence of DO residents ($p=0.780$) or DO faculty ($p=0.411$) and the 15-year American Board of Surgery examination index.

CONCLUSION: There are significant differences in the presence of DO residents based on program type, and the program type is the most significant determinant for the presence or absence of DO residents. Furthermore, the presence of DO residents does not appear to impact program performance on board examinations over time.

BIOMEDICAL STUDIES

BIOM-1

M3 RECEPTOR INHIBITION SYNERGISTICALLY ENHANCES THE ANTICANCER ACTIVITY OF CISPLATIN IN ESOPHAGEAL ADENOCARCINOMAS

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INTRODUCTION/BACKGROUND: The esophageal adenocarcinoma (EAC) is highly morbid and inherently resistant to chemotherapy due to multiple overactive cancer promoting pathways. Therefore, identification of important oncogenic pathways and development of novel drug combinations that target such pathways can significantly improve the therapeutic outcome of patients with EAC. The M3 muscarinic acetylcholine receptor (M3 receptor) could be one such therapeutic target. Overactive M3 receptor can drive the progression of various cancers; however, its role as a potential target for treatment of EACs is not known. At present, Cisplatin is frequently used as a first-line therapy for treatment of EACs.

HYPOTHESIS/GOAL OF STUDY: We hypothesize that targeting M3 receptor with a specific inhibitor (Darifenacin, a clinically approved drug) will be an effective strategy to inhibit EAC as a single agent or in combination with Cisplatin in vitro.

METHODS AND RESULTS: For this study, analysis of publically available gene expression data from TCGA and CCLE databases indicated that M3 receptor mRNA expression is significantly high in EAC tissues and cell lines. Subsequent western blot protein expression analysis of a panel of normal esophageal cells and EAC cell lines further show that M3 receptor protein expression is significantly higher in EAC cell lines than normal esophageal cells. Following treatment of FLO-1 cells with various combinations of Darifenacin and/or Cisplatin; MTT cell viability, clonogenic cell survival, and cell cycle analyses were done to measure cell viability, cell survival and cell cycle progression, respectively. Our data demonstrate that targeting M3 receptor with Darifenacin effectively inhibits cell viability, cell survival, and cell cycle progression. In addition, Darifenacin also exhibits a synergetic effect in combination with Cisplatin in FLO-1 EAC cells.

CONCLUSIONS: Our findings indicate that targeting M3 receptor with Darifenacin could be an effective strategy to inhibit EAC as a single agent or in combination with chemotherapy. Our project can have an immediate positive impact on cancer therapeutics by repurposing M3 receptor inhibitors to significantly enhance traditional treatment options for patients with EAC.

BIOM-2

THE ROLE OF SGP IN MEDIATING THE PATHOGENESIS AND SYMPTOMATOLOGY OF EBOLA VIRUS

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While Ebola Virus Disease (EVD) is not an immediate threat to people living in the United States, it has devastated parts of Africa including Guinea, Liberia, and Sierra Leone with a reported 28,616 cases and 11,310 deaths according to the CDC. Although EVD has been incredibly devastating to many communities, we still have not elicited a treatment aimed at specifically targeting the virus and ultimately treating EVD. Ebola virus is a rapidly-acting, dangerous virus and during outbreaks can often see up to 90% mortality rates, making it difficult to conduct research into developing a treatment for EVD. In this study, we sought to delineate the pathogenesis of Ebola virus by taking activated M1 macrophages and treating them with Ebola secreted glycoprotein (sGP). Upon sequencing the mRNA from the M1 macrophages, we found that FBLN2, SPOCK1, COL1SA1, and PMEPA1 were upregulated with the addition of sGP. FBLN2 gene encodes an extracellular matrix protein, fibulin-2, that has been shown to mediate platelet adhesion by binding fibrinogen and thus is related to hemostasis and thrombosis. SPOCK1 is a gene that encodes a plasma proteoglycan that contains chondroitin and heparan-sulfate chains. COL1SA1, a novel isoform, encodes the alpha chain of type XV collagen. PMEPA1 is an isoform that encodes a transmembrane protein that contains a Smad interacting motif (SIM) that suppresses TGF-beta signaling pathways. Together, these genes function to mediate platelet adhesion, inhibit proteases, produce collagen and suppress anti-inflammatory pathways. sGP has been demonstrated to modify the expression of these genes and might be some of the ways by which Ebola virus has produced a wide array of symptoms ranging from general malaise to inexplicable hemorrhaging and even mortality.

BIOM-3

HOW SMOKING STATUS IMPACTS THE EFFECTIVENESS OF FACIAL EFFLEURAGE IN ACUTE RHINOSINUSITIS

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With an estimated 1 billion smokers around the world, complications arising from smoking have a huge impact on the individuals and the healthcare system that serves them. Smokers have a higher chance of developing recurrent sinusitis, which is inflammation and/or infection of the sinuses, due to smoking-related damage to the cilia within their sinuses. When cilia are damaged, mucus backs up within the sinuses, creating an opportunity for bacteria to multiply. Additionally, smoking causes vasoconstriction of the blood vessels, hampering blood flow to the face and possibly affecting lymph movement. To assess methods of alleviating sinusitis symptoms, we are studying the impact of an osteopathic manipulative treatment (OMT) called facial effleurage on patients with acute rhinosinusitis. Facial effleurage is a technique where rhythmic movements and pressure applied over the sinuses promote lymph flow, allowing the clogged sinuses to drain and alleviating sinusitis symptoms. This project will specifically evaluate how the smoking status of acute rhinosinusitis patients impacts the effectiveness of facial effleurage. The efficacy is assessed via patient-reported survey data, looking for a reduction in symptoms after facial effleurage. We will determine if there is a difference in the intensity of symptom reduction and recovery time between smokers and non-smokers. Given that smokers are predisposed to developing sinusitis frequently, knowing how facial effleurage affects their recovery from acute rhinosinusitis will directly impact their healthcare outcomes.

BIOM-4

DEVELOPMENT AND IN SITU EVALUATION OF A NOVEL BIOFUNCTIONALIZED DECELLULARIZED EXTRACELLULAR MATRIX SCAFFOLDING SYSTEM FOR SKELETAL MUSCLE REPAIR

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BACKGROUND: Volumetric muscle loss (VML) is traumatic or surgical loss of skeletal muscle with resulting functional impairment. It presents a challenging clinical problem for both military and civilian medicine. Current treatment options for restoring large muscle tissue, such as muscle flaps or grafts, are limited by host muscle tissue availability and donor site morbidity. Our previous research resulted in the development of a novel decellularization protocol for skeletal muscle. Using this, we developed a muscle-derived extracellular matrix (dECM) scaffold that we were able to conjugate with IGF-1/IGFBP-3. In vitro characterization including IGF-1 release kinetics and cellular infiltration were assessed.

HYPOTHESIS: We hypothesized that by using our novel, muscle-derived dECM, we could create an IGF-1 conjugated biomaterial that would provide a muscle-specific microenvironment for in situ muscle tissue regeneration. Feasibility of this dECM-based scaffolding system for in situ muscle regeneration was investigated in a rabbit tibialis anterior muscle model.

METHODS: Building off our initial study, we decided to investigate the rheological, morphological, and biological properties of our novel muscle-specific scaffolding, as well as collagen and dECM scaffolds. Cell viability, proliferation, and myogenic differentiation (as confirmed by MHC immunofluorescence) in all scaffolds were examined. Finally, the feasibility in a rabbit tibialis anterior (TA) muscle defect model was investigated.

RESULTS: Cell viability was greater than 90% at 1, 3, and 7 days in culture. Cell proliferation was significantly increased in the IGF-1/dECM scaffold when compared with the other groups. Most importantly, myogenic differentiation within the implanted scaffold was confirmed by myosin heavy chain (MHC) immunofluorescence and showed a significantly greater number of myofibers when compared with controls at 1 and 2 months post implantation.

CONCLUSIONS: Firstly, our lab has pioneered an optimal decellularization protocol for skeletal muscle. Second, we developed a novel, biofunctionalized IGFBP-3/IGF-1 conjugated scaffold that has the potential for volumetric in situ muscle regeneration. Our research demonstrated that our scaffolding significantly promoted muscle tissue regeneration in situ at 1 and 2 months in a rabbit tibialis anterior muscle model. This conjugated scaffolding system is a promising approach for future in situ muscle tissue regeneration.

BIOM-5

A NOVEL BIPYRIDONE CISPLATIN ANALOG EXHIBITS ENHANCED ANTICANCER ACTIVITY IN PRECLINICAL MODELS OF UPPER GASTROINTESTINAL CANCERS

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INTRODUCTION/BACKGROUND: Upper Gastrointestinal Cancers (UGCs) respond poorly to conventional chemotherapy due to variable P53 status and overactive mechanisms that mediate drug resistance. Platinum-based compounds like Cisplatin (CDDP) are frequently used for treatment of UGCs. However, clinical use of CDDP is limited due to development of drug resistance and dose limiting side-effects resulting in nausea, vomiting, neutropenia, thrombocytopenia and renal toxicity.

HYPOTHESIS/GOAL OF STUDY: In this study, we investigated the anticancer potency of a novel CDDP derivative (dichloro [4,40-bis(4,4,4-trifluorobutyl)-2,20-bipyridine] platinum) (DCTF-CDDP) and compared it to CDDP in P53 wild type (P53 WT) and mutant (P53 MT) models of UGCs.

METHODS AND RESULTS: For this study, we evaluated the effect of CDDP or its derivative (DCTF-CDDP) on AGS (P53 WT) and FLO-1 (P53 MT) UGC cell lines. After treatment with CDDP or DCTF-CDDP; MTT cell viability, clonogenic cell survival, cell cycle, Annexin V staining, and western blot analyses were carried out to measure cell viability, cell survival, cell cycle progression, cell death, and expression of apoptotic proteins, respectively, in AGS and FLO-1 UGC cell lines.

Our in vitro data indicate that DCTF-CDDP is significantly more potent at inhibiting cell viability and cell survival of P53 wild type and mutant UGC cells. The cell cycle, cell death, and pro-apoptotic protein expression analyses further indicate that DCTF-CDDP is much more effective in suppressing cell cycle progression and inducing apoptotic markers in P53 wild type and mutant UGC cells.

CONCLUSIONS: Overall, our study suggests that DCTF-CDDP could be an effective CDDP derivative that can be used to achieve better therapeutic outcome at lower doses and toxic side effects. Future studies characterizing the anticancer and toxicological effects in vivo are warranted to further develop this promising analogue.

BIOM-6

GENE EXPRESSION PATTERNS REMINISCENT OF DIFFERENTIATED LUNG CELL TYPES IDENTIFIED IN ADENOCARCINOMA TUMORS.

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Adenocarcinoma of the lung is the leading cause of cancer death worldwide. Although long known to be comprised of a heterogeneous group of tumors several attempts to develop a histopathological sub-classification have been marginally successful with respect to guiding treatment. In the era of molecular profiling the classification of tumors based on tumor-acquired mutations is showing promise, and yet only 25% of tumors have actionable mutations. There is still need for sub-classification schemes. One paradigm emerging for lung tumor development is that the origin of tumors may lie along the developmental pathways that give rise to the trachea, bronchi, and alveolar components. This reasoning led to the hypothesis that lung adenocarcinomas may derive from stem cells or transiently amplifying cells interrupted in their transition to a fully differentiated lung cell. For this reason, we chose to look for gene expression patterns that were indicative of fully differentiated lung cell types in adenocarcinoma tumors to determine if they could be used to identify reproducible tumor sub-types. Gene expression patterns defining individual lung cell types were derived from studies using single cell transcriptome sequencing. The cell-type gene lists were then used to evaluate adenocarcinoma tumors. Initial attempts to classify tumors based on the full gene expression patterns failed to identify distinct and reproducible sub-types. When partial lists were considered, as an indication of a partial or incomplete differentiation, it was possible to identify distinct sub-types of lung tumors. We conclude that at least part of the heterogeneity of adenocarcinomas is derived from the high expression of genes indicative of terminally differentiated cell types of the lung.

