2021 Scientific Research Poster Competition Abstract Booklet

Experimental Research and Case Studies
submitted by:
NSU KPCOM Students, Residents, and Fellows and
NSU KPCOM GME-Affiliated Residents and Fellows

Dr. Kiran C. Patel College of Osteopathic Medicine
NOVA SOUTHEASTERN UNIVERSITY | NSU Florida

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Piedmont Columbus Regional Health – Midtown Medical Center	Columbus, GA
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Dear Poster Competition Entrants,

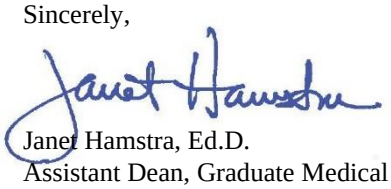
Let me take this opportunity to personally thank and commend each of you for your submission to the 2021 KPCOM Office of Graduate Medical Education's Annual Student/Intern/Resident/Fellow Scientific Research Poster Competition. Your work demonstrates the commitment that you have made to excellence as a clinician, scholar, and educator.

Please let this Abstract Book bring you great pride - in yourselves and your institutions - as you have gone above and beyond expectations by completing the scholarly activity that you had anticipated displaying and presenting.

I hope this is not the end of your research endeavors but just one mark along your pathway to increasing the body of knowledge of your chosen profession. I wish to challenge all of you to continue your research efforts as you move forward in your career.

On behalf of all the faculty and administration of NSU-KPCOM, we wish you all success in achieving your personal and professional goals!

Sincerely,



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Many thanks to the KPCOM and KPCAM faculty who served as judges for this year's competition!

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Alokika Patel, OMS3; Manasa Peddineni, OMS3; Sarafina Musto, OMS3; Adam Beeble, DO
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Reema Patel, OMS2; Isabel Eaddy, OMS2; Mayur Parmar, PhD, MS
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Sridhi Patel, MD, PGY2; Najla Zayed, OMS3; Christopher Aguirre, OMS3; Judith Cornely, DO
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Veshesh Patel, OMS3; Divy Mehra, OMS3; Ankit Srivastava, OMS3; Brenda Ramirez, PGY1; Alfredo Lindo, PGY2; Manuel Suarez, MD
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Aline Pereira, DO, MBA, PGY1; Carlos Tornes Laria, MD, PGY2; Jorge Nunez, DO, PGY1
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Prachi Singh, OMS3; Piero Carletti, MS3; Angelo Abelli, MD, PGY1; Brinsley Ekinde, MD, PGY3; Ruben Cabrera, MD, PGY3; Yoandy Rodriguez-Fuentes, MD; Jose Gascon, MD
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Christian Hailey Summa, MBS, OMS3; Marcos Clavijo Fernandez, OMS3; Jordan Simpson, MBS, OMS2; Andrew D. Beckler, MD; Michelle Demory Beckler, PhD
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Renuka Tolani, DO, PGY1; Alejandro Dominguez, DO, PGY2; Carlos Barbur, DO, PGY3; Lisset Sirven, MD, PGY1
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Oleg Tsvyetayev, OMS3; Mandi Abdelahad, OMS3; Carmen E. Sainz, OMS3; Rogerio S. Faillace, MD
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David Tuyn, OMS2; Joshua Berko, OMS3; Gregory Kunis, OMS3; Mark Sandhouse, DO
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Adithi Vemuri, OMS3; Alyssa Goldenhart, OMS3; Ashley Long, OMS3; Stephen Igel, MD
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Felix Vergilis, OMS3; Joshua Berko, OMS3; Gregory Kunis, OMS3
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Ashley Ryan Vidad, OMS3; Ahjay Bhatia, OMS3; Himadri Shah, OMS3; Shrinand Shah, OMS1; Divy Mehra, OMS3; Olu Ogunjemilusi, MD, PGY1
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Don Woody, OMS3; Mandi Abdelahad, OMS3; Brooke Alexander, OMS3; Taylor Mazzei, OMS3; Rebecca Cherner, DO
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Rebecca Yaras, DO, PGY1; Elena Tellez, DO, PGY2; Taleb El-Masri, DO, PGY3; Yaswanraj Yuvaraj, DO, PGY1
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Yaswanraj Yuvaraj, DO, PGY1; Tram Nguyen, DO, PGY3; Taleb El-Masri, DO, PGY3
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Geidel N. Zambra, DO, PGY2; Micheal Girard, MD, PGY3; Alejandro Dominguez, DO, PGY2; Pedro Valdes, DO
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Susan Zhang, OMS3; Julia Zorn, DO, PGY3; Joseph Brandt, DO, PGY5; Kyle Summers, DO, PGY4; George Keckeisen, MD
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EXPERIMENTAL RESEARCH ABSTRACTS

Title: **Clinical Outcomes in Octogenarian Patients Undergoing Craniotomy with Newly Diagnosed Meningioma or Glioblastoma**

Authors: Assad Ali, OMS2; Aakangsha Jain, OMS2

Background: Over the past 60 years, the life expectancy of the U.S. population has increased by nearly a decade. The incidence of brain tumors has also modestly increased over this time. There are more than 20,000 patients diagnosed with high grade gliomas each year. Particularly, the incidence of brain tumors in the elderly is increasing. Changes in diagnostic criteria for brain tumors, improvements in surgical technique and diagnostic imaging technology can at least partially explain the increasing incidence trend. However, with more people living well into their 8th and 9th decades of life, adapting criteria regarding the surgical management of tumors in our aging population is critical.

Objectives: The objective of this study is to illustrate the outcomes between case matched patients 80 years old or older (octogenarian) undergoing craniotomy versus patients 65 years old or younger with newly diagnosed meningioma or glioblastoma (GBM).

Methods: This is a retrospective study to assess the 30 days readmission rate, post-operative complications, and change in KPS score of octogenarian patients versus patients 65 years old and younger between January 2012 and January 2020. Data collection included patients' demographics, comorbidities, diagnosis, length of stay, duration of surgery and operative outcomes. Data was also collected on case matched patients under the age of 65, based on tumor type, location of lesion, and preoperative KPS score.

Results: All patients had associated comorbidities. Hypertension was found in 75.0% of patients, hyperlipidemia in 61.5%, type 2 diabetes in 38.5%, and systemic cancer 25.0%. The median ASA was 3 (Range 2-4). Median operative time 200 minutes. Median hospital stay was 3 days. In the meningioma stratification both young group (n = 34) and the octogenarian group (n=24) had three readmissions within thirty days after surgery. The post-operative complications of the young meningioma group included 1 new neurological deficit and 6 other complications including acquired skilled defect, vertigo, difficulty finding words, eye fogging, bruising, blood clot affecting gait, urinary incontinence, flat affect, and atrial fibrillation. The post-operative complications of the octogenarian meningioma group included 3 new neurological deficits, and 7 other complications including weakness, confusion, unsteady gait, hyponatremia, and headache. The average decline in KPS was 8.58 and 5.51 in the young and octogenarian meningioma groups, respectively. In the GBM stratification the young group (n = 15) there were 2 readmissions within 30 days of surgery. In the octogenarian group (n=5) there were no readmissions within thirty days of surgery. The post-operative complications of the young GBM group included 1 had DVT and 2 that had 'other' complications defined as difficulty finding words, disorder of hypoglossal nerve, and hydrocephalus. There were no post-operative complications in the octogenarian GBM group. The average decline in KPS was 5.33 and 14 in the young and octogenarian GBM groups, respectively.