BIOM-7

EBOLA VIRUS PROMOTES ACTIVATION AND INHIBITION OF INFLAMMATORY PATHWAYS

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The current Ebola virus outbreak has claimed the lives of 516 individuals, including 100 children. Although Ebola virus has an overwhelmingly high mortality rate, we have still not developed a specific treatment to help those infected. Unfortunately, the biggest barrier to the creation of a treatment or cure is that we still lack understanding of the disease pathogenesis. Previously we activated non-infected human M1 macrophages in vitro and treated them with Ebola virus secreted glycoprotein (sGP) which is found in high quantities in the serum of infected patients. Treatment with sGP downregulated proinflammatory cytokine [specifically IL-6 and TNF- α] production but did not change anti-inflammatory cytokine IL-10 production. Here, we further explored this effect by sequencing the mRNA of activated macrophages after challenge with Ebola Virus sGP for 24 hours. We found that sGP significantly affects the transcription of the IL-10 signaling pathway and the IL-4 signaling pathway via RNA sequencing. This is interesting since it has been shown that infected patients who ultimately die have a higher level of IL-10 than the infected patients that live. We are hopeful this deeper understanding of the virus's ability to adjust cytokine production via alterations of the mRNA, will lead us to a better understanding of its pathogenesis. This might be critical information for the development of an effective vaccine, and a helpful determinate in the mortality of the infection.

BIOM-8

A POTENT MULTI-KINASE TARGETING PYRROLO [2, 3-D] PYRIMIDINE DERIVATIVE EXHIBITS SIGNIFICANT ANTICANCER ACTIVITY IN P53 MUTANT AND WILD TYPE MODELS OF UPPER GASTROINTESTINAL CANCERS

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INTRODUCTION/BACKGROUND: Upper Gastrointestinal Cancers (UGC) exhibit resistance to conventional chemotherapy due to variable P53 status and constitutive overactivity of EGFR, ERBB2/HER-2, Aurora kinases, and JAK2 oncogenes. UGC is a leading cause of cancer related deaths worldwide and development of multi-kinase targeting inhibitors could pave the way for improved chemotherapy and better therapeutic outcomes.

HYPOTHESIS/GOAL OF STUDY: In this study, we investigated a series of N4-phenylsubstituted-7H-pyrrolo[2,3-d]pyrimidin-4-amines and selected a promising novel investigational derivative (RS-41) that targets multiple kinases and exhibits significant anticancer activity in P53 mutant and wild type models of UGC.

METHODS: Target kinase inhibition and selectivity screening (T-KISS) and MTT-cell viability assays were performed to determine potency and selectivity of kinase inhibition and anticancer efficacy of primary derivatives, respectively. RS-41 was identified as the most promising agent. Next, clonogenic cell survival, cell cycle, Annexin V staining, and western blot analyses were done to evaluate the effect of RS-41 treatment on cell survival, cell cycle, cell death, and expression of apoptotic markers in P53 mutant (FLO-1) and P53 wild type (AGS) UGC cells, respectively.

RESULTS: Our T-KISS data indicate that multi-targeted inhibition of EGFR, AURKA, AURKB and JAK2 can be achieved with the pyrrolo [2, 3-d] pyrimidine scaffold. Our cell viability data and cell survival data indicate that treatment with RS-41 results in significant inhibition ($P \leq 0.05$) of cell viability and suppression of colony formation in AGS and FLO-1 cells. The cell cycle and Annexin V data shows a marked increase in the percentage of apoptotic cells in both AGS and FLO-1 cells treated with RS 41. The western blotting data further confirmed apoptosis in AGS and FLO-1 cells through increased expression of apoptotic markers following treatment with RS-41.

CONCLUSIONS: Overall, our study suggests that inhibition of various oncogenic kinases with RS-41 is an effective therapeutic strategy for inducing apoptosis in both P53 mutant and wild type UGC cells.

BIOM-9

EVALUATING THE IMPACT OF FACIAL EFFLEURAGE ON TNF-ALPHA LEVELS IN PATIENTS WITH ACUTE RHINOSINUSITIS

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BACKGROUND: Acute rhinosinusitis is a sinus mucosa inflammatory condition that 12% of Americans face every year. Treatment is based solely on clinical diagnoses: a viral infection presents with symptoms for less than 7 days, while a bacterial infection lasts longer and causes more severe symptomology. Guidelines direct physicians to only prescribe antibiotics in severe cases when symptoms last beyond 10

days and a non-viral cause is suspected. This leaves many patients without adequate treatment options. A potential alternative treatment for patients suffering from acute rhinosinusitis is an osteopathic manipulative treatment called facial effleurage (FE). To test FE effectiveness, serum levels of the pro-inflammatory cytokine tumor necrosis factor- α (TNF α) were collected.

HYPOTHESIS: TNF α levels should increase in the blood after facial effleurage because increasing amounts of this cytokine have the ability to leave the site of infection

Methods: In a parallel-arm, randomized, placebo-controlled clinical trial, patients that presented to two outpatient, direct primary care clinics in a mid-sized manufacturing town are asked to participate. Participants are then randomly assigned to one of the eight treatment groups: healthy control (HC), HC with physical touch (PT), HC with facial effleurage (FE), rhinosinusitis (RS) with antibiotics (Abs), RS with PT, RS with FE, RS with Abs and PT, and RS with Abs and FE. Physical touch is the sham/placebo treatment. Peripheral blood samples are then collected. The treatment is performed and 1 hour after the initiation of facial effleurage serum samples are collected again. Peripheral blood is also collected at a follow-up appointment 7 days after treatment. Serum TNF α levels are then measured via ELISA.

RESULTS: A total of 135 patients were enrolled. The difference between sick patients and healthy controls prior to treatment was not statistically significant, but sick patients tend to have slightly higher levels. Patients who received FE had significantly increased TNF α levels one hour after treatment compared to healthy patients and patients that received the sham treatment. On follow-up 7 days after facial effleurage, TNF α was increased in sick patients who received antibiotics and FE compared to the healthy patients and the healthy patients that received PT treatment.

CONCLUSIONS: TNF α is significantly upregulated in the blood one hour after facial effleurage treatment, and this increase persists at least a week after one treatment session. Since pre-treatment values of serum TNF α did not statistically differ from healthy patients, the increase in TNF α after FE may be indicative of the technique causing substantial change to lymphatic or vascular circulation. One possible explanation for this significant increase in serum TNF α levels is that increasing amounts of this cytokine have the ability to escape the site of infection. TNF α exodus could decrease the swelling and pain the patients' experience, as well as ushering in the healing response rather than prolonging the state of inflammation.

BIOM-10

FACIAL EFFLEURAGE SIGNIFICANTLY INCREASES INTERFERON GAMMA PRODUCING NK CELLS DURING ACUTE RHINOSINUSITIS

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Acute rhinosinusitis accounts for nearly 16 million medical visits in the United States each year. Although the illness' etiology is most commonly viral, antibiotics are frequently prescribed. In an effort to decrease antibiotic prescribing, we suggest using facial effleurage, a soft tissue osteopathic manipulative treatment (OMT), as a first-line treatment for acute rhinosinusitis. Facial effleurage involves applying pressure over the sinuses to refresh the lymph in the head and neck. We studied the immunological effects of facial effleurage in patients with acute rhinosinusitis via collecting blood samples before and after treatment. We used flow cytometry to identify certain immune cell populations, including natural killer (NK) cells. NK cells are critical in combating viral infections via their cytotoxic activity and, to a lesser degree, their ability to release cytokines. We found that facial effleurage is capable of promoting

the movement of immature, cytokine-producing NK cells one-hour after treatment. Patients who received only antibiotics had high levels of mature NK cells one week after treatment, while inflammation was resolved in patients who received OMT, suggesting that facial effleurage may be resolving inflammation faster. In conclusion, facial effleurage might be immediately increasing the number of cytokine-producing NK cells and promoting their activation, which might be helping to resolve the inflammation quickly. This would provide the first evidence that OMT directly affects the NK cell population to benefit patients.

BIOM-11

mRNA SEQUENCING TO UNDERSTAND GENE EXPRESSION IN EBOLA sGP-TREATED MACROPHAGES

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In 2014, a total of 28,616 cases of Ebola Virus Disease (EBOV) and 11,310 deaths were reported in Guinea, Liberia, and Sierra Leone. Due to these alarming numbers and the ravishing nature of this disease the development of treatments to eradicate Ebola have been extensively researched. Despite this effort, the vaccines currently available for EBOV are limited. Due to the deadly nature of EBOV, understanding the pathogenesis of this disease has proven to be a challenge. Previously, we showed that when macrophages are exposed to the EBOV secreted glycoprotein (sGP); the anti-viral mechanisms of the macrophages were significantly inhibited. Here, we explored the effect of EBOV sGP on activated macrophages by sequencing the RNA and exploring the effected transcripts.

Some of the most affects transcripts are isoform UNC5B, which plays a role in apoptotic pathways. The novel isoform RHOH was also implicated which is a member of the Ras family of signaling proteins, and is often associated with regulation of T-cell signaling, which is critical in all types of infections. Another transcript that is significantly altered by exposure to sGP is F13A1, which encodes for one of the coagulation factors; this might be a major player in the symptoms of hemorrhagic fever syndrome that causes significant bleeding. Together, these transcripts play a significant role in the body's ability to clear such a hazardous virion. Understanding the underlying pathogenesis of the Ebola Virus Disease will help scientists develop more effective vaccine and treatment options.

BIOM-12

COMPUTATIONAL FLUID DYNAMICS CALCULATIONS VALIDATE INCREASED FLOW AND DECREASED SHEAR STRESS IN THE LEFT COMMON CAROTID ARTERY ORIGINATING FROM THE BRACHIOCEPHALIC TRUNK

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BACKGROUND: Roughly, 41,000 people are affected by stroke related to carotid artery atherosclerosis every year in the United States. Atherosclerosis of the carotid arteries starts with intimal thickening upon endothelial activation. While blood chemicals are thought to be the major factors that activate the endothelium, hemodynamics are also a major factor. Previously, our laboratory reported that the left common carotid artery (LCCA) originating from the brachiocephalic trunk (BT) presents increased intimal thickening both compared to the right common carotid artery (RCCA) or LCCA with direct origin from the aortic arch (AA).

HYPOTHESIS: Based on theoretical mathematical calculations, we have predicted that the reason for the intimal thickening in the LCCAs originating from the BT is due to the increased flow and decreased shear stress created by the anatomical variation.

Methods: We have evaluated the aortic arches of the cadavers in all VCOM campuses in the academic year 2018-2019. 10 new cases were identified where the LCCA originates from the BT. We arbitrarily selected a matching number of normal cases (LCCA originates from AA) as controls. Measurements of the vessel diameters were taken both in situ and after histological processing, in the latter cases we also recorded the luminal and wall diameters. Using the obtained values, we have 3D-reconstructed the aortic arches in SimVascular (computer software). By applying computational fluid dynamics to our 3D model, we were able to calculate the flow and shear stress in the common carotid arteries.

Results: In situ and histological measurements of the new samples followed our previous results: no significant differences between the diameters of the LCCA, RCCA, BT and AA; but significant increase in intimal thickness of the LCCAs originating from the BT. We confirmed the endothelial activation and cellular composition of the intimal thickening by fluorescent immunohistochemistry and laser confocal microscopy. Computational fluid dynamics calculated exactly at the sites of the histological sample collections, which showed significantly increased flow and significantly decreased shear stress in the LCCA originating from the BT versus branching off directly from the AA.

CONCLUSIONS: We have identified a vascular anatomic variation, which predisposes to increased intimal thickening, the initial step of the atherosclerosis. Our preliminary mathematical calculation were successfully validated by computational fluid dynamics. Overall, routinely screening the AAs for variations, as a risk for carotid artery atherosclerosis, could lead to early diagnosis and treatment of a serious illness.

BIOM-13

HEMATOPOIETIC-DERIVED CELLS IN HEALTHY AND DISEASED HUMAN HEART VALVES

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BACKGROUND: Approximately five million Americans are diagnosed with heart valve disease annually. Diseased heart valves can show two different clinical pictures: insufficiency and stenosis. Histologically, a heart valve shows signs of damage when the cells cannot maintain the extracellular matrix. The origin of the heart valve cells, especially in adults, remains to be elucidated. Our laboratory previously published the contribution of the hematopoietic-derived cells in a murine system and this was repeatedly confirmed by other laboratories. Recent reports from an ovine model, however, suggests the valvular endocardial to mesenchymal transition (EndMT) as the source of the heart valve cells.

Hypothesis: Similar to the murine model, the cells in the human heart valves are replenished by hematopoietic-derived cells.

Methods: We have collected aortic cusps and mitral leaflets from ten cadavers in the VCOM Carolinas anatomy lab. After histological processing of the samples, sections were prepared for classical and immunohistochemical analysis. Bright field and laser confocal microscopy were used for capturing images of the stained samples.

RESULTS: Hematoxylin-eosin and Movat's Pentachrome stainings revealed both physiologic and pathologic samples in our collection. In the normal human valves, immunohistochemistry showed CD45/CD34/CD133 (hematopoietic progenitor markers) positive cells directly underneath and deeper to the endocardium on the low pressure side. Additionally, the deeper localized cells express myofibroblast markers (alpha-smooth muscle actin-ASMA, Hsp47). In the pathologic human heart valves, both the

hematopoietic and myofibroblast markers were increased. Also, cells with only hematopoietic markers (lymphocytes, macrophages) were identified. We have found evidence of EndMT (CD31/ASMA double positivity) only in the pathologic cases.

Conclusions: The hematopoietic-derived cells are the major contributors to the adult human aortic and mitral valves; the EndMT seems to play a role only in pathological conditions. Also, our work highlights the importance of using the right model animal for the heart valves. This validation of murine data on human system opens new experimental opportunities on a much more affordable animal model.

BIOM-14

CAN EXPOSURE TO THE ENVIRONMENTAL ENDOCRINE DISRUPTER TOLYFLUANID DURING CELLULAR DIFFERENTIATION SIGNIFICANTLY ALTER NEURONAL STRUCTURES IN DEVELOPING CEREBRAL ORGANIDS?

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Tolyfluanid (TF), (the active ingredient in agricultural pesticides) is an endocrine disruptor that has been shown to increase anaerobic glycolysis and reduce oxygen consumption in human cells. We propose to determine whether TF exposure during central nervous system development could significantly alter fully differentiated human brain organoids. The central nervous system forms in the third week of fetal development and is derived from neuroectodermal germ tissue (1). In the brain, most of the glucose is oxidized in order to produce the vast amounts of ATP required to maintain cellular processes (2). The availability of energy to neuronal progenitor cells could limit the brain's size and activity (3). To answer this question, we grew cerebral organoids from iPSCs and treated them with varying concentrations of TF (0, 1 μ M, 2 μ M and 5 μ M) to analyze expressivity and morphological discrepancies between the treated and non-treated groups. Our results showed decreased proliferation and development of several regions of the brain. The expressivity of SATB2, vimentin, proliferation marker Ki-67 showed a reduction in growth of the superficial layers of neuron and subventricular structures as well as a decrease in development of the early ventricles. In contrast, SOX2 and TTF1 suggested increased growth in ventricle and GABAergic neurons. Overall, the data showed developmental deviation from the early brain in TF (5 μ M) treated cerebral organoids. Ultimately, our results demonstrated that TF causes global-suppression of proliferation and development of maturing central nervous system.

BIOM-15

NONCANONICAL NF-KB STEM CELL SIGNATURES IN COLONIC MUCOSA AND AFFECTS SUSCEPTIBILITY TO INFLAMMATION-INDUCED CARCINOGENESIS

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Colon cancer is the third most prevalent cancer as well as cause of cancer related deaths in the United States, with an increased incidence in patients with Inflammatory Bowel Disease (IBD). Studies have found that patients with IBD for twenty years have a 5-10% increased likelihood of inflammation induced carcinogenesis, in addition to the 4% lifetime risk in a healthy individual. Nik (-/-) mice mimic the inflammation associated with IBD through manipulation of the NF-kB signaling pathway. NF-kB

signaling is divided into two distinct pathways, defined as either canonical or non-canonical. Canonical NF- κ B signaling is well described and characterized. However, significantly less is known regarding mechanisms regulated by the noncanonical NF- κ B pathway. We are investigating mice colon crypts to compare morphological differences and likelihood of tumorigenesis between wildtype and Nik (-/-) mice. Our data shows that lack of noncanonical signaling through the complete knockout of Nik in mice results in an aberrant large intestine phenotype characterized by reduced stem cell marker expression, altered regeneration, and predisposition to inflammation-associated tumorigenesis. Together, these findings indicate that noncanonical NF- κ B signaling is a critical regulator of the gastrointestinal tract and plays a vital protective role against colorectal cancer.

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BIOM-16

SUSTAINABLE NUTRITION: INVESTIGATING THE EFFECTS OF HEALTHY FOOD OPTIONS IN A MEDICAL SCHOOL CANTEEN ON VENDOR PROFITS

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Background: The medical school curriculum is demanding; in the first didactic years, students spend the majority of their time studying with productivity being of utmost importance, and as such have a high demand for food that is filling, healthy, quick, and accessible. Therefore, it is important that the food and beverage options available to students meet this criterion and that in the sales of the products are profitable for the vendor.

HYPOTHESIS: Collaborating with medical student's preferences healthier foods would be sustainable, profitable and be minimally wasteful for the vendor.

METHODS: This retrospective study of the point of purchase (POP) data collected over a 30-month period in a medical school canteen.

RESULTS: Data analysis indicated that there was no profit loss when substituting healthier choices in a canteen in a medical school environment. Sales of healthy choices were either sustained or increased in most cases.

CONCLUSION(S): When stakeholders (students) have collaborative input into product variety shifts to healthier and generally more perishable items, profits will contribute to business sustainability.

BIOM-17

EFFECTS OF SINUS EFFLEURAGE ON SYSTEMIC LEVELS OF IL-6 AND ITS EFFICACY IN TREATMENT OF RHINOSINUSITIS

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Rhinosinusitis is inflammation of the sinus's and nasal cavity. During the acute infection patients suffer from congestion, irritability and difficulty sleeping. As of now the standard for determining the causative agent in rhinosinusitis is dependent on the duration of symptoms. It is hypothesized that if the infection resolves within 7 days it is viral and if symptoms persist or worsens it is deemed a viral cause. We set out to determine the causative agent as well as the effects of OMT (Osteopathic manipulative treatment) on the symptoms and severity. In order to find out the causative agent we sampled patient's mucus, saliva and serum, we cultured the bacteria and ran ELISA for the viral. To test the use of OMT on the symptoms and resolution of rhinosinusitis we performed Facial Effleurage on our patients and had them rate their symptoms before, during and after treatment. To be able to quantify the results of the OMT we measured patients IL-6 levels. Interleukin (IL)-6 is an acute phase reactant which is commonly elevated in patients fighting infection and inflammatory processes. By measuring patient's serum levels of IL-6 before treatment, 1 hour after treatment and 1 week after treatment we were able to verify our results of the positive effect facial effleurage has on curing the symptoms as well as the infection of rhinosinusitis.

BIOM-18

EFFECTS OF ADIPOR1 AGONISTS ON INSULIN-INDEPENDENT GLUCOSE TRANSPORT PATHWAYS IN SKELETAL MUSCLE CELLS

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With nearly 30.3 million Americans living with diabetes mellitus, further elucidation of insulin-independent pathways for glucose metabolism is critical. Adiponectin is a protein hormone secreted by adipocytes that is able to modify glucose homeostasis. Higher levels of circulating adiponectin are associated with decreased insulin resistance and a lower risk of developing type 2 diabetes¹. The development and use of adiponectin receptor agonists could be an important turning point in the treatment of type 2 diabetes.

We are examining the effects of treating cultured human skeletal muscle cells (myocytes and myotubes) with a plant phytoestrogen lignan, matairesinol, and its gut microbe metabolites, enterolactone and enterodiol. Previous work has shown the binding and activation of the adiponectin receptor 1 (AdipoR1) by matairesinol². We hypothesize that matairesinol, along with its metabolites, can agonize the AdipoR1 receptor and increase the expression of the insulin-responsive glucose transporter type 4 (GLUT4) and its translocation to myocyte membranes. This would result in increased glucose uptake and a potential restoration of insulin sensitivity via downstream pathways.

We have grown primary skeletal myocytes and differentiated them into polynucleated myotubes. By treating these with insulin, adiponectin, or our test compounds, we will examine the expression changes of AdipoR1 and GLUT4, as well as activation of the AMP-activated Protein Kinase (AMPK) signaling pathway. We will use immunoblotting of each target to quantify protein expression between these various treatments compared to canonical insulin- and adiponectin-activated signaling. We are also examining the ultimate effect of these compounds on glucose uptake in the muscle cells, using a luciferase-based glucose uptake assay.

Clinically, these studies could lay a foundation for future work creating small molecule compounds or monoclonal antibodies that could be used to decrease the use of insulin in type 2 diabetic patients. Our results could inspire new first-line medications for diabetic patients, due to the potential cardiovascular benefits associated with AdipoR1 activation.

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CLINICAL CASE-BASED REPORTS

CBR-1

UNEXPLAINED HYPERTENSION: PAGE THE OR

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INTRODUCTION: Page kidney is a rare phenomenon due to compressive forces act on the kidney causing a resultant rise in blood pressure. These force usually secondary to bleeding around the kidney, which is often the result of physical trauma (car accident), iatrogenic (after kidney biopsy or transplant) or spontaneous (AV malformation, tumor, anticoagulation). Other causes are the result of mass effect and include: lymphoceles, urinoma or growing cysts.

CASE PRESENTATION: A 68-year-old male with previously controlled hypertension presents to the emergency room (ER) for evaluation of hypertensive emergency. The patient's hypertension was controlled and then discharged home with a new antihypertensive medication regimen. Five days later the patient presents back to the ER with chest pain, shortness of breath, left flank pain and a blood pressure of 223/50. The patient was started on antihypertensives as well as heparin for possible myocardial ischemia. As his course progressed, he developed worsening left flank pain. A contrast enhanced computed tomography (CT) was ordered and showed a 6cm enhancing mass in the left kidney accompanied by a subcapsular hematoma. The patient underwent a left radical nephrectomy and pathology confirmed a primary papillary renal cell carcinoma with subcapsular hematoma. Post operatively the patient's blood pressure gradually returned to normal.

DISCUSSION: Page kidney causes secondary hypertension by activating the renin-angiotensin-aldosterone system (RAAS). External forces compress the kidney and the renal vessels which leads to decreased renal flow, causing the kidney to sense compensates by releasing renin. Renal function is usually preserved as long as the opposite kidney is healthy and functioning. One of the most common presentations of page kidney is a young patient who develops a new onset of hypertension after experiencing physical trauma. However, Iatrogenic causes became more frequent recently due to increasing use of renal biopsies

Diagnosis is commonly done through the use of imaging with either ultrasound or CT.

Treatment options include RAAS blockade and surgical intervention may be necessary in cases of enlarging hematoma or uncontrollable.

CONCLUSION: Page kidney is a rare disorder that can often be overlooked when looking for the etiology of secondary hypertension. This case showcases the need for page kidney to become a more common differential to physicians who encounter secondary hypertension, especially when treating trauma or post-surgical patients. Correct diagnosis and prompt intervention can help decrease the morbidity associated with Page Kidney.

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CBR-2

RETAINED SURGICAL ITEM WITH THE INTENT TO CREATE VACUUM (NON-MEDICAL ERROR)

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Retained surgical items are reported to occur in as many as 1 out of every 5,500 to 18,760 operative cases. Surgical sponges are the most commonly retained items and when present, they are likely to have been from abdominal procedures, which account for 56% of the cases. This is attributed to its widespread use, small size, and its ability to blend in with the surrounding tissues especially when immersed with blood.

Retained surgical items are considered medical error with potential for harm. However, surgeons may intentionally leave surgical items behind to create a negative pressure vacuum to treat GI tract leak or perforation. The benefits of negative pressure vacuum are collapse of the wound which allows greater source control, decontamination, debridement, and increased tissue perfusion. It is important for clinicians to be aware that surgical items may be left in patients to create an artificial vacuum leading to a similar diagnostic findings as retained surgical items due to a medical error.

Here, we report a case of a 21 year-old male who presented to the ED with intraabdominal gunshot. Exploratory laparotomy showed perforated hypogastric vein, small bowel injuries, and devascularization of rectosigmoid junction, which required sigmoid colon resection. However, due to heavy pelvic bleeding and devascularization of the rectum, anastomosis was deferred at the time. Instead, a wound vacuum was created using a sterile towel, loban, kerlix, and blake drain. The patient was brought to the operating room 48hours later to remove pelvic packing and for maturation of descending colon colostomy.

CBR-3

EMPYEMA NECESSITANS: A RARE COMPLICATION OF EMPYEMA THORACIS

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Empyema necessitans is a rare complication of an underlying pneumonia and subsequent parapneumonic effusion, in which inflammation creates a sinus tract between the empyema and thoracic wall. The most common cause of empyema necessitans is *M. tuberculosis*, followed by *Actinomyces* spp. and *S. pneumoniae*.