Conclusion: Presently, there is a divide in literature regarding the historically popular opinion that elderly patients are less fit to tolerate major brain surgery. In our study we identified patients in a young and old group matched by tumor type, location of lesion, and KPS score and determined that the descriptive statistics of each group are similar and provide no stark differences in negative outcomes within the octogenarian cohort. While our sample size is small, further extrapolation of this data and the addition of more patients will help us identify the specific factors where age plays a role in regard to major brain surgery.

Title: **Glaucoma and its Associations with Autoimmunity: A Review**

Authors: Ruth Antony, OMS2; Michelle Wu, OMS2; Jessica Steen, OD; Bindu Mayi, PhD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Glaucoma is a group of diseases that present with characteristic patterns of progressive optic nerve damage and loss of retinal ganglion cells and their axons. There are two prevalent types of glaucoma: open-angle and angle-closure. Glaucoma is the leading cause of irreversible blindness worldwide and can be associated with autoimmune diseases. As such, it is important to establish an early diagnosis to halt disease progression. Our review discusses the characteristics of glaucoma, methods of diagnosis, and timely intervention to prevent permanent vision loss, particularly in those with autoimmune conditions.

Objective: The objective of this study was to document and clarify the etiology, pathophysiology, diagnosis, and available treatments of glaucoma.

Methods: Literature search was conducted on PubMed using "glaucoma" as a title word with additional terms such as "optic nerve head", "retinal fiber layer", "trabecular meshwork", "risk factors", "autoimmune comorbidities", "pathophysiology", "immunology", "diagnosis" and "treatment".

Results: Global numbers of glaucoma are estimated to increase 74% by 2040. With respect to primary open-angle glaucoma, men are more likely than women to develop the condition, as are individuals with African ancestry as compared to European ancestry. In contrast, primary angle-closure glaucoma is more prevalent in those of Asian descent. Other risk factors include elevated intraocular pressure, thinner central corneal thickness, and pre-existing conditions such as metabolic syndrome. Untreated glaucoma can result in autoimmune conditions such as Graves' disease. We overview the proposition that glaucoma is an autoimmune disease and an infiltration of T cells into the retina may be partially responsible for destroying the retinal nerve fiber layer. Traditionally, autoimmune conditions are treated with systemic glucocorticoids. However, we found that glucocorticoids that are especially useful in systemic and ocular autoimmune diseases may cause additional injury by exacerbating intraocular pressure in those with glaucoma. The mainstay of detection for glaucoma is examination of the optic nerve head and retinal nerve fiber layer. Imaging techniques such as Optical Coherence Tomography is used to detect retinal nerve fiber layer and ganglion cell complex abnormalities. Current therapeutic interventions aim to decrease intraocular pressure by reducing aqueous humor production or increasing aqueous outflow. Topical drugs such as prostaglandin analogues and beta-adrenergic blockers as well as laser treatments have proven to be effective.

Conclusion: Results of our literature review suggest that glaucoma is a panoply of conditions that cause a characteristic pattern of progressive neurodegeneration of the retinal ganglion cells. Underlying pathogenesis, risk factors, treatment, and prognosis vary based on the type of glaucoma. Although pathogenesis of glaucoma is not well-understood, intraocular pressure remains the only modifiable risk factor for its development and progression. With the debilitating effects of glaucoma, it is imperative that this condition should be properly detected early and treated adequately. Moving forward, an improved understanding of pathogenesis of glaucoma will lead to development of new treatment targets and improved screening tests for the general population.

Title: **The Correlation Between BMI Status and Depression/Depression-like Symptoms Based on Gender and Race**

Authors: Nathan Badillo, OMS2; Mohammed Khatib, OMS2; Deepesh Khanna, PhD, MBBS, MPH, MBA, MS; Payal Kahar, PhD, MPH

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: While being overweight is a risk factor for hyperlipidemia, type 2 diabetes, cancer, and heart disease, it can also be a risk factor for depression and vice versa.

Objective: This study aims to evaluate the relationship between BMI and the prevalence of depression symptoms between genders and races.

Methods: A nationally representative sample was utilized to explore the relationships between depression-related symptoms and BMI status based on comparing gender and racial identities. Data from the 2013-2016 National Health and Nutrition Examination Survey (NHANES) editions were used. The focus of this study was the responses from the Patient Health Questionnaire (PHQ) given during this study, in which we accounted for the eight primary questions' responses based on one's gender and BMI status. Statistical analysis was conducted by descriptive analysis, Chi-Square test, and multinomial regression analysis.

Results: Data are presented as percentages. Both men and women had the majority of those who admitted to having depression or depression like symptoms more than half the days or nearly every day be overweight or obese. However, men had a higher prevalence than women among most of the questions. Statistical analysis showed that men and women who felt down, depressed, or hopeless nearly every day, 61.5% ($\chi2=5.045$, $p= 0.992$) and 50.9% ($\chi2=17.186$, $p= 0.308$) were overweight, respectively. Among the races, for those who felt down, depressed, or hopeless nearly every day, non-Hispanic Asian individuals had the lowest percentage be overweight at 47.7% ($\chi2=7.099$, $p= 0.955$), while Hispanic individuals other than Mexican-American had the highest percentage be overweight at 67.4% ($\chi2=8.792$, $p= 0.721$).

Conclusion: Results indicate that being overweight or obese does have a positive relationship with depression and depression-like symptoms for each gender and race. Individuals who report having depression-like symptoms are likely to be overweight or obese. Further research is needed to determine other differences in etiologies between genders and races along with finding out whether more individuals become depressed due to being overweight or obese or more individuals become overweight or obese due to being depressed. Results are limited to the data attained from NHANES.

Title: **The Role of Baby's Sex in Intrahepatic Cholestasis of Pregnancy**
Authors: Samantha Bartolone, OMS2; Harvey N. Mayrovitz, PhD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Intrahepatic cholestasis of pregnancy (ICP) is the most common liver disorder of pregnancy. It occurs when bile flow from the liver is obstructed, causing bile acid to accumulate. ICP usually presents with itching that lasts for the remainder of pregnancy. Less common symptoms include jaundice, right upper quadrant pain, pale stool, and dark urine. The implications for the fetus, however, are more serious. Untreated ICP has been shown to increase the incidence of adverse outcomes for the baby, including respiratory distress, meconium aspiration, and NICU hospitalization due to both pre-term delivery and the disease itself. The most dreaded outcome of untreated ICP is stillbirth. The probability of these events increases when bile acid levels are greater than 40 mmol/L. The standard of care for ICP patients is a combination of Ursodeoxycholic acid by mouth and delivery at or before 36 weeks of gestation since the risk of stillbirth due to ICP increases in the last weeks of pregnancy. Since the symptoms of ICP are often nonspecific, it is important for healthcare practitioners to be aware of the disease to help reduce or prevent adverse outcomes. Further, because some pregnancy complications vary by sex of the baby we wondered if the occurrence of ICP and its elements might also be dependent on the sex of the baby.

Objectives: To investigate if the incidence, timing of diagnosis, bile acid levels, or severity of itching are dependent on the baby's sex in mothers who had ICP.

Methods: An online question-set (survey) was offered to women who had had ICP and were members of three different online support groups.

Results: A total of 1,502 women responded for a total of 2,289 documented ICP pregnancies in which there were 1,059 female babies and 1,230 male babies. Based on chi square analysis of differences in frequencies, there was no difference between the sex of the baby and incidence, timing of diagnosis, bile acid levels, or severity of itching in the evaluated population. However, surprisingly, the findings revealed that there first trimester diagnosis of ICP was made in 128 of the evaluated pregnancies and a diagnosis of 30 cases with no itching.