A 60 year old Caucasian male with a history of COPD, HTN, DM, tobacco abuse and recent fall presents to the ED and was admitted with cough and syncope. He was discharged on same diabetic and

antihypertensive medication. The patient presents to his primary care provider one month later complaining of a nonproductive cough, palpable left neck mass 4 x 4 cm in size and decreased breath sounds. A contrast-enhanced CT of the neck revealed nonspecific inflammatory changes in the posterior triangle of the left neck with no fluid collection. The contrast-enhanced CT of the chest revealed a fracture of the 9th rib, atelectasis in the left lung, and left lower lobe empyema measuring 9 cm in height by 18 cm anterior-posterior diameter by 1.6 cm transverse with extension outside of the pleural cavity and into the soft tissues deep to the left lateral chest wall musculature. The patient was then admitted for blood culture, empiric IV antibiotic prophylaxis, IV fluids and a consult for surgery and infectious disease. As the surgeon determined the empyema was more outside of the chest wall, interventional radiology was consulted for a CT guided drainage tube in the left posterior upper back positive for purulent fluid. Labs revealed a WBC count of 8,000/mcL, average Hb of 11.3 gm/dL, blood glucose of 175, arterial blood gas of pH 7.40, pCO₂ 47 and pO₂ 61 on room air, normal UA, and Bun and SCr in normal limits. Various cultures and pathology reports were collected over the next few days. The blood culture came back negative for growth, no growth from the drainage tube, negative urine, fungus or AFB culture, negative TB Quantiferon gold and pathology report negative for malignancy. The vancomycin was discontinued, the drainage tube was removed and the patient was discharged to home after 7 days in the hospital with oral antibiotics and a one week follow-up with his PCP. Compared to the handful of cases seen in current medical literature, the presentation of empyema necessitans may be asymptomatic or vague in nature of pleuritic chest pain, cough or SOB, but can be distinguished with the presence of an enlarging chest wall mass¹. Although the most common primary causes are bacterial, the rate of complications has declined significantly since the advent of antibiotics in the 1940s, but may occur in inadequately treated pulmonary infection or immunocompromised state. The patient's negative blood culture suggests an underlying pneumonia with extension by trauma as seen by the rib fracture. Less common causes include an inadequately drained bronchopleural fistula, bronchogenic carcinoma, esophageal rupture, mediastinitis with pleural extension and transdiaphragmatic spread of abdominal infection. As seen in this case report, empyema necessitans is a complication to consider in the differential in spite of its asymptomatic or vague presentation in nature.

CBR-4

A CASE OF PRIMARY ANGIITIS OF THE CENTRAL NERVOUS SYSTEM IN A YOUNG FEMALE

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CONTEXT: Primary Angiitis of the Central Nervous System (PACNS) is a rare and deadly disease affecting 2.4 in one million people per year. The combination of wide array of symptoms and difficulty in definitively diagnosing the condition lead to under recognition and delayed or inappropriate treatments.

CASE SUMMARY: A 25 year old African American female presented to the emergency department (ED) with one week of right arm weakness. She was discharged after a stroke work up showed no acute findings. Two months later she returned to the ED with left leg weakness. Brain MRI showed multiple cortical infarcts in multiple vascular territories. CTA of the head and neck showed luminal irregularities concerning for vasculitis. Her CRP was elevated at 2.8 (<0.9) and sed rate of 64 (0-20). An extensive rheumatologic and infectious workup were negative including: HIV, syphilis, HZV, hepatitis, Lyme, ANCA, CCP, RF, Sjogren, and antithrombin deficiency. She was discharged home on high dose steroids with the most plausible diagnosis being PACNS. Two weeks after discharge she again presented to the ED with weakness and new seizure like event. During this hospitalization she underwent further testing that

ultimately lead to a leptomeningeal and brain biopsy providing a definitive diagnosis of PACNS. Patient was started mycophenolate and discharged to rehab. Patient did well for approximately four months before being admitted for lower extremity weakness and cognitive decline. MRI showed worsening and new infarcts and the patient was considered to be in relapse of her PACNS. The decision was made to start rituximab in place of mycophenolate.

COMMENTS/CONCLUSION: Due to the rarity and broad presentation of PACNS it is often considered in the broad differential of cryptogenic strokes. There are limited treatments available and those available often have several and severe adverse effects. The progression and recurrence rates are high leading to a poor prognosis in most patients. Twelve articles were selected after reviewing the limited amount of peer reviewed material available from the past fifty years.

DIAGNOSIS: The patient underwent a brain biopsy that was reviewed by neuropathologists who confirmed the diagnosis of PACNS.

CBR-5

A TYPICAL PRESENTATION OF PRIMARY LUNG ADENOCARCINOMA

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CONTEXT: Primary lung adenocarcinoma (PLA) represents a diagnostic challenge because its presentation mimics common parenchymal diseases, including pneumonia and pulmonary fibrosis. This report details a case of refractory pneumonia in an 86-year-old male, later diagnosed as PLA. By sharing clinical, radiographic, and histologic findings that led to this diagnosis, we aim to expedite future diagnoses of atypical PLA.

REPORT OF CASE: 86-year-old male presented for 3 weeks of dyspnea and cough. Patient reported history of prostate cancer, systolic CHF, 20-pack-year smoking history. Chest CT revealed collapsed L lung with multiple granulomas in R lung. On admission, patient was afebrile with leukocytosis of 14,600. L chest tube placement drained 3L of dark pink fluid. Cytologic examination revealed exudative pleural effusion with scattered atypical cells. On third day of admission, patient's WBC peaked at 34,000. He was treated with moxifloxacin, zosyn, and inhaled albuterol for suspected pneumonia. Repeat chest CT showed ground-glass opacities with scattered subpleural honeycombing in R lung base. Bronchoscopy with bronchoalveolar lavage returned negative for malignancy. Patient later underwent L thoracotomy with decortication of trapped L lung. Pathology report demonstrated poorly-differentiated non-small cell carcinoma. Immunohistochemical staining appeared consistent with lung adenocarcinoma. Treatment of lung adenocarcinoma typically includes chemotherapy, radiation, and surgical resection. At this time, patient and family have decided to pursue palliative care.

COMMENTS: According to cases of PLA reported in literature, patients are typically asymptomatic in early stages, but develop dyspnea, cough productive of copious mucous, hemoptysis, weight loss in advanced disease. Although our patient endorsed persistent dyspnea, cough, and smoking history, the finding of leukocytosis on admission significantly deviated from the classic presentation of PLA. Radiographically, PLA presents as a single nodule, typically in the lung periphery. Associated atelectasis and pleural effusion are common. Our patient's initial radiographic findings of multiple granulomatous nodules lowered suspicion for adenocarcinoma. Later CT and chest XR findings showing pleural effusion and peripheral atelectasis were more consistent with PLA. Pleural fluid analysis of PLA classically appears

as blood-tinged fluid containing atypical cells with high nuclear-to-cytoplasmic ratio. In addition, malignant pleural effusions generally have pH < 7.4, elevated LDH level, and fluid/serum protein ratio > 0.5. Gross and cytologic analysis of our patient's pleural fluid was consistent with malignant pleural effusions seen with lung adenocarcinoma. In this case, lung biopsy ultimately confirmed diagnosis of adenocarcinoma due to its close correlation with classic biopsy results from established cases of adenocarcinoma. Lung tissue obtained from our patient demonstrated immunohistologic staining for TTF-1 and CK7 – consistent with PLA.

DIAGNOSIS: This report details a case of refractory pneumonia in an 86-year-old male, later diagnosed as primary lung adenocarcinoma.

CBR-6

ONE IN A MILLION: MULTIPLE HEPATIC ADENOMAS IN ABSENCE OF ORAL CONTRACEPTIVE PILL USE

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Hepatic adenomas are rare, benign neoplasms of the liver that have a strong association with oral contraceptive pill use in young women. This case describes a 51 year old female with no history of oral contraceptive pill use who presented with severe right upper quadrant abdominal pain. The patient was found to have a large 16.8 x 16 x 9.4 cm lesion of the left hepatic lobe with internal hemorrhage and necrosis, as well as several smaller lesions in the right hepatic lobe. A left hepatectomy was performed and pathology revealed hepatic adenoma. This is an atypical case of a rare disease due to lack of risk factors commonly associated with hepatic adenoma.

CBR-7

PSEUDOANEURYSM OF A PANCREATIC PSEUDOCYST WITH SUBSEQUENT GASTRIC OUTLET OBSTRUCTION

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Pancreatic pseudocyst is the most common cystic lesion of the pancreas. They present as single or multiple cystic lesions and arise in 10-20% of acute pancreatitis and 20-40% of chronic pancreatitis. The pathogenesis of pancreatic pseudocyst varies between acute or chronic pancreatitis, but they both lead to a similar clinical presentation. The limited data on the natural history suggests that pseudocysts commonly follow a benign clinical course followed by spontaneous resolution. However, pseudocysts may be complicated by expansion, rupture, infection, and pseudoaneurysm.

Here, we report a rare case of a 34-year-old African-American male who developed pancreatic pseudocyst which was complicated by pseudoaneurysm and mechanical gastric outlet obstruction. Here, we report a development of pseudoaneurysm of pancreatic pseudocyst with subsequent gastric outlet obstruction, and this case has not been reported in the literature as far as our knowledge. The differences in the diagnostic approach and treatment between pancreatic pseudocyst and pseudoaneurysm of pancreatic pseudocyst will be discussed.

CBR-8

CHRONIC HAMSTRING INJURY IN A DIVISION 1 HEPTATHLETE

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CONTEXT: Depending on the sport, the prevalence of hamstring tears has ranged from 8% to 25%. Full thickness hamstring tears involving multiple tendons with retraction should be surgically corrected so the patient can return to their highest level of function possible. Delay in diagnosis and treatment can lead to more complications in surgery and poorer outcomes.

REPORT OF CASE: A 19 year old Division 1 heptathlete presented to his physiotherapist at home in Australia with left buttock pain after a wakeboarding fall while on summer break. Past medical history included a grade 2 strain to the left hamstring 6 months prior. He was seen by the sports medicine physician 16 weeks after his injury. On palpation of the left middle hamstring there was fullness and concern for a defect proximally. He had weakness with hip extension and dead butt on dynamic supine testing. X-ray of the pelvis was unremarkable. MRI of the pelvis demonstrated left full thickness tear of all 3 components of the hamstring with 2.4 cm of retraction.

The athlete followed up with the orthopedic surgeon to discuss treatment options. He decided to treat surgically and underwent left proximal hamstring open repair which occurred 22 weeks after the initial injury. Intraoperatively there was scar tissue present at the ischial tuberosity which had to be released, however a very small portion of the tendon was still attached to distally torn hamstring muscle. There were no complications and no grafts required.

COMMENTS: Currently, the appropriate management of full hamstring tears is surgical repair of the tendons with suture anchor systems being the gold standard. Surgical repair is recommended within the first four weeks of injury in those with either complete three-tendon tears or those with a two-tendon tear with >2cm retraction. The longer the delay from the original injury to surgery the more difficult it is to restore the retracted tendon's length and muscle integrity during surgery. As a result, these surgeries often have poor outcomes. Once a tendon is torn from its typical bony attachment, it will begin to scar. Scar tissue can make identification and neurolysis of the sciatic nerve difficult. Muscle atrophy can cause further tendon retraction. If the tendon cannot be approximated to the attachment site then in some cases a graft is required.

In this case the athlete was able to sprint and exercise at a high level which was why the athletic trainers did not initially consider a significant hamstring tear initially. He presented late to the sports physicians and subsequently had significant scar tissue during surgery. Fortunately, during surgery the tendon was located and approximated to its attachment site with no complications reported. Post-surgical management will involve 8-12 months of physical rehabilitation.

DIAGNOSIS: Chronic left grade 3 proximal hamstring tendon tear

CBR-9

A LARGE PRIMARY GALLBLADDER CARCINOSARCOMA IN A 71-YEAR-OLD FEMALE

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BACKGROUND: A 71-year-old female patient presented with acute, sharp abdominal cramping, and decreased urinary output. However, she noted constant and dull right-sided abdominal pain for 1

month. CT imaging showed a gallbladder mass measuring 20 x 8.5 x 8 cm extending from the liver to inside the pelvis.

SUMMARY: Carcinosarcomas of the gallbladder are rare neoplasms characterized by both epithelial and mesenchymal elements. No matter their primary location, they are aggressive and, as a result, are usually diagnosed in later stages. We herein present the case of a 71 year-old female with carcinosarcoma of the gallbladder measuring 20 x 8.5 x 8 cm, the largest able to be found in medical literature to date, that was removed by seemingly curative resection via a cholecystectomy, common bile duct resection, partial right hepatic lobectomy and partial colectomy of the transverse colon including the terminal ileum. Pathology revealed that the tumor had chondroid and sarcomatoid differentiation highlighted by both cytokeratin and desmin positivity. Further analysis of the specimen showed clear margins, negative lymph node involvement, and no invasion into the colonic muscularis propria, all of which are criteria described by Park et al in 2012 that would have placed the patient in a favorable 5-year survival rate of 88.9%.

CONCLUSION: Biliary carcinosarcomas are rare and aggressive malignancies that require early detection for favorable prognosis. More research is needed to determine best practices in order to improve overall patient survival and quality of life.

CBR-10

CASE REPORT: FEMALE WITH POLYCYSTIC KIDNEY DISEASE AND A RECURRENT LARGE NONPARASITIC EPITHELIAL SPLENIC HILUM CYST

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Splenic cysts are rare with nonparasitic cysts being even rarer. In the United States, nonparasitic cysts are typically congenital and discovered early in life or due to trauma. This case report documents a large nonparasitic splenic hilum cyst in a 33-year-old white female (23.5 cm in length and 20.0 x 16.0 cm axially) with no history of trauma but with polycystic kidney disease. The splenic hilum cyst was removed laparoscopically and several months later the cyst grew back to almost pre-operation size. Due to recurrent symptoms and rapid growth of the cyst, a splenectomy was successfully performed.

CONCLUSION: This case also highlights the ability to safely remove a large nonparasitic splenic cyst via laparoscopic technique while sparing the spleen. However, there is a chance of rapid recurrence, therefore if splenectomy is not performed, the patient should be closely monitored for reoccurring symptoms and cystic growth. Although, not commonly associated with PKD, nonparasitic splenic cysts might warrant a further workup for other disease processes which might play an important role in cyst management and outcome.

CBR-11

PAGET'S DISEASE OF THE BREAST

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CONTEXT: Paget disease of the breast accounts for less than 5 percent of new breast cancer cases in the United States annually and it is usually overlooked because symptoms appear benign or are mistaken for

conditions such as eczema, dermatitis or infection. This report outlines the case of a 64 year old female with a diagnosis of Paget disease of the breast which then progressed to high grade DCIS.

REPORT OF CASE: 64 year old AA female with history of head and neck cancer treated with radiation, right pulmonary nodule, COPD, hyperthyroidism, GI bleed, Bell's palsy and aspiration pneumonia who presented with 2 weeks of itching of the left breast with a slightly crusted area in the left nipple, which she attributed to constant scratching. No pertinent family history, denied use of OCPs, caffeine, alcohol or chocolate. Mammogram showed a possible mass in upper outer quadrant of left breast, BIRADS 0. Breast US showed normal glandular tissue and patient was diagnosed with benign disease of L breast. Three months later, patient presented with bloody L nipple discharge. MRI then showed asymmetric enhancement of L nipple papilla with probable 1cm enhancing mass (adenoma vs papilloma), BIRADS 4. Patient underwent subareolar duct excision with mass excision and pathology report showed fibrocystic changes and microcalcifications with no evidence of atypical hyperplasia, in situ or invasive carcinoma. Patient continued to have occasional bloody nipple discharge and breast pain. Repeat mammogram showed BIRADS 2 and radiologist suggested considering Paget disease of breast due to skin changes noted on nipple with bleeding and scaling. She chose to undergo simple mastectomy with sentinel lymph node biopsy. Pathology report of biopsy showed high grade DCIS involving ducts of nipple with Pagetoid extension of tumor cells into skin of nipple, grade II/III, without lymph node involvement; HER 2 +, p53 +.

COMMENTS: Per the literature, Paget disease of the breast typically presents in women of ages 50 to 60 years with a hallmark appearance of a scaly, raw, vesicular or ulcerated lesion that involves the nipple and then spreads to the areola and it is commonly associated with pruritus. About 90% of these patients have an underlying in situ or invasive breast carcinoma. This disease is usually diagnosed with a wedge or punch biopsy showing Paget cells within the epidermis of the nipple, which were not present on the initial biopsy pathology report performed on this patient. Literature findings also report that about 2/3 of patients without a palpable breast mass will have a normal mammogram. Original mammogram performed on our patient showed a possible mass in the left upper outer quadrant of the breast, which was then shown to be normal glandular tissue on US. Further work up performed after patient began experiencing symptoms of bloody nipple discharge and breast pain confirmed the diagnosis of Paget disease of the breast and high grade DCIS per the pathology report. We can conclude that the progression of the disease seen in our patient is typical of the progression seen in patients diagnosed with Paget disease of the breast. She underwent left breast mastectomy and sentinel LN biopsy, which was negative. Patient did not require adjuvant therapy such as radiation or chemotherapy, which is typically recommended in patients with positive sentinel LN biopsy.

DIAGNOSIS: This report outlines the case of a 64 year old female diagnosed with Paget disease of the left breast which later progressed to high grade DCIS. She underwent left breast mastectomy and sentinel lymph node biopsy and has been in remission since the procedure.

CBR-12

HIGH INDEX SUSPICION FOR CONGENITAL ADRENAL HYPERPLASIA IN INFANTS PRESENTING IN SHOCK
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The term Congenital Adrenal Hyperplasia (CAH) is used to describe a family of autosomal recessive disorders that can be traced back to enzyme deficiencies in the steroidogenesis pathways of the adrenal

glands. Patients may present with complications related to abnormal aldosterone, cortisol, or androgen levels depending on which deficiency is present. CAH, specifically classical 21-hydroxylase deficiency, presents in infancy with hyponatremia, hyperkalemia, severe hypotension, and ambiguous genitalia in chromosomally female infants as a result of virilization. This is a novel case report because despite the fact that the patient presented with all of the above criteria in the first several days of life, the diagnosis was not made until nine days old, when she was admitted for life-threatening shock and electrolyte imbalances. Though standard newborn screening for elevated 17-hydroxyprogesterone was performed, delays in the test being sent to the state resulted in a delay in the patient's parents and physicians receiving the information. A high degree of suspicion is needed in newborns presenting with ambiguous genitalia and electrolyte abnormalities in the first days of life, as is typical for classical 21-hydroxylase deficiency, in order to prevent negative patient outcomes.

CBR-13

ANTHRAX NODULOSA

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Injection site granulomas secondary to aluminum containing vaccinations are a well-known, but rare phenomenon. Clinical and histological manifestation often mimics that of a neoplastic process, resulting in a diagnostic challenge for the dermatopathologist. Predominance of aluminum in the biopsy specimen, via scanning electron-microscopy with dispersive x-ray spectroscopy or ammonium aurintricarboxylate stain, can help rule out Langerhans Cell Histiocytosis and cutaneous pseudolymphomas. Here we report the first documented case of aluminum granuloma induced by the anthrax vaccine. A 37-year old female presented with a persistent, pruritic subcutaneous nodule on the left upper arm. The biopsy revealed aggregates of macrophages with abundant violaceous granular cytoplasm and admixed chronic inflammatory cells. The cells were stained positive for PAS and CD68. Given the patient's history of receiving 9 doses of the anthrax vaccine on the bilateral upper arms, further evaluation was warranted. This included a scanning electron microscope (EM) with energy dispersive x-ray spectroscopy which demonstrated intra-histiocytic granules containing aluminum, oxygen, sodium, phosphorus and carbon. A diagnosis of aluminum granuloma secondary to repeated anthrax vaccination was rendered. Excision of the nodule resulted in complete resolution with no recurrence at one year.

CBR-14

CASE OF PREDNISONE-RESPONSIVE TRIGEMINAL NEURALGIA

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CONTEXT: In 90% of patients, trigeminal neuralgia begins after age 40 years, with typical onset between 60-70 years.

REPORT OF CASE: A 23-year-old woman with a history of systemic lupus erythematosus (SLE) reported with brief episodes of sharp/stabbing pain localized to the 3rd division of the trigeminal nerve on the left. Initially, a dental etiology was suspected but was ruled out after careful examination and negative X-rays.

Persistent discomfort led the patient to her family practitioner. Other than facial pain, review of systems was negative and she endorsed prior vaccination against varicella zoster virus. Physical examination was

normal. Based on patient's symptoms, she was diagnosed with trigeminal neuralgia (TN) and was prescribed prednisone and carbamazepine.

Carbamazepine is the best studied drug for TN and the only medication approved by the US Food and Drug Administration (FDA) for TN.¹ The patient reports taking only one dose of carbamazepine due to lack of symptom improvement and concern of drug interactions with her other medications. Her symptoms subsided during the week of treatment with prednisone.

The patient was referred to a neurologist because her age of onset increased the probability of secondary causes of TN such as multiple sclerosis (MS). Neurologic examination findings were normal, and facial sensation, masseter bulk and strength, and corneal reflexes were intact. Her brain MRI showed no acute or chronic pathology. MRI did not show periventricular white matter changes. TN due to MS, anatomical abnormalities, vascular compression and tumor were ruled out with an MRI. MS is associated with trigeminal neuralgia in patients who are younger than 40. The pain remitted with the seven-day course of prednisone and has not returned.

COMMENTS: This patient did not fall within the typical age group for trigeminal neuralgia, with TN affecting patients over the age of forty 90% of the time¹. A search of PubMed for terms "trigeminal neuralgia and prednisone" and "Trigeminal neuralgia and lupus" was conducted. TN is seldom mentioned as a neurological manifestation of SLE; however, it was cited as the cause of TN in a 2017 case report in the American Journal of Case Reports². A 2006 article from the Journal of Clinical Rheumatology, presented a case of patient with mixed connective tissue disease (MCTD) and trigeminal neuralgia (TN), who had responsiveness to corticosteroid treatment³. This patient's symptom remission with prednisone suggests an inflammatory cause of the TN. Patient's history of SLE also supports the proposed etiology.

DIAGNOSIS: Trigeminal Neuralgia

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CBR-15

VAPING-INDUCED LUNG INJURY

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INTRODUCTION: Vaping products have been advertised as a safe alternative to tobacco with the goal of helping smokers overcome the addiction of nicotine. According to the CDC, as of December 2019, there was a total of 2,602 cases of hospitalized vaping users from 50 states. The significant rise of vaping is concerning because the use of tobacco products is the leading cause of preventable disease and death in the United States. While it can be argued that switching from cigarettes to e-cigarettes may benefit adult smokers, no tobacco product including e-cigarette is safe.

OBJECTIVE: This presentation aims to accomplish the following objectives: (1) Provide a brief overview of the pathophysiology of vaping-induced lung injury. (2) Discuss a clinical case.

CASE DESCRIPTION: A 21 year-old male with a long history of vaping presented with increased shortness of breath, cough, and body ache that started 5 days ago. Symptoms were aggravated by coughing and deep breathing; and nothing seemed to alleviate the symptoms better. Patient was found to be using vaping products that contain tetrahydrocannabinol (THC). Chest X-ray showed bilateral pneumonic infiltrates and follow-up chest CT scan showed multifocal infiltrates. He was treated with Rocephin and Zithromax for pneumonia but went into sepsis a few days later. Pulmonary team was consulted, which led to the addition of high dose IV corticosteroid to the medication regimen. His condition improved dramatically as evidenced by resolution of sepsis, tachycardia, and hypoxia. He was then transitioned to oral steroid and monitored by an outpatient pulmonologist after discharge. Vaping cessation was discussed with the patient.

DISCUSSION: Although the exact mechanism of injury is still under investigation, recent studies have discovered the common pathophysiological pathway to include inflammation of the lung parenchyma with epithelial sloughing, alveolar inflammation, and hypoxemia. Patients usually develop symptoms within 30 days after the utilization of vaping products; and symptoms range from shortness of breath and chest discomfort to acute airway damage, respiratory failure, and in rare cases, death. Manifestation of symptoms also depend on the type and amount of toxic compound inhaled. Chest X-ray may show diffuse bilateral infiltrates while chest CT may show bilateral ground glass opacities with or without sub-pleural sparing. Bronchoalveolar lavage may yield cellular debris and reactive mononuclear cells. Most patients improved within 1-2 weeks after vaping cessation and administration of systemic corticosteroids.

CONCLUSION: Further studies are needed to determine the specific compounds in vaping products that are causing lung injury and ways to prevent the injury. Regardless of the ongoing investigation, any vaping products should not be used as an alternative for smoking cessation due to the associated risks.

CBR-16

EVALUATION OF PARADOXICAL VOCAL CORD DYSFUNCTION IN A NCAA DIVISION-I WOMEN'S TRACK AND FIELD ATHLETE

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CONTEXT: Conditions involving difficulty breathing during exercise, such as exercise induced bronchospasm, or exercise induced asthma, are commonly diagnosed conditions in the general population as well as athletes. These conditions are diagnosed when a patient completes pulmonary function tests that exhibit a pre- to post-exercise drop in FEV₁ of greater than 10% and a response to medications that treat asthma. A condition that presents similarly to exercise induced asthma but produces normal pulmonary function tests and does not respond to asthma treatments is paradoxical vocal cord dysfunction. This condition is usually a diagnosis of exclusion and is confirmed by visualization of the vocal cords during laryngoscopy. Paradoxical vocal cord dysfunction is not well studied in collegiate athletes.