Conclusions: The findings suggest that the baby's sex does not impact the incidence, timing of diagnosis, peak bile acid levels, or itch severity in intrahepatic cholestasis of pregnancy. Other studies are needed to determine if this is consistent across other populations. Since it was found that 5.6% of the ICP pregnancies in the present study were diagnosed in the first trimester, more investigation is needed to understand what risk factors these mothers had. Therefore, more studies of cases of first trimester ICP would be useful. Our finding of 30 cases of ICP without the presence of itching suggests that there could be women who are not aware they have this disease, and therefore are not diagnosed or treated. Although the cases of no itching were a small percentage, this helps to reinforce the idea that screening in the absence of symptoms could be useful. Overall, these study results add to the general body of knowledge pertaining to ICP and will help in the formation of new research questions.

Title: **United Network for Organ Sharing Database Analysis of Factors Associated with Kidney Transplant Time on Waiting List**
Authors: Devina Basdeo, OMS2; Kylie Dunn, OMS2; Kristina Fritz, MS, MA, OMS2; Jennifer Hong, OMS2; Kimberly Byrnes, OMS2; Andres Cordoba, MS, OMS2; Umbul Haider, OMS2; Mareena Kashif, OMS2; Nick Lee, OMS2; Aysha Nuhuman; Radleigh Santos, PhD; Robin J. Jacobs, PhD, MSW, MS, MPH
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Institutionalized racism can be seen in many areas of society, not excluding medicine. Low socioeconomic status (SES) has been shown to be associated with kidney disease progression and access to kidney transplant. In addition, low SES is further associated with increased incidence of chronic kidney disease, progression to end-stage renal disease, inadequate dialysis treatment, reduced access to kidney transplantation, and poor health outcomes. This research sought to determine if racial disparities exist in receiving timely treatment for end-stage kidney disease.

Objective: The purpose of the study is to determine if ethnicity affects the wait-list time of kidney transplants in the United States.

Methods: The data collected from the National Organ Procurement and Transplantation Network database were used to analyze associations between race and time spent on the waitlist for a kidney transplant in the US. Additional sub categorical data were

analyzed to determine further associations and potential covariates, such as gender, age, citizenship, primary source of payment, region of transplant center, BMI, Kidney Donor Profile Index (KDPI), renal diagnosis, and presence/type of diabetes. Data was analyzed using odds-ratios and validated by Bonferroni-Holm's corrected chi square tests at confidence intervals of 95% to determine if there are statistically significant differences between transplant time spent on the waitlist and ethnicity, as well as age, diagnosis category, region of transplant center, and KDPI.

Results: All non-white races examined, other than those identifying as multiracial, had statistically significant increases in the odds of remaining on the kidney transplant list greater than 2 years, when compared to persons who identify as white. Asian American patients had the greatest odds of remaining on the waitlist greater than 2 years in comparison to white patients: 1.51 times that of a patient categorized as white. African American and American Indian or Native Alaskan patients had odds of remaining on the transplant waitlist greater than 2 years that was slightly lower than that of Asian Americans in comparison to white patients: 1.38 times that of patients categorized as white. Hispanic patients had the smallest odds of remaining on the waitlist greater than 2 years in comparison to white patients: 1.37 times that of white patients.

Conclusion: In this study, ethnic disparities persisted as a barrier for non-white individuals receiving treatment for end-stage kidney disease, specifically in the context of time spent on the waitlist for a kidney transplant. Further research should be conducted on causes of these disparities in time spent on the waitlist, such as cultural restrictions in organ donation, racial differences in parameters for organ match, and institutionalized racism in health care practitioners.

Title: **Investigation of Potential Effects of a Localized Static Magnetic Field on Peripheral Pulse Wave Conduction Time: A Pilot Study**

Authors: Lizbet Chavez, OMS2; Heather Silverstein, OMS2; Veronica Albello, OMS2; Harvey N. Mayrovitz, PhD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Impacts of static magnetic fields (SMF) are often studied as general bioeffects with limited emphasis on specific human physiological functions. Although SMFs are ever-present in many aspects of our lives, from using computers to magnetic resonance imaging studies, little is known about effects of localized SMFs on peripheral pulse wave conduction time (PWT). It is believed that acute health events of SMFs are only likely within high fields but until now there have been no studies on effects from exposure to fields in the millitesla (mT) range.

Objective: Since PWT is regarded as a good index of arterial wall stiffness, this pilot study's goal was to evaluate possible impacts of a rare-earth concentric magnet SMF on PWT.

Methods: Eight subjects (4 male), recruited from medical students, were evaluated during one session after they signed an IRB approved consent form. Entry requirements were age of 18-35 years, no adverse skin conditions and not taking vasoactive medications. Excluded were persons with diabetes or implanted devices. With subject's supine, photoplethysmographic (PPG) sensors were placed on the index finger and great toe of the dominant hand side to measure peripheral arterial pulses. EKG was measured with standard limb leads. Pulses and EKG data were recorded at 1000 samples/sec during a 45-minute duration. After 15-minutes of recording, magnets were placed over the ulnar and median nerves at the wrist level and recording continued for 30 more minutes. PWT was determined prior-to and during magnet placement by measuring the time from the EKG R-wave peak to peripheral PPG pulse upstroke. Averages of 30 consecutive pulses were determined at 2-8-and 14-minutes during control and at 2-8-14-and 29-minutes during magnet placement. Trends for changes in PWT with experiment time (t) over the 45-minute experiment time were assessed via regression analysis of finger and toe PWT in msec.

Results: At the finger, the control (pre-magnet) PWT value (mean ± SD) was 222.8 ± 13.5 msec. During the magnet interval it was 231.8 ± 15.1 msec. This difference was not statistically significant (p=0.173, Wilcoxon-signed-ranks). However, a decreasing trend in PWT during the course of the experiment was observed. This decline could be expressed by the regression equation PWT = 228.0 – 0.064t, r=0.648, p = 0.004 in which t is the experimental time in minutes. At the toe, the control PWT value was 332.4 ± 15.5 msec. During the magnet interval it was 331.7 ± 17.4, P = 0.563, with no statistical difference or evidence of a temporal trend. The differential conduction time (DPWT) between toe and finger, was initially 107.9 ± 14.5 msec and showed a significant negative regression with time as DPWT = 108.9 – 0.10t, r=0.749.

Conclusion: Temporal changes in peripheral PWT for fingers were not large but they showed a significant declining trend with time. Such a time dependent change was not observed for PWT measure at the toe site. There was however a highly significant declining trend of the toe-finger PWT differential. Although this suggests the finger PWT changes were not totally due to systemic changes, this

possibility is not ruled out via the present design. Further research is needed to isolate the cause of the change in peripheral conduction speed noted in the present pilot study. Future studies could place PPG sensors on fingers of both hands with one hand exposed to active magnets and the other to sham magnets.

Title: **Technology Adoption Among Seniors During COVID-19 Pandemic Impacts Mental Health and Feelings of Companionship**

Authors: Brittany Derynda, OMS2; Mary Goodyear, DO; Jade Kushner; Nicole Cook, PhD, MPA
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Social isolation and lack of companionship, exacerbated by COVID-19 "stay at home" orders, has been an ongoing concern among seniors in the US. Among other strategies, Lifelong Learning Institutes (LLIs) were created to support continuing education for older adults. These programs bring seniors together to encourage engagement through lectures, art and fitness classes in a common space. LLI in South Florida adapted to COVID-19 "stay at home" orders by moving all programming online in March 2020.

Objective: The objectives of this study included to identify the impact of online social connection on feelings of isolation during social distancing due to COVID-19 among seniors, assess the ease of technology adoption among members of a Lifelong Learning Institute (LLI) during COVID-19 and its impact on feelings of companionship, assess the impact of "isolated alone" verses "with others" on feelings of companionship among LLI members during COVID-19, and to assess the impact of mental health on feelings of companionship among LLI members during COVID-19.

Methods: In May 2020 LLI members, faculty and students designed a research study to understand the experience of LLI members with social isolation and companionship prior to, and during, "stay at home" orders. An anonymous survey was developed by the research team and administered via RedCap to access Social Isolation, Connection, Technology adoption and demographics. A number of instruments were reviewed, and approval was acquired for those that were needed. Questions were adopted from the Technology Acceptance Model, Wave 3 NSHAP questionnaire and the Healthy Days Core Module. The research team and LLI advisory board met, discussed and adjusted the questions (face validity). The final survey included 31 questions (including demographics). The study was determined exempt by the NSU IRB. The LLI advisory board administered the survey via email to LLI members who participate in Zoom programming.

Results: Responses included 127 members (mean age 75.5). Respondents reported significantly lower social isolation ($p<.01$) and lack of companionship ($p<.01$) as a result of "stay at home". Interestingly, social isolation had no significant explanatory variables. However, significant results ($p<.05$) showed that seniors who isolated alone were 6.7 times more likely to lack companionship compared to those who isolated with a friend or spouse; seniors who reported they are not tech savvy were 8.3 times more likely to lack companionship compared to those who reported they are tech savvy; and that for every additional day of poor mental health respondents had a 1.15 higher odds of lacking companionship.

Conclusion: These results underscore the importance of technology adoption among seniors during times of social isolation and the positive impact this can have on companionship and mental health. One implication of this study is that the positive mental health findings of LLI members with online programming adoption may be beneficial for similar Lifelong Learning Institutes throughout the country. Additionally, future research of online technology use among seniors in other settings may be beneficial.

Title: **Examining Osteopathic Manipulative Treatment in Injured NCAA Athletes from a Single University**

Authors: Michael Downing, OMS3; Adithi Vemuri, OMS3; Eric Xu, OMS3; Lailah Issac, DO; Alessandra Posey, DO
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Injuries are common amongst National Collegiate Athletic Association (NCAA) athletes, and medical treatments vary depending on the severity, location of injury, and patient history. One treatment modality that requires further evaluation in an athletic setting is Osteopathic Manipulative Treatment (OMT). Common treatments for athletic injuries typically include pain medications, procedural therapies, and if severe enough, surgery. All of these options have increased risks and expenses when compared to OMT. Ford et. Al (2017) reported on athletes and the psychological toll of sports-related injury. They found that athletic injury and

subsequent medical procedures and rehabilitation can result in increased athlete anxiety. This may lead to a delayed healing process, diminished future performance, and can also lead to depression, particularly in athletes whose identity revolves around their sport. Studies have discovered that this reinjury anxiety can actually lead to reinjury or a different second injury.

Objective: This study aims to examine the following: OMT and its effect on pain, strength, range of motion (ROM), and performance in athletes. Additional topics to be examined: OMT and its use in preventing reinjury, as well as accelerating an injured athlete's timeline to return. Injured NCAA athletes treated with OMT will be compared to injured NCAA athletes who did not receive OMT. We hypothesize that the athletes treated with OMT will demonstrate improved pain relief and functionality when compared to the athletes not treated with OMT. We also hypothesize the treatment group will demonstrate less reinjury occurrences and an accelerated timeline for return to sport.

Methods: The Google Survey link was distributed by athletic trainers via email to all active NCAA Division II athletes at Nova Southeastern University. Individual responses and total data collection were stored in a password protected excel file. Athletes were asked to rate their pain before and after treatment. The pain scale ranged from 0-10, with 0 being no pain at all, and 10 being the worst pain the patient has ever experienced. The pain score recorded after treatment was then subtracted from the pain score given prior to treatment by each patient. This difference was then averaged amongst two groups: athletes treated with OMT, and athletes not treated with OMT.

Results: Responses came from athletes participating in rowing, soccer, swimming, cross country, track and field, basketball, and volleyball. The average reduction in pain scale for those who received OMT was 2.2 (n=15) while the average reduction in pain scale for those who did not receive OMT was 2.0 (n=7). In the 15 students who received OMT, 100% reported an improvement in at least one of the following categories: Range of Motion, Strength, or Performance. 6 of the 15 students who received OMT experienced reinjury, while 2 of the 7 students who did not receive OMT also experienced reinjury to the same location.

Conclusion: OMT provides a holistic approach that can be beneficial to the collegiate athlete at the physical, mental, and emotional level. Based on our preliminary survey results, OMT may provide improvement in the physical function of the treated athletes. While it's worth discussing the value that OMT provides in terms of pain relief, we cannot definitively state it is better or worse based on these preliminary findings due to limited sample size, variation in the severity and location of injuries, and the subjectivity of pain scales amongst individual athletes. Our future research will retrospectively explore health records of NCAA athletes treated with OMT and their timeline from injury onset to full participation.

Title: **Maternal Mortality in Black Women in the United States: A Scoping Review**

Authors: Romina Esmkhani, OMS2; Preston Celico, OMS2; Kaitlyn Alessi, OMS2; Joel Davis, OMS2; Jenna Hart, OMS2; Brenden Huynh, OMS2; Jinhyuck Kim, OMS2; Licia Lopez, OMS2; Luzan Phillpotts, DO, MPH

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Women have higher rates of pregnancy-related deaths in the United States than other developed countries. Black women in the United States experience three to four times higher rates of maternal mortality than non-Hispanic white women. Maternal mortality is defined here as the death of a woman during pregnancy, at delivery, or soon after delivery. Maternal mortality is widely acknowledged as an indicator of the overall health of a population. Adverse pregnancy events are associated with significant costs to health systems in addition to significant impact on Black families and communities. For these reasons, many different studies have been conducted over the years to understand the etiology of disproportionately high pregnancy-related deaths for Black women in the United States. Despite these efforts, the disparity in maternal health outcomes for Black women has persisted over time. Given that racism is now recognized as a social determinant of health, we recognize that microaggressions and institutionalized racism may play a role in poor pregnancy related health outcomes for Black women. For this reason, it is important to analyze both the societal and health system factors that may potentially impact the rates of maternal mortality for Black women in the United States.

Objective: The objective of this study is to bring together the literature published on this topic to create a concise review for further analysis.

Methods: This study was designed as a scoping review using literature previously gathered for maternal mortality in the United States. The identification of the articles to be collected were sourced from research databases including PubMed, CINAHL, MEDLINE, and Gender Studies. The articles were filtered to match the specific requirements using the Boolean phrase of: (maternal mortality or maternal deaths or pregnancy related deaths) AND (Black or African- American or African American or Black American) AND (United States or America or USA or U.S or United States of America or U.S.A.). The timeline of the studies ranged from 2016-

2021.

Results: This search identified 328 articles, of which 109 were deemed to match the criteria, while the other 219 articles were excluded. Exclusions, after duplicates were removed, resulted in 78 relevant articles. Further screening will be performed for eligibility and inclusion in the final review. Using the literature gathered, we observed trends occurring in Black women in the United States leading to increased maternal deaths. The trends were associated with pre-existing health conditions and disparities in healthcare access. Further analysis of trends pending.

Conclusion: The results of this study suggest that there are many potential causes for the high rates of maternal mortality in Black women in the United States. These causes are preventable and may be attributed to health factors, societal factors, or a combination of the two. The influence of these factors needs to be further discussed and researched to mitigate this unacceptable healthcare reality.