CASE REPORT SUMMARY: This is a 19-year-old NCAA Division-I track and field athlete who presented with difficulty breathing during exercise. The patient was worked up for an exacerbation of reactive airway disease during a 4-month time period in which a combination of bronchodilators and

antihistamines offered no relief. Additionally, a methacholine challenge test, pulmonary function tests, chest X-Ray, cardiac EKG and echocardiogram were all negative. The patient was diagnosed with costochondritis and a systolic ejection murmur was found on physical examination. Despite addressing these conditions, the patient's symptoms persisted. The patient was then referred to an ENT to perform a laryngoscopy during exercise to confirm her diagnosis of paradoxical vocal cord dysfunction.

COMMENTS: Many sources support that paradoxical vocal cord dysfunction is often a diagnosis of exclusion, but a laryngoscopy during exercise can aid in the confirmation of the diagnosis. In literature it was also seen that patients do not respond to typical asthma treatments and spirometry testing is normal. The treatment of paradoxical vocal cord dysfunction is achieved by a combination of speech therapy, counseling and therapeutic exercises in addition to medications that can help treat accompanying symptoms. Many of these aspects of vocal cord dysfunction were seen in our patient and helped lead to the diagnosis of paradoxical vocal cord dysfunction.

DIAGNOSIS: A 19-year-old female NCAA Division-I track and field athlete with difficulty breathing, normal pulmonary function tests as well as a poor response to an Albuterol inhaler, Claritin, Flonase, and Zyrtec warranted a referral to ENT to make a diagnosis of paradoxical vocal cord dysfunction with the use of laryngoscopy during exercise.

CBR-17

INTERCOSTAL NERVE SCHWANNOMA

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Anmed Health; Edward Via College of Osteopathic Medicine - Carolinas Campus, Spartanburg, SC

Schwannomas, also known as neurilemmomas or neurinomas are benign nerve sheath tumors arising from differentiated Schwann cells. Schwannomas of the intercostal nerve are extremely rare. Only a few cases are reported in the literature. Most of these tumors were found incidentally during surgery. Most of the cases reported focused on the imaging modalities, and surgical methods of treatments, however persistent post op pain was rarely discussed. Patients usually present with motor and sensory deficits due to compression of the nearby nerves. Surgical resection is the most common treatment modality of these tumors. Most cases reported in the literature showed that patient had a good prognosis after the tumor resection.

Here, we report a small intercostal nerve schwannoma found upon investigating a patient with chronic left chest wall pain. Patient's post op course is of different interest here.

Our patient was 42-year-old healthy gentleman, who presented with left chest wall pain for last 7 years. He had normal cardiac work up. His Chest CT scan showed a soft tissue density mass 2.0 x 1.7 cm within the intercostal space between the 7th and 8th ribs, everything else including lung parenchyma was normal and CT was negative for pulmonary embolism. His exam showed no palpable masses otherwise everything was normal. Patient was referred to interventional radiology to obtain a CT-guided needle biopsy of the mass. The results of the histologic examination revealed a peripheral nerve sheath tumor, most consistent with schwannoma. Patient underwent a left VATS with resection of intercostal schwannoma. The patient was discharged home on post op day one as he was stable, ambulating and pain was controlled with Tylenol and oxycodone as needed. On follow up 2 moths he still had post op pain which was unexpected though it is better than patient's original presentation.

CBR-18

INVASIVE SINUSITIS WITH ARCANOBACTERIUM HAEMOLYTICUM AND FUSOBACTERIUM NECROPHORUM COMPLICATED BY SUBDURAL EMPYEMA IN AN IMMUNOCOMPETENT YOUNG ADOLESCENT

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CONTEXT: This is a rare case of an invasive infection with *Arcanobacterium haemolyticum* and *Fusobacterium necrophorum* that resulted in meningitis, cerebral edema and empyema secondary to sinusitis in an immunocompetent young adolescent confirmed by empyema bacterial cultures.

REPORT OF CASE: A 17-year-old male with no significant medical history presented to his pediatrician with upper respiratory infection (URI) symptoms for 3 days. He was diagnosed with a viral URI and instructed to continue symptomatic care. Eight days later, the patient developed a headache, facial droop, and left sided weakness. He continued to have subjective fevers and diaphoresis despite symptomatic treatment. He presented to the Emergency Center due to altered mental status, worsening left sided weakness and difficulty speaking. The day prior, when the patient was dragging his left leg, he fell and hit his head. Head CT showed small right-sided fluid collection with right-to-left shift of midline; marked opacification of paranasal sinuses with air-fluid levels in frontal sinuses. The patient underwent an emergent craniotomy that revealed subdural empyema under high pressure. Due to AMS and dilated right pupil with slight reactivity to light, a repeated CT was ordered. CT scan showed developing ischemic changes and an emergency right decompressive craniectomy was completed. The patient was started on vancomycin, cefepime, metronidazole, dexamethasone, and levetiracetam. MRI on hospital day 3, showed large acute infarctions of the right hemisphere, edema and subfalcine herniation. On hospital day 3 and 4, two brain death exams were performed and the patient was pronounced dead.

COMMENTS: *Arcanobacterium haemolyticum* infections are common pathogens for the 15-25 age group, responsible for 2.5% of pharyngitis infections and often associated with polymicrobial infections. This pathogen often presents similar to Group A Strep with fever, exudate, erythema, rash and cervical lymphadenopathy. Invasive infections of *A. haemolyticum* are rare, though often seen in immunosuppressed patients, can cause peritonsillar abscess, Lemierre syndrome, sepsis, endocarditis, brain abscess and orbital cellulitis. *A. haemolyticum* infections are not detected by rapid GAS tests or any other routine lab screenings. *A. haemolyticum* is susceptible to erythromycin or azithromycin and is commonly resistant to TMP-SMX. It is often necessary to include metronidazole in empiric treatment for possible *Fusobacterium* co-infection.

Fusobacterium necrophorum can be found in the oropharynx of healthy people, dental plaques, and linked to persistent pharyngitis. *F. necrophorum* infections are most common in young adults and are often seen with concomitant infections. Lemierre's syndrome is a serious, though uncommon complication. *F. necrophorum* should be treated with metronidazole and clindamycin in addition to a beta-lactamase.

This case demonstrates the need to consider rare organisms and further follow up in presumed viral pharyngitis/sinusitis that does not improve within 7 days including bacterial cultures for *F. necrophorum* and *A. haemolyticum*.

DIAGNOSIS: Meningitis and subdural empyema, secondary to sinusitis

CBR-19

A RARE CASE OF PERFORATED DUODENAL DIVERTICULA

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The acquired duodenal diverticula are a false-diverticula that arises from wall weakness due to the entry of ducts and blood vessels. The duodenum is the most common location of diverticula outside the colon, with up to 22% of the population with this defect. It is worth noting that although they are common, 90% of patients remain asymptomatic. Those that develop symptoms may experience generalized abdominal pain, nausea, vomiting, bleeding due to intra-diverticular angiodysplasia, or in this case, perforation, which exists only around 200 documented cases worldwide.

METHODS AND PROCEDURES: A 68-year-old female presented to the Emergency Department with a 2-day history of diffuse and severe abdominal pain with nausea and vomiting. The patient can pass gas, but reports no recent bowel movements, and reports no history of similar events. The patient was tachycardic at 110, and the initial complete blood count revealed a white blood cell count of 11 with the left shift. A pelvic and abdominal CT with contrast revealed a duodenal perforation of the 3rd part of the duodenum with extra-luminal gas accumulation in the retroperitoneum along with inflammatory change and fat stranding. The patient was emergently prepared for surgical intervention. A diagnostic laparoscopy was initiated however was converted to an open procedure due to difficulty with Kocherization. The surgeon performed a duodenal diversion followed by a gastrojejunostomy. The portion of suspicious resected duodenum was sent to pathology. There were minimal blood loss and no complications during the case.

RESULTS: Sample of duodenum retrieved in formalin from surgery was a tan-brown soft tissue histologically considered a benign piece of the colon with congestion and hemorrhage.

CONCLUSION: Duodenal diverticula rarely produce symptoms, but complications such as perforation should not be overlooked when investigating. Duodenal diversion with gastrojejunostomy was effective in restoring health in this patient. Due to the low-volume of documented cases, I ask for all encountered perforated duodenal diverticula cases and their course of management to be shared as to explore the most effective option.

CBR-20

BILATERAL THYROID ASSOCIATED ORBITOPATHY IN AN ANTI-BODY NEGATIVE, EUTHYROID PATIENT
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CONTEXT: Thyroid associated orbitopathy is an autoimmune mediated disease that affects orbital tissues. We report a patient with clinical features of Grave's orbitopathy including exophthalmos and CT evidence of rectus muscle enlargement with negative antibody titers and normal thyroid functioning.

REPORT OF CASE: A 61-year-old male presented with an 8-month history of eye lid retraction, exophthalmos, blurry vision and orbital pain. He reported a 10-pound weight loss but had no other symptoms of thyroid dysfunction including palpitations, heat intolerance, tremor, fatigue and sweating. He had a history of hypertension controlled on Metoprolol Succinate ER 50mg and took Olopatadine HCl 0.2% solution as needed for eye discomfort. He smoked one pack of cigarettes per day.

On examination, he had bilateral upper and lower eye lid retraction, exophthalmos, lower lid fat pad and mild conjunctival redness. Visual acuity of right eye was 20/30 and left eye was 20/40. His Grave's orbitopathy clinical activity score was 3. The remainder of his physical examination was normal. CT of orbit with contrast showed mild bilateral enlargement of inferior rectus and medial rectus muscles consistent with Grave's disease. CT head with and without contrast showed mild-moderate atrophy with no acute intracranial event.

Thyroid function tests were normal: TSH 1.180 mIU/mL (reference range 0.358-3.740), free T4 0.98 ng/dL (reference range 0.82-1.70), thyroglobulin antibody <1.0 IU/mL (reference range 0.0-0.9) and thyroid stimulating immunoglobulin antibody <0.10 IU/L (reference range 0.00-0.55).

He was started on a 45-day taper of oral Prednisone and 200 mcg Selenium. He was also educated on the dangers of smoking including worsening of his orbitopathy.

On his return visit 45-days later, he had improved conjunctival redness and resolved orbital pain. His exophthalmos remained stable and had not progressed.

COMMENTS: Grave's orbitopathy has an incidence of 16 cases per 100,000 in women and 3 cases per 100,000 in men.(1) The most common onset of symptoms is 30-50 years of age.(1) More severe cases tend to occur in male patients and those that are over 50 years of age which both apply to our patient. The pathophysiology behind Grave's orbitopathy is an immune mediated reaction directed against orbital fibroblasts leading to expansion of orbital tissue. (3) The most common antibody associated with Grave's orbitopathy is thyroid stimulating immunoglobulin. (1) Approximately 5% of patients with Grave's orbitopathy are euthyroid and have low antibody titers. (3)

While euthyroid Grave's orbitopathy with negative antibodies is an atypical presentation, there have been cases in the literature. In one case, hyperthyroidism and antibodies developed 24 months after initial presentation. (6) This suggests a potential progressive relationship between Grave's orbitopathy and development of hyperthyroidism in patients with initial negative antibodies.

Diagnosis: The diagnosis of Grave's orbitopathy was concluded after contrast imaging of orbital tissue and physical examination despite his euthyroid status and negative antibody panel.

CBR-21

ARTHROSCOPIC DEBRIDEMENT OF MOREL-LAVALLEE LESION SPEEDS HEALING AND RETURN TO ACTIVITY

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A Morel-Lavalée lesion is a closed degloving injury of the soft tissue caused by post-trauma sequale. The trauma shears the subcutaneous tissue from the underlying fascia which creates a potential space for blood and fluid to accumulate over time and can serve as a potential nidus for infection and tissue necrosis. Conservative measures are utilized initially with percutaneous drainage, surgical treatment is the definitive treatment when conservative measures fail.

Open wound debridement has traditionally been the procedure of choice, however there are scant publications reporting the utilization of endoscopic treatment. This case report describes a Morel-Lavalée lesion involving the lateral hip that was successfully treated with arthroscopic debridement. This supports prior reports that endoscopic debridement achieves the similar to improved outcomes when compared with open surgical debridement This case illustrates expedited healing with the post-operative use of incisional wound vac and rapid return to activity with no increased morbidity, decreased length of hospital stay by utilizing the endoscopic approach over the open approach.