Title: **COVID-19 Anxiety and Personal Protective Behaviors in the General U.S. Population**

Authors: Amanda Eukovich, OMS2; Shreya Bhattacharya, OMS2; Anahit Ghaltaghchyan, OMS2; Nicholas Hallman, OMS2; Aakangsha Jain, OMS2; Craig Dent, MS, OMS2; Alena Abouhana, OMS2; Marianne Cortes, OMS2; Mursell Khairzada, OMS2; Samuel Kwiatkowski, OMS2; Eduardo Castro, OMS2; Robin J. Jacobs, PhD, MSW, MS, MPH

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: COVID-19 has resulted in various economic, social, and health consequences. Specifically, with consuming thoughts of uncertainty, isolation, and fear of infection; mental health has been on the decline since the beginning of the pandemic. Studies have shown that the prevalence of anxiety has increased during the pandemic, which is critical as mental distress can lead to increased inflammation and compromised cell-mediated immunity, further increasing susceptibility to COVID-19. Furthermore, studies show that individuals with a greater perceived risk of infection are more likely to implement protective measures, such as handwashing and social distancing. However, the role of anxiety and how it may facilitate transmission-reducing behaviors has not been thoroughly investigated.

Objective: The purpose of this study is to examine psychological reactions to the COVID-19 pandemic and related behavioral responses among the general population in the United States.

Methods: Using snowball sampling, cross-sectional data were collected from 12/7/2020 to 01/27/2021 via an anonymous online survey that included 4 validated measures: COVID-19 Anxiety Syndrome Scale (C-19ASS), Brief Version of the Big Five Personality Inventory (BF-10), Patient-Reported Outcomes Measurement Information System (PROMIS) for mental health, and Coronavirus Safety Behavior Checklist (CSBC). Items about COVID-19 diagnosis and testing were also included. Regression analysis was conducted to investigate the significant contribution of COVID-19-related anxiety and knowing someone who died from COVID-19 (controlling for personality type and mental health) in COVID-19 preventive safety behaviors (PSB). To examine the unique contribution of the independent variables (IVs) in the explanation of protective behaviors, a hierarchical multiple regression analysis was performed. The IVs were entered in two steps. In step 1, PSB was the dependent variable and (a) neuroticism [BF-10] and (b) mental health [PROMIS] were the independent variables. In the step 2 equation, (a) COVID-19 anxiety and (b) "having someone close die from COVID-19" were added variables. Data were analyzed using SPSS v.26. This study was approved by the Nova Southeastern University Institutional Review Board.

Results: Of the 182 individuals that completed the survey, 67.6%(*n*=123) were women; 24% (*n*=44) were Hispanic; 67.6% (*n*=123) had been tested for COVID-19; 13.7% (*n*=25) tested positive, and 18.7% (*n*=34) believed they had contracted the virus but were never tested. Most (*n*=144; 79.1%) had a family member/close friend who had been diagnosed with COVID-19; 14.3% (*n*=26) or participants reported having someone close die due to the virus. The results of step 1 indicated that the two IVs (neuroticism and mental health) accounted for 25% of the variance, (F (2,179) = 30.883, p<.001), R^2 adj=.248) in predicting PSB. In step 2, COVID-19 anxiety and "having someone close die from COVID-19" were entered into the regression equation. The change in variance accounted for (ΔR^2) was equal to .034, which was significantly different from zero, accounting for 47% of the variance (F (4, 177)=40.817, p<.001), $R^{2adj.}$=.468.

Conclusion: Findings from this study suggest that personality type (i.e., neuroticism), poor mental health, and anxiety about contracting COVID-19 might contribute to increased personal safety behaviors to prevent contracting COVID-19. More research is needed to address personal attributes that might assist public health responses to COVID-19 and future pandemics.

Title: **Assessing the Use of Telemedicine Among Patients Seeking Health Services During COVID-19**
Authors: Karen Go, OMS2; Bahtya Peterson, OMS2; Sahar Zargar, OMS2; Robin J. Jacobs, PhD, MSW, MS, MPH
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: The advent of the SARS-CoV-2 (COVID-19) pandemic has abruptly forced healthcare providers to embrace telemedicine as a necessary adjunct to routine healthcare. Studies completed prior to COVID-19 demonstrated that telemedicine, while underutilized, increased continuity of care, improved accessibility, decreased cost of care, and proved to be an effective method of communication. However, clinicians reported a loss of personal connection with their patients with virtual visits. Humanistic barriers such as the traditional and cultural expectation of patient physician encounters often include physical and empathetic touch which are impossible to meet through virtual visits. Scant published research is available addressing how patients and providers have reacted to this paradigm shift vis à vis continuity of care, patient-physician communication, and the role of physician's touch on patient care.

Objective: The purpose of this study is to explore telemedicine use and behaviors of patients seeking medical care during the COVID-19 pandemic.

Methods: Cross-sectional data were collected from 125 participants from the general population in the U.S. using an anonymous, online questionnaire posted on social media and via snowball sampling. The survey consisted of demographic items and validated measures regarding patient attitudes and expectations toward telehealth virtual medical visits during COVID-19 assessing 1) continuity of care, 2) patient-physician communication, and 3) verbal and nonverbal empathy. Descriptive data were analyzed, and Pearson Correlation test of independence was conducted using SPSS v.26. This study was approved by the Nova Southeastern University IRB.

Results: The mean age of the participants was 39 years (*SD*=17.33; range 20-78 years); 75.7% (*n*=87) identified as female, 23.4% (*n*=27) as male, and .8% (*n*=1) as 'other.' Most of the participants (*n*=82; 66.2% held a bachelor's or master's degree. The majority (*n*=101;80%) reported having seen a physician via virtual visits in their lifetime; 65.6% (*n*=82) reported using telemedicine for the first time (during the time of the COVID-19 pandemic). Nearly 50% (*n*=62) reported seeing their 'usual' physician via virtual visit and 52.8% (*n*=66) saw a new physician via telehealth during the pandemic. A Pearson correlation was calculated determining if believing your provider demonstrated verbal and nonverbal empathy during virtual visits (e.g., physician could view things from their perspective) was independent of having seen that same provider before (i.e., face-to-face). A weak but significant interaction was found (r=.287, p<.01), indicating that having seen their provider face-to-face is related to feeling their physician exhibited empathy during virtual visits. Also, having seen a physician using telemedicine prior to COVID- 19 was moderately correlated with positive attitudes toward telehealth as a viable option for continuity of care (r=.305, p<.01).

Conclusion: While we cannot assess cause and effect with this correlational study, most of the participants reported recognition of physician empathy during virtual visits after previously establishing an in-person patient physician relationship. The findings also suggest that positive attitudes of patients toward telemedicine may be positively correlated with virtual doctor visits. As telemedicine adoption increases, codifying new rules establishing the patient physician relationship within the virtual visit may be warranted.

Title: **The Effect of the Physician Payment Sunshine Act on General Industry Payments to General Orthopedic Surgeons from 2014-2019**
Authors: Joshua Gruber, OMS1; Johann Braithwaite, DO, PGY1; Nicholas Frane, DO, PGY5; Matthew Partan, DO, PGY3
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: The Physician Payment Sunshine Act (PPSA) went into effect in 2010 as an attempt to increase the transparency of relationships between physicians and industry. Many specialties, including orthopedic surgeons, have a long history of intimate relationships with companies in the medical industry. Following the implementation of the PPSA there was speculation that it would have an adverse effect on the physician – industry relationship. Although this was the expectation, there are no previous studies that evaluated the impact of the PPSA on relationships between general orthopedic surgeons and the industry.

Objective: This study set out to evaluate trends in general industry payments to general orthopedic surgeons from 2014 to 2019.

Methods: A retrospective review of the Center of Medicare and Medicaid Services' Open Payments Database was conducted to identify payments made to all general orthopedic surgeons from 2014 to 2019. The researchers analyzed yearly trends of total payments and subtype payments and conducted a regional analysis. The Jonckheere-Terpstra test was used to assess the overall trend in total median payments. Descriptive statistics include medians with interquartile ranges. $P<0.05$ was considered statistically significant.

Results: Between 2014-2019, a total of 1,330,543 payments amounting to $1.79 billion dollars was paid to 108,041 general orthopedic surgeons. During this time, the number of surgeons receiving payments increased along with a significant upwards trend in median payments per surgeon ($p<0.001$). While the top 25 percentile of general orthopedic surgeons received more than 95% of total payments, the bottom 25 percentile received less than 0.1% of total payments. With the exceptions of "Ownership or Investing Interests" ($p=0.657$) and "Royalty or License" ($p=0.517$), all types of general payments saw significant increases ($p<0.001$). Significant regional upward trends in median industry payments were also seen in the Midwest, Northeast, South, and West ($p<0.001$). Between 2014-2019 four of the top five companies in the orthopedic industry saw increases in their yearly payments.

Conclusion: Despite the increased transparency of physician-industry relationships brought about by the PPSA, general industry payments to general orthopedic surgeons continued to increase from 2014 to 2019 with a considerable disparity in payments between the highest paid and lowest paid surgeons.

Title: **COVID-19 and Pregnancy: Risk, Symptoms, Diagnosis, and Treatment**

Authors: Vera Hapshy, OMS2; Daniel Aziz, OMS4; Deepesh Khanna, PhD, MBBS, MPH, MBA, MS; Mayur Parmar, PhD, MS; Payal Kahar, PhD, MPH

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) is a novel virus responsible for causing an infection known as COVID-19. Several pulmonary and systemic manifestations of the illness have been described since the discovery of this virus. However, there have been higher-risk populations in which this infection has not been well studied nor documented. One of these populations includes the pregnant cohort. The unique physiologic changes in pregnancy which often mimic infectious and inflammatory etiologies are particularly concerning due to the vast array of symptoms caused by COVID-19.

Objective: The study objective was to describe the clinical manifestations of COVID-19 infection in the pregnant population and review the implications and sequelae of the infection throughout pregnancy and the outcomes of live births. Also, to understand the safety of current treatments and vaccination in pregnancy.

Methods: This study was designed as a comprehensive review using data previously gathered for patient care. A systematic literature review of the effects of COVID-19 on pregnancy was conducted by using online databases such as PubMed and MEDLINE. The data used in this study were selected using the following criteria: Publications on the effects of COVID-19 on pregnancy were eligible for inclusion in this systematic review. Studies were eligible only between January 1, 2020, and December 31, 2020, and comprised several case reports, case series, cohort studies, retrospective studies, and randomized clinical trials. The authors searched over 200 articles and used 45 publications related to pregnancy and COVID-19 infection.

Results: Findings regarding maternal morbidity included an increased risk of acquiring severe COVID-19 infection requiring a higher level of inpatient hospital care along with the increased risk of preterm labor and cesarean delivery. Neonatal COVID-19 vertical transmission was shown to have conflicting data as there was a presence of transmission in certain retrospective studies and absence in others. There was also no evidence of teratogenicity from maternal COVID-19 infection.

Conclusion: In conclusion, there is limited evidence to provide clear cut answers regarding recommendations for those at risk and infected with COVID-19 in the peripartum and antepartum period. Additionally, the evidence for this novel infection is conflicting and has not been in place long enough to truly assess the full length of pregnancy. However, in part due to the unique physiologic state of pregnancy and part due to unknown factors, pregnant patients are at increased risk for negative outcomes of COVID-19 infection and must be classified as a high-risk population.

Title: **Caretaker's Compliance with CDC Requirements for Childhood Vaccinations**
Authors: Alexander Hardy, DO, PGY1; Aline Pereira, DO, MBA, PGY1; Karla Objio, OMS3; Saulin Quan, DO, PGY3
Program: Palmetto General Hospital, Family Medicine Residency Program

Background: Compliance among vaccinations has the direct potential in preventing diseases, including cancer. Some vaccines are required to attend public schools, including DTaP, but others like HPV are not. The increase in vaccine hesitancy and refusal among caretakers may be due to the conflicts and ambiguities in the information they gather. Personal experiences with the disease, as well as religious and cultural beliefs, may also influence caretakers' decisions regarding vaccination.

Objective: The objective of this study was to examine the extent to which caretakers complied with the vaccination schedule recommended by the Centers for Disease Control (CDC).

Methods: This study was designed as a voluntary survey given to the caretakers of students enrolled in a rigorous private middle school for students qualifying for need-based scholarships in St. Petersburg, Florida. The survey was developed and administered anonymously to the entire student body (n=112). The caretaker's educational level comprised the independent variables. The dependent variables measured the caretaker's reporting of compliance with the following vaccinations: 1) Hepatitis A; 2) Hepatitis B; 3) Polio; 4) Pneumonia; 5) Pertussis; 6) DTaP [Diphtheria, Tetanus, and Pertussis]; 7) Chicken Pox [Varicella]; 8) Hib [*Haemophilus influenzae* type b]; and 9) HPV [Human Papillomavirus]. The analysis included descriptive statistics, and a Multivariate Analysis of Variance (MANOVA) was conducted to identify significant trends across groups.

Results: Fifty percent of the 112 caretakers who have a child attending Academy Preparatory School (AP) responded to the survey (N=56). Results indicate that 96% of caretakers reported that their child received the DTaP ($p< 0.02$), which is in sharp contrast to only 64% of caretakers having immunized their child against HPV ($p<0.01$). Additionally, our data identified that caretakers with a High School diploma or a General Education Development (GED) equivalent were less likely (88%) to vaccinate against DTaP compared to 100% of children with caretakers who have some degree of college education. Although not significant, the following are overall compliance percentages for the remaining vaccinations: 1) Hepatitis A (91%); 2) Hepatitis B (93%); 3) Polio (93%); 4) Pneumonia (84%); 5) Pertussis (80%); 6) Chickenpox (94%); and 7) Hib (71%).

Conclusion: HPV is the most commonly sexually transmitted infection and 79 million Americans are infected each year. Although many sexually active adults become infected at some point, the literature suggests that fifty percent of new infections occur among adolescents between the ages of 15 to 24. The American Academy of Pediatrics identified the need to encourage stronger provider recommendations for the HPV vaccination series, while simultaneously using effective communication strategies in order to reduce the number of missed clinical opportunities.

Title: **Genitourinary Complications in African American and Caucasian IBD Patients**
Authors: Jake Herbert, OMS3; Emily Teeter; Landen Burstiner, OMS3
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Inflammatory Bowel Diseases (IBD), like Ulcerative Colitis (UC) and Crohn's Disease (CD), are associated with numerous extra-intestinal manifestations (EIM). Commonly studied genitourinary (GU) EIM's found in Crohn's Disease include urolithiasis, urinary tract infections (UTI), and cystitis. The majority of literature reviewed for this study identifies an increased association of CD and urolithiasis against the general population. There is a paucity of studies comparing these rates of incidence in CD to those in UC. Furthermore, the rate of manifestation of GU comorbidities has also not been well characterized in cross-race analyses.

Objective: To establish the proliferation of common GU comorbidities in CD and UC and to further determine at what rate these affect the African American (AA) and Caucasian (CA) populations.

Methods: This is a retrospective cohort study using data collected from a research data base that included 6 integrated, tertiary healthcare facilities from 2012 to 2020. Electronic chart records for 3104 CA and AA IBD patients were reviewed for any incidence of urolithiasis, UTI, or cystitis via diagnosed ICD-10 codes. Comparison between data groups was made using t-tests and chi-squared tests.