FACULTY RESEARCH

FAC-1

THE EFFICACY OF FACIAL EFFLEURAGE ON ACUTE RHINOSINUSITIS

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Acute rhinosinusitis (RS) affects millions of people each year, occurring in about 1 in 7 US adults annually. Acute RS is an infection of the nasal passages and paranasal sinuses characterized by nasal congestion and nasal drainage presenting for less than 12 weeks. Nasal inflammation prevents proper mucus drainage from the sinuses, leading to mucus buildup. Viruses, bacteria, fungi, and allergic response can all cause acute RS, although the most common etiology is presumed to be viral. There is no clinical test performed to delineate etiology; etiology is assigned based on symptom duration, symptom severity, clinical examination, and medical history. Generally, physicians attribute viral etiology to RS presenting for less than 5 days and bacterial etiology if RS symptoms worsen after 5 days or persist longer than 10 days. Regardless of etiology, antibiotics are prescribed to 85-98% of RS patients in the US. An increase in antibiotic resistance paired with the decline of novel antibiotic discovery has led to an antibiotic crisis, for which antibiotic over prescription is partially to blame. In an effort to decrease antibiotic prescription to acute RS patients, we propose utilizing osteopathic manipulative treatment (OMT) as a first line of therapy. Facial effleurage (FE) is a well-established OMT that has been used by osteopathic physicians to treat sinus and upper respiratory dysfunctions. FE utilizes rhythmic pressure applied over the sinuses to refresh the lymph, effectively promoting mucus drainage. However, there is very little published literature assessing FE's function and impact on patient's symptoms, both at patient-reported and molecular levels. In this study, we aim to determine if FE can reduce the symptom severity or duration in acute RS patients, as well as elucidate FE's effects on the immune system. In addition to patient-provided survey information, a variety of molecular markers will be analyzed, including white blood cell populations, serum antibody (IgG, IgM, and IgE) levels, serum cytokine (IL-6 and TNF α) levels, and serum complement levels. Patients report significantly reduced acute RS symptoms 1 hour after receiving FE; however, some patients who received the OMT control treatment also reported significantly reduced symptoms 1 hour after treatment, pointing to the placebo effect. Certain biomarkers were significantly altered 1 hour and even 1 week only after FE treatment, not after OMT control treatment, indicating FE's impact on the immune system. We propose that using OMT as the first line of treatment should quickly alleviate patients' acute RS symptoms, positively impact their immune response to acute RS, and reduce the amount of antibiotics being unnecessarily prescribed.

FAC-2

PROGRESS ON A DECISION SUPPORT TOOL FOR THE EVALUATION OF EARLY CHILDHOOD GROWTH: A MIXED METHOD SURVEY OF LIKELY USERE

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BACKGROUND: Electronic healthcare records (EHR) are rapidly becoming a standard component of medical practice and provided a platform for multidisciplinary communication and collaboration. Their use provides a real time view of anthropometrics, chemistries, current symptoms, tests results,

treatments, and complications for a patient while providing valuable data which enable healthcare providers to make both immediate and long term decisions directing the plan of care. EHRs function as valuable data warehouse and tracking system. The next logical stage in this evolution is the use of decision support systems that make use of the collected data to provide better evidence-based care for individualized patients. This study describes the early development of a decision support tool for plotting and evaluating infant and early childhood anthropometric data and the feedback of users on the first phase of software for clinical use.

METHODS: A mixed methods study was conducted with physicians and medical students who attended demonstrations of a Systematic Early Growth Monitoring Algorithm (SEGMA) with the opportunity for hands on experience with the tool. Participants completed a survey and participated in a focus group interview on SEGMA's appearance, potential barriers to use in clinical practice settings, and potential usefulness.

RESULTS: The survey results established that the physicians and medical students viewed SEGMA's software features and alerts as providing accurate, clinically useful information and was easy to use. Features of the software that were viewed as helpful and advantageous included the novel graphing format that appears to be beneficial for the early identification of infant/child growth changes, the existence of alerts that could prompt closer investigation of growth, and the addition of links for more clinical information or resources. Areas for improvement included concerns about excessive alerts, the nature of when and where growth curves could be viewed, whether the workflow would be halted by erroneous measurements, and how seamlessly the software would fit into the existing clinical workflow.

CONCLUSIONS: The assessment of SEGMA was overwhelmingly positive, indicating that the core functionality of the tool is well-established. Feedback from this study suggests that usability depends on full integration with standard EHR systems and the method of providing alerts to users.

FAC-3

EFFECT OF COLLABORATIVE GROUP TESTING ON INTRINSIC MOTIVATION AND COMPETITION IN MEDICAL STUDENTS

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CONTEXT: In education, one of the key components associated with the highest levels of intrinsic motivation is the feeling of competence. In the context of medical students, this means does a student feel that they can apply what they have learned. In collaborative group testing (CGT), students work together to achieve a learning task and by definition, are not competing against one another. Presumably, their collective backgrounds and experiences allow them to learn from one another, which could increase their competence.

OBJECTIVE: Therefore, we tested the hypothesis that participating in CGT would increase intrinsic motivation and decrease competition in first and second year medical students.

METHODS: Beginning in the spring of their M1 year through the winter of their M2 year, VCOM-Carolinas students from the Class of 2020 took the medical physiology component of the curriculum,

wherein there are thirteen multiple-choice exams, each of which contains a CGT component. Students completed the Intrinsic Motivation Inventory and the Competitive Attitude Scale, which assess levels of intrinsic motivation and competition, respectively, prior to the first exam (baseline) and after the last (13th) exam. Out of 162 students in the class, 83 consented to participate in the study (51% participation rate).

RESULTS: After participating in thirteen CGT over nearly ten months, each intrinsic motivation subscale was significantly increased compared to baseline. However, there was no significant difference in the levels of competition.

CONCLUSION: We conclude that participation in CGT increases intrinsic motivation but does not change competition.

FAC-4

CELL-FREE RECONSTITUTION OF IMMUNOREGULATORY SIGNALING PATHWAYS

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CBL-b and c-CBL are closely related RING type E3 ubiquitin ligases that negatively regulate T cell activation. In mice, CBL-b non-redundantly inhibits peripheral CD8 T cell activation, and CBL-b deficient animals reject syngeneic tumors owing to enhanced anti-tumor T cell responses. Whether and how a similar regulatory paradigm functions in human CD8 T cells remain unanswered. Using CRISPR mediated gene deletion in primary T cells, we confirmed that CBL-b is responsible for limiting human peripheral T cell activation. In resting CD8 T cells, CBL-b was necessary for ubiquitination of CD3z following TCR stimulation despite cells expressing 4-5 fold more c-CBL than CBL-b, suggesting inherent differences in the regulation of enzyme activity underlie the nonredundant role of CBL-b. To address this hypothesis, we integrated CBL-b and c-CBL into a liposome-based system for reconstituting T cell signaling pathways in vitro. The conserved TKB-RING domains of CBL-b and c-CBL were indistinguishable in their abilities to ubiquitinate CD3z and ZAP70 and were similarly regulated by E3 and substrate phosphorylation, membrane recruitment, and ubiquitin/E2 backside interactions. However, an N-terminal element unique to CBL-b enhanced target ubiquitination. Together, our data demonstrate how a number of shared regulatory mechanisms integrate to enhance CBL family activity, with an additional unique N-terminal element underlying the non-redundant role of CBL-b in limiting T cell activation. Furthermore, our data highlight the utility and versatility of our cell-free system for reconstituting immune signaling pathways, positioning it as a platform for future research collaboration.

FAC-5

FOOD FREQUENCY QUESTIONNAIRE IDENTIFYING CULTURAL DIFFERENCES IN DIETS IN LATIN AMERICAN AND CARIBBEAN ADULT WOMEN

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Food frequency questionnaires are commonly used for dietary assessments, with numerous reports from Latin American and Caribbean countries. VCOM conducted a nutritional assessment and

comparative study in the Dominican Republic (DR), El Salvador (ES) and Honduras (HD). The hypothesis stated that among the three VCOM international countries barriers to obtain adequate nutrition in each location will vary. Additionally, dietary preferences will differ, thus, expecting cultural sensitivities to adequately assess status and deliver effective nutrition education in future intervention programs. In this communication, part of a multiphase study conducted in 2019 we report preliminary findings to reflect commonalities and differences in food choices made by participants during the pre-testing phase of our one-year study that includes a nutritional education intervention with subsequent tests after 4 months. Researchers at the Shalom Family Medical Center, located in Santiago, Texacuangos, San Salvador, the Baxter Clinic in Tegucigalpa, Honduras, and the Veron Clinic in Punta Cana, Dominican Republic were asked to respond to a 35 item diet assessment. Subjects were asked to respond to, "How frequently do you consume (food/beverage)?" by selecting from the following response choices; never, 1-3/week, 4-6/week, 1/day, 2/day, 3/day. For protein sources in their diets the predominant responses indicated; Legumes were reportedly consumed 2/day in ES, 1/d in HD, and 1-3/week in the DR. The next most frequently consumed protein source was milk added to their coffee, in ES and HN milk 2/day, but 1-3/wk in the DR. Milk, yogurt, cheese and other dairy items ranged in all three countries from 1-3/week to 1/day. Chicken was reported to be consumed in the DR 4-6/wk, and less, 1-3/week in ES and HD. The most consistent responses across countries were for red meat (DR 62%, ES 58%, HD 70%) and eggs both consumed 1-3/week. However, the responses, for example for eggs, although respondents selected 1-3/wk as the predominant response (Dr 38%, ES 38%, HD 41%), within countries, this rate was more variable. Again, consistent responses were reported for never consuming tinned fish (sardines, tuna, DR 62%, ES 58%, HD 70%), organ meat (liver) and peanuts. This study, the first multi-phase, multi-country study with a research team dependent on collaborating university, faculty, staff and students as well as research assistants. The data provide a baseline for future intervention studies to support VCOM international service clinic missions to promote preventive medicine and treat malnutrition and comorbidities. Findings will be reported to in-country partners, supporting agencies and provide a research platform for grant opportunities.

FAC-6

EVALUATION OF NUTRITIONAL STATUS IN ADULT WOMEN VISITING SHALOM FAMILY MEDICAL CENTER IN EL SALVADOR

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A nutritional assessment and comparative study to improve the nutritional status for women visiting VCOM clinics was conducted in the Dominican Republic, El Salvador (ES) and Honduras. The hypothesis stated that among the three VCOM international countries participating barriers to obtain adequate nutrition in each location vary. Malnutrition is a risk factor contributing to an increased risk for both chronic and infectious diseases that represent a great burden for the elderly and health care systems. In ES eight out of ten leading causes of death in the adult population are chronic conditions. The 2015 national survey reported the prevalence in ES of overweight was 37.9%, obesity 27.9%, dyslipidemias 26.9%, hypertension 37%, diabetes mellitus 12.5%, chronic kidney disease of 12.6%. Obesity due to visceral adipose tissue is a greater metabolic risk than body fat stored as subcutaneous tissue. In this communication, we report anthropometric data for subjects in ES who have completed the preliminary testing phase of our one-year study that includes a nutritional education intervention with subsequent tests after 4 months. Researchers at the Shalom Family Medical Center, located in Santiago, Texacuangos, San Salvador, participated in training offered by VCOM dietitians. Results: Subjects (n=95)

varied in age, the majority, 37%, were 20 years old, 25% in their 30 years and 21% in their 40s, had a mean weight = 147.2 lbs. (17.9, standard deviation, SD); mean heights of 60.04 inches (2.3, SD); average waist circumferences of 37.0 inches (4.39, SD) and average BMI 28.47 (3.36, SD). BMI distributions indicated that no subject was underweight, 21% were normal, 43% overweight (national average, 38%) and 27% considered obese. Educational achievement varied, 36 attained a primary level education, and 52 attained at least some third cycle course. Mean weekly household income was less than \$ 50 (USD) per week, based on a 72% response rate. Their diets were quantified with a food frequency questionnaire, reflecting almost daily intakes of corn products (tortillas, tamales), legumes (beans, lentils) and tomatoes and rice consumed 4-6 times per week. To conclude, both waist circumference and the BMI measures were within the desired recommendations in approximately 25% of patients. Pearson correlations identified BMI with several factors; the highest positive coefficient was for waist circumferences ($r, 0.76$) and the weakest correlations were for age ($r, 0.14$), physical activity ($r, -0.34$), education ($r, -0.03$) and income ($r, -0.11$). Conclusion: Additional analysis of our pre- and post-testing data on variables known to contribute to risk of morbidity will guide the development of nutrition education interventions. The measures reported here for ES represent selected components of a multinational, comprehensive intervention study with demographic information, food frequency intakes, and nutrition knowledge. This study highlights the valuable uniqueness of the international service area clinic model.