Results: This study included 3,104 patients of which 38% were AA, 59% were female, and 45% were diagnosed with UC. Similar proportions of UC and CD patients developed urolithiasis (6.4% vs 6.5%, $p= 0.090$), while patients with UC were more likely to

develop UTI's or cystitis than those with CD regardless of race (12.4% vs 14.5%, p= 0.042; 4.2% vs 5.7%, p= 0.028, respectively). Additionally, the prevalence of urolithiasis was similar among AA and CA patients (5.4% vs 7.0%, p= 0.077) with AA's showing a higher risk of developing UTI's and cystitis (17.0% vs 11.1%, p= <0.001; 6.2% vs 4.0%, p= 0.003, respectively).

Conclusion: This study found that there were similar rates of urolithiasis formation in both UC and CD. Furthermore, these rates were not significantly different between AA and CA IBD populations. This could potentially represent that patients with UC have a similarly elevated risk of urolithiasis as those with CD. Further studies of patients with UC against a demographic-matched control cohort would help to clarify these findings. Conversely, the prevalence of UTI and cystitis was greater among UC patients and AA patients. African American patients with Ulcerative Colitis have a particularly high burden of genitourinary complications.

Title: **Parental Socioeconomic Stressors Influence Pediatric ADHD Prevalence: A Cross-Sectional Analysis on 2018-2019 NSCH Data**

Author: Jyothi Kakuturu, OMS3
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Attention Deficient Hyperactivity Disorder or ADHD is a neurological and developmental disorder that manifests in early childhood. Pediatric patients diagnosed with ADHD can be characterized by hyperactive, impulsivity and/or inattention symptoms and can experience marked social, behavioral, and cognitive impairments. Since, ADHD has a complex etiology of environmental, social, and genetic influences, identifying the risk factors are important to tackle this impairing and prevalent condition. Significant adverse childhood experiences from parent(s), parental income and insurance status are some of the ways to conceptualize and measure socio-economic status, which have been explored in this study.

Objective: To understand the association of adverse family events, parental income level, and insurance status on the prevalence of ADD/ADHD in the USA.

Methods: This study is a retrospective cross-sectional study analyzing the 2018-2019 data from National Survey of Children's health representing U.S. children's emotional and physical status reported by parents. Adverse childhood experiences (ACE), parental income and insurance status were selected to examine their association with ADHD prevalence among 3–17-year-olds. The primary outcome was currently having, had, or not having an ADD/ADHD diagnosis. A child was considered to have ACE exposure if parents said yes to divorce or separation, death, and/or incarceration of a parent or a guardian; witnessing violence at home, cohabitation with mentally ill, suicidal, or severely depressed, or with alcohol or drug abusers. ACE variable was further graded into having none, one, or two or more ACEs. Household income responses are stratified to 4 federal poverty levels (FPL): 0-99% FPL, 100-199% FPL, 200-399% FLP, or ≥400% FPL. Insurance status was categorized as having "adequate" or "inadequate" insurance. Data was analyzed and graphed using Python software and MS Excel. The differences between sample counts among the groups were carried out and compared using Chi-square test for independence and odds ratio. All statistical tests were considered significant at a level of 0.05 or less.

Results: Our final sample included 52939 children. The prevalence of currently having ADHD is 8.7%. Overall, of those with ADHD 16.9% had experienced two or more ACEs and 9.3% experienced only one ACE, compared to 5.6% who had no ACEs (OR = 2.46, 95% CI=2.32-2.61; $\chi 2$-test $p << 0.0001$). Increasing prevalence was also noted and significant ($p<0.05$) with decreasing income levels (OR=1.2; 95% CI=1.18-1.3; $\chi 2$ $p<<0.001$). Finally, the prevalence of ADHD was only 8.1% in insured compared to 9.9% in those who had inadequate insurance (OR=5.37, 95% CI=5.06-5.71; $\chi 2$ $p <<0.0001$).

Conclusion: The study tested the hypothesis that associations would exist between parental behaviors, insurance status and household income levels and prevalence. Through statistical control of covariates, parental self-reports of above exposures were positively correlated with parental reports of ADHD in their children. This demands vigorous public health and clinician efforts to address early detection and diagnosis of ADHD in children faced with difficult home conditions arising from parents.

Title: **Neck-to-Arm Tissue Dielectric Constant Ratios as Potential Indices of Lymphedema: Dependence on Subject Age**

Authors: Raj V. Kavadi, OMS2; Harvey N. Mayrovitz, PhD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: In 2020, the incidence of cancer cases is expected to top 1.8 million and about 600,000 lives will be lost. Head and neck lymphedema, which is a common complication of head and neck cancer treatment, can be present in 90 percent of head and neck cancer patients within the first 18 months post treatment. This lymphedema may cause difficulties swallowing, breathing, body image dissatisfaction, abnormal head and neck mobility, and impaired nutrient intake. Lymphedema has been evaluated with a variety of scales, visual inspection, tape measurements, and palpation techniques, all with quantitative limitations. A new method using tissue dielectric constant (TDC) measurements stands out as a potentially effective way of measuring localized external limb lymphedema due to its sensitivity to skin-to-fat water content. However, its use in assessing head and neck lymphedema has not been investigated. The goal of this research was to create a reference range of TDC measurements in healthy individuals that could then be compared to those of cancer patients suffering from head and neck lymphedema.

Objective: Due to various age groups that can present with lymphedema, the specific aim of this study was to determine if subject age has a significant influence on neck-to-arm TDC ratios in healthy individuals. For convenience, this index is herein referred to as NAI.

Methods: This study was an IRB approved observational study that took place in a university setting. TDC was measured with a hand-held non-invasive device (MoistureMeterD-Compact) in sixty healthy adults after they signed an approved consent form. Subjects were 18-83 years of age, had normal skin conditions, and affirmed they had no history of lymphedema. Excluded were subjects that had diabetes, significant facial or neck hair, skin lesions or implanted devices. Triplicate TDC measurements were made at two standard skin sites located on each side of the neck and at one location on each arm. The TDC value depends on the interaction of a 300MHz signal reflected from the skin from which its water dependent TDC value is calculated. NAI value were determined for each neck site and averaged to yield one NAI value per subject. The dependence of this value on subject age was evaluated using linear regression analysis with subject age as the independent variable. Values are reported as mean ± SD.

Results: The overall NAI value of the 60 subjects was 1.255 ± 0.248. Regression analysis revealed no significant dependence of subject NAI on subject age based on a Pearson correlation coefficient R-value of -0.112 with a p-value of 0.395.

Conclusion: Based on the present findings it is concluded that age per se is a non-factor in the determined neck-to-arm TDC ratio. This is fortuitous since if NAI is to be used as a reference comparison value to persons with head-and-neck lymphedema, then age need not be a significant consideration. With respect to the possible use of the ratio as a threshold for the presence of lymphedema, the present dataset provides such a reference. It is suggested that this threshold should initially use the overall mean of the healthy population herein studied plus 2.5 SD which for the present data would be a threshold of 1.75. This potential threshold needs to be assessed in a clinical population of patients with head-and-neck lymphedema.

Title: **Contribution of the Human Microbiome and Proteus Mirabilis to Onset and Progression of Rheumatoid Arthritis: Potential for Targeted Therapy**

Authors: Jessica Kerpez, OMS3; Michelle Demory Beckler, PhD; Marc M. Kesselman, DO
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

The human microbiome has been shown to play a role in the regulation of human health, behavior, and disease. Data suggests that microorganisms that co-evolved within humans have an enhanced ability to prevent the development of a large spectrum of immune-related disorders but may also lead to the onset of conditions when homeostasis is disrupted. In many conditions, a link between dysbiosis (microbial imbalance or microbiome upset) has been identified and associated with immune conditions such as rheumatoid arthritis (RA). This review provides insight into how an individual's unique microbiome, combined with a genetic predisposition and environmental factors may lead to the onset and progression of RA. While research efforts have been largely focused on *Porphyromonas gingivalis* in the generation of citrullinated products as a trigger in the onset and progression of RA, recent research efforts have also indicated that *Proteus mirabilis* may play a key role in the development of anti-citrullinated antibodies through shared epitope sequences IRRET and ESRRAL. Thus, this review also highlights how targeting dysbiosis with alternative approaches may help to reduce microbial resistance as well as potentially improve outcomes. Further investigation is needed to see if potential future treatments for RA could benefit from personalized medicine based on an individual's unique

microbiome.

Title: **Risk of Chronic Disease in Individuals Reporting Feeling Down, Depressed, or Hopeless**

Authors: Mohammed Khatib, OMS2; Nathan Badillo, OMS2; Payal Kahar, PhD, MPH; Deepesh Khanna, PhD, MBBS, MPH, MBA, MS

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Feeling down, depressed, or hopeless may provide a comprehensive measure for physicians to utilize, allowing them to quickly assess risk for chronic diseases.

Objective: The objective of this study was to assess risk of chronic disease in relation to feelings of depression.

Methods: A face-to-face, an in-home, validated survey was conducted on participants aged 16 and older. Trained interviewers administered the questionnaire through Computer-Assisted Personal Interview (CAPI) system. Through this measure responses such as feelings of depression, diagnosis of high cholesterol, high blood pressure, diabetes, asthma, being overweight, coronary heart disease, and cancer or malignancy were recorded.

Results: Data are presented as a mean ± SD and percentage. A total of 10560 individuals participated in the survey. Statistical analysis showed that out of the participants that have reported feeling down, depressed, or hopeless almost every day, 54.3% reported being told they had high blood pressure ($\chi 2$=116.108, p= 0.000), 44.1% with high cholesterol level ($\chi 2$=540893, p= 0.000), 22.9% had a doctor tell them they have diabetes ($\chi 2$=91.091, p= 0.000), 25.0% with Asthma ($\chi 2$=93.836, p= 0.000), 49.5% had a doctor tell them they were overweight ($\chi 2$=59.319, p= 0.000), 8.2% had coronary heart disease ($\chi 2$=32.390, p= 0.000), and 11.4% that had cancer or malignancy ($\chi 2$=7.732, p= 0.655). This is compared to individuals who reported no feelings of depression with 34.2% having high blood pressure, 32.2% with high cholesterol, 12.9% with diabetes, 14.1% told had asthma, 14.1% told they were overweight, 3.9% with coronary heart disease, and 9.4% who had cancer or malignancy. Individuals reporting feelings of depressions and poor appetite over several days had 34.9% having high blood pressure, 34.3% with high cholesterol, 13.6%with diabetes, 20% told they had asthma 40.1% told they were overweight, 3.9% with coronary heart disease, and 10.3 who had cancer or malignancy. Within Individuals who reported feelings of depression more than half the days, 46.8% had high blood pressure, 40.2% with high cholesterol, 15.3% with diabetes, 21.6% had asthma, 45.5% told they were overweight, 6.6% with coronary heart disease, and 9.9% who had cancer or malignancy.

Conclusion: The results of this study indicate that the assessment of feeling down, depressed, or hopeless is significantly associated with risk of certain chronic diseases. Individuals who have reported feeling depressed every day had more individuals reporting a diagnosis of high blood pressure, high cholesterol, diabetes, asthma, being overweight, and coronary heart disease. The results of this study can indicate the self-reported measure of feelings of depression can be useful in the clinical setting to assess both patient's risk for depression and for chronic disease. Further research can be conducted to assess the efficacy of measures for depression such as the PHQ-2 and PHQ-6 to assess risk of chronic disease risk.

Title: **The Effects of COVID-19 on Physicians Perceptions and Ability to Provide Care for Patients with Type II Diabetes Mellitus**

Authors: Shawn Kurian, MS, OMS2; Krisha Gupta, OMS2; Abbas Abidi, OMS2; Antony Aranyos, OMS2; Avidor Gerstenfeld, OMS2; Daniel Epstein, OMS2; Francis Demiraj, OMS2; Garry Berdichevskiy, OMS2; Liu Tianyi, OMS2; Nasser Assadi, OMS2; Robin J. Jacobs, PhD, MSW, MS, MPH

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: The SARS-CoV-2 (COVID-19) pandemic presents multiple, diverse challenges to providing appropriate medical care, with medication and treatment adherence to chronic diseases, such as type II diabetes mellitus (T2DM), among them. Pre-existing comorbidities, such as diabetes mellitus, seem to increase the risk of serious SARS-CoV-2 infection and lead to increased disease severity and possibly mortality. Patients with T2DM already face several different challenges to receiving appropriate medical care. The COVID-19 pandemic has further exacerbated these barriers by potentially forcing physicians to modify their treatment plans due to limitations on in-person visits and changes to patient financial and social support systems. It remains uncertain whether physicians

believe they can provide the same standard of care, using telehealth technology or otherwise, for their patients during the pandemic.

Objective: The goal of this study was to explore physician perceptions about their ability to provide care for patients with T2DM during COVID-19.

Methods: This cross-sectional study collected data 1/25/21-2/2/21 using an anonymous, self-administered online survey from DO/MD physicians/residents treating patient with T2DM. The survey, delivered via REDCap, collected data on participant demographics, attitudes, perceptions, knowledge, prior and current (COVID-19 era) experience with care for T2DM patients. Physicians registered with the Florida Department of Health with publicly available emails were invited to participate. This study was approved by the Nova Southeastern University Institutional Review Board. Descriptive statistical analyses were conducted using SPSS v.26. We report the preliminary results from 55 participants on an ongoing study.

Results: The mean age of the participants was 56.2 years (*SD*=10.13; range 31-74 years). Most of the participants practice in Florida. Only 14.5% (*n*=8) of participants reported that prior to COVID-19 up to 25% of their care was through telehealth; however, 50.9% (*n*=28) reported they currently (during COVID-19) provide up to 25% of their care through telehealth. Regarding patient care during COVID-19, 69.1% (*n*=38) reported they have been able to effectively monitor patients HbA1c levels; 69.1% (*n*=38) were able to have adequate visits with patients (face to face or telehealth visits); 63% (*n*=35) agreed or strongly agreed that a regular physical exam is necessary to properly treat patients with T2DM; and 56.5% (*n*=31) believed that telehealth is necessary to adequately treat patients with T2DM.

Conclusion: Preliminary results indicated that physician care via telehealth for patients with T2DM has increased during COVID-19. Moreover, they believed that telehealth was necessary for monitoring patients with T2DM and that it allowed for effective treatment. However, most agreed that in-person physical exams are required to properly treat patients with T2DM, which cannot be completed virtually. We anticipate collecting more data after which the results will be reported.

Title: **Posterior Tilt Predicts Failure in Garden I and II Femoral Neck Fractures**
Authors: Nicholas Lampasona, OMS3; Drew Papadelis, DO, PGY2
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Internal fixation with cannulated screws has long been the standard of care for Garden I and II femoral neck fractures. Complications however are not uncommon and failure rates of internal fixation in this fracture population can approach 20%. There is a paucity of evidence to support objective factors that can be attributed to this rate of failure. The posterior tilt angle has been recently discussed as a specific measurement to guide treatment