FAC-7

SUCCESSFUL WEIGHT MANAGEMENT WITH THE C-ICAN DIET PLAN FOR A YOUNG WOMAN WITH DOWN SYNDROME: A CASE REPORT

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CONTEXT: Primary care physicians are in a unique position to provide holistic and individualized care to their patients, and this is even more true for their patients with Down syndrome (DS). It is caused by trisomy 21, a common chromosomal abnormality in humans (Malt et al., 2013). Evidence has shown that DS patients are likely to have a more obese body habitus than the general population of children without DS due to a decreased basal metabolic rate and lower lean body mass (Bertapelli, Machado, Roso, & Guerra-Junior, 2017; Hill et al., 2013; Prasher, 1995). The prevention of obesity is an important public health issue for both the general population and for the population of individuals with Down syndrome. If abnormal weight gain is treated effectively, many secondary comorbidities can be prevented.

REPORT OF CASE: A 20-year-old woman with Down syndrome presented in with a history of abnormal weight gain, GERD, constipation, arthritis, and BMI 25.9 kg/m². The caregiver reported a recent increase in patient complaints of hunger, resulting in uncontrolled snacking. Family history included hyperlipidemia and hypertension. Initially, the patient was prescribed a standard 1500-calorie DASH diet which improved her symptoms. However, weight gain and lack of satiety remained a concern over the course of a period of 18 months. During this time the mother reported that the patient was sneaking foods outside of the diet plan which increased caregiver stress. Her BMI slowly increased up to 29 kg/m². These behaviors suggested that the patient may be carbohydrate sensitive, so the Consistent Individualized Carbohydrate-controlled Anti-inflammatory Nutrition plan (C-ICAN) was implemented as part of her treatment plan. The regular structure of the meal plan eased the patient's anxiety and increased compliance with the diet. Despite an elective laparoscopic hysterectomy with salpingectomy, overall adherence to the plan was maintained and her BMI reached 28 kg/m².

RESULTS: This patient and her caregivers adjusted to the C-ICAN diet's structured meal pattern well and mealtime stress was reduced. C-ICAN is a diet plan is easily taught and can fit into the workflow of a busy practice.

COMMENTS AND METHODOLOGY: After IRB approval and parenteral approval, the patient's medical records were de-identified and collected. Reported histories, nutritional interventions and treatment plans, consultations, and physical findings to include trending BMIs during a period of seven years were reviewed. A literature review was completed using both the VCOM library catalogue and PubMed Growth charts of normal female patients were obtained from the CDC and growth charts of female Down Syndrome patients were obtained from the Journal de Pediatria⁷. BMI data for adult female patients with and without Down syndrome was obtained from the Journal of Intellectual Disability Research². The patient's anthropometric data was evaluated with these tools. A Registered Dietitian provided the initial instruction for the C-ICAN diet plan, and then followed the patient quarterly. The physician provided brief supportive education during routine office visits.

FAC-8

THYMOMA PRESENTING AS A PLEURAL-BASED MASS

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CONTEXT: A thymoma is a tumor of the thymus gland, often seen with autoimmune conditions including myasthenia gravis, pernicious anemia, and others. Typically, thymomas present in the superior anterior mediastinum. We present a unique case of a satellite pleural-based thymoma abutting the left lateral border of the pericardium.

CASE REPORT: The patient is a 66 year old White female with no significant PMH except a history of a left pericardial soft tissue mass documented by serial CT scans since 6 years ago, originally thought to be a pericardial cyst. She had been asymptomatic. Routine Chest X-ray done in preparation for a colonoscopy indicated a gross increase in size of the mass when compared to a Chest X-ray done 4 years ago. Resulting work-up included a CT scan with contrast, PET CT scan and echocardiogram. CT with contrast was compared to previous CT scans performed as far back as 2013 and revealed a presence of a mediastinal mass in the left infrahilar region along the left lateral pericardium adjacent to the left atrial appendage with an increase in size from 4.6 X 3.7 X 3.2 cm 3 years ago to 5.6 X 5.2 X 4.2 cm. PET CT showed the mediastinal mass had an increased F18 FDG uptake with SUV of 7.2 and multiple calcified and noncalcified mediastinal and bilateral hilar lymph nodes measuring up to 9 mm, with low-grade uptake up to 3.5 SUV. Echocardiogram did not reveal pericardial effusion, pericarditis, mass or involvement.

The patient underwent left thoracotomy with resection of an 81g, 6 x 5.5 x 5.0 cm tan-pink well-encapsulated pedunculated mass displacing the Left phrenic nerve. The mass was under the parietal pleura and not attached to the pericardium. Also, multiple calcified subcarinal and Left hilar lymph nodes were excised. Frozen section revealed lymphoid tissue. The patient was discharged on POD#3 in stable condition. Final pathology report afterwards showed histologic sections revealing an abundance of small lymphocytes with intermixed epithelioid cells with singular, small nucleoli and open chromatin. The pleural nodules were hyalinized. Immunohistochemical profile indicated this tumor is best classified as a thymoma, B1 type.

COMMENTS: Thymomas are relatively rare in the United States, pleural-based thymomas are even more so. As illustrated in the clinical work-up for this patient, early detection of thymomas through imaging modalities is critical to avoid late-stage thymoma growths. Early-stage thymomas are traditionally resected surgically. Late-stage or invasive thymomas may require combination therapies including chemotherapy, radiation or hormone therapy. Pericardial involvement of thymomas is unique and clinically significant, due to risk of pericardial effusion, tamponade and a more complicated operative course. Also, pleural-based thymomas are equally unique and clinically significant, and as in this case, could have resulted in diaphragmatic paralysis secondary to phrenic nerve involvement.

DIAGNOSIS: Pleural-based Thymoma

FAC-9

PREVALENCE OF DEPRESSION IN ADOLESCENTS WITH ADHD

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ADHD is the most common mental disorder of childhood in the United States. About 6.1 million kids are diagnosed annually. Estimates of comorbidities with ADHD range from less than 5% to over 50%. ADHD is the most common mental disorder of childhood in the United States. About 6.1 million kids are diagnosed annually. Estimates of comorbidities with ADHD range from less than 5% to over 50%. Previous studies have shown the prevalence of depression in patients with ADHD range from 13 - 27%, though clinical samples run as high as 60%. This is important because researchers have shown that patients with ADHD and comorbid mental health disorders have worse outcomes and a more rigorous assessment and treatment protocol may be necessary to effectively manage these children. One citation noted that in children with ADHD and depression 'generally, it appears best, to treat the depression first because depressed patients show worse cognitive impairment. The purpose of this study is to determine the prevalence of depression in 11 - 17year old children with Attention Deficit Hyperactivity Disorder (ADHD). This is a retrospective chart review of over 350 patients, selected randomly and blindly, based on specific inclusion and exclusion criteria who were seen at a federally qualified community health center (FQCHC) in rural South Carolina between 1/1/2015 and 12/31/2018. Patient demographic data including age, race and sex, patients' mental health comorbidities, psychiatric medications and depression screave shown the prevalence of depression in patients with ADHD range from 13 - 27%, though clinical samples run as high as 60%. This is a retrospective chart review of over 350 patients, selected randomly and blindly, based on specific inclusion and exclusion criteria who were seen at a federally qualified community health center (FQCHC) in rural South Carolina between 1/1/2015 and 12/31/2018. Patient demographic data including age, race and sex, patients' mental health comorbidities, psychiatric medications and depression screening scores were documented. The total study population was 356 patients. Statistical analyses were used to evaluate the data and determine the prevalence of depression in this population. The study showed that over 67% of these children were depressed or at risk for depression. Equally significant, was the study finding that 1 in 4 of these children were never screened for depression. The study clearly demonstrated that adolescents with ADHD should also be evaluated for depression because the prevalence of depression in this population is substantial.

FAC-10

ASSESSMENT OF HEALTH RECORDS FOR PHYSICAL ACTIVITY DOCUMENTATION FOR INPATIENTS WITH CHRONIC DISEASE IN SIX RURAL VIRGINIA HOSPITALS

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Health disparities have existed throughout Virginia, particularly in coal-dependent regions, recognized over 50 years ago by federal agencies and local organizations offering assistance. To reduce rates of preventable chronic diseases, hospital providers are encouraged by Healthy People 2020 goals to assess patient physical activity levels. The purpose of this study was to evaluate the degree of assessment of physical activity among inpatients with a chronic disease diagnosis from hospitals within health disparate regions in Virginia. Methods: A total of 1,958 medical records were obtained from six hospitals in rural, underserved areas of Virginia, some in coal-dependent counties. Record data were analyzed for the prevalence of chronic diseases utilizing International Classification for Disease, 9th edition codes, lifestyle/social habits, family history, laboratory and physical exam findings. The four physical activity consumption categories included: 1) Inactive—sitting or standing still; 2) Light—walking on a level surface at 2.5 to 3mph; 3) Moderate—walking 3.5 to 4mph, and 4) Heavy—walking with load uphill. Results: The average age was 64.9 years (± 17.1), 42.8% (n=865) were males, 12.1% (n=238) were unknown gender or missing due to no, or lack of, documentation. Chronic diseases documented in patient records; 7.6% (n=154) had cancer, 25.6% (n=517) had type 2 diabetes, 47.2% (n=952) had a metabolic or immunological condition, 31.2% (n=629) had a mental disorder, 25.7% (n=519) had ischemic heart disorder, 31.5% (n=636) had hypertension, 20.8% (n=419) had chronic bronchitis, and 5.8% (n=117) had coal miners pneumoconiosis. Records reviewed had a mean of 2.9 ± 2.2 chronic diseases (ICD-9 classifications), with the highest mean observed for a coal-dependent hospital, 4.4 ± 2.8 . Medical record documentation rates of physical activity were low (< 25%). Chi-square procedures revealed differences in favoring documentation of physical activity in records in coal-dependent regions. The fewest assessments were made by providers in non-coal dependent regions. Discussion: Opportunities to influence change through provider-patient communication can be improved, with the potential to influence nearly three times as many patients through hospital consultations compared to current reports. Inpatient provider assessment and education of appropriate patient physical activity is necessary to encourage physical activity uptake, a vital component of preventive measures, to reduce chronic disease rates and achieve Healthy People 2020 goals. Acknowledgements: E Carbaugh, OMSIV, S Campbell, MS, R. Edson, MS.

FAC-11

DIAPHRAGMATIC PARALYSIS: A PRESENTATION OF SPONTANEOUS ATYPICAL CHEST PAIN AND SHORTNESS OF BREATH

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Chest pain accounts for approximately 7.6 million annual visits to emergency departments (ED) in the United States and includes a broad differential. The workup warranted includes extensive testing with the goal of demonstrating a reassuring cardiopulmonary status. When preliminary workup is negative, the secondary symptoms or subtle features of primary symptoms can provide insight into other less common etiologies. This case looks to highlight the rare presentation of an otherwise healthy middle age male with complaint of abrupt chest pain and shortness of breath, worsened with exertion and supine position. When standard cardiopulmonary workup was negative, further specialty testing was

pivotal to identify a rare and potentially life threatening cause of symptoms in the form of diaphragmatic paralysis. Frequently asymptomatic, presenting symptoms can vary in severity from common dyspnea, shortness of breath, and orthopnea to acute respiratory failure. Consideration of rare causes such as diaphragmatic paralysis is important in ensuring accurate evaluation and identification of underlying etiology which may range from traumatic, infectious, malignant, neurovascular, and idiopathic.

The views expressed in this publication represent those of the author(s) and do not necessarily represent the official views of HCA Healthcare or any of its affiliated entities.

FAC-12

THORACOCERVICOFACIAL PETECHIAE: A CASE REPORT

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BACKGROUND: Thoracocervicofacial petechiae can be seizure induced, although this is a rare cause. It is important in the clinical setting to rule out potential life-threatening etiologies. However, this etiology should be considered when patients present with a clinical picture fitting recent seizure-like activity.

CASE PRESENTATION: A 31 year-old male with a known medical history of epilepsy presents to the Emergency Department after waking up with a petechial rash over the thoracocervicofacial region. He also relayed that he had lateral tongue discomfort secondary to trauma. His physical exam was otherwise unremarkable. The patient reported lightheadedness and intermittent memory lapses the day prior to presentation with other review of systems reported to be negative.

CONCLUSION: A thoracocervicofacial petechial rash may be the only indicator of epileptic activity in a presenting patient. It is essential that this sign of seizure activity be recognized due to the complexity and necessity of treatment for epilepsy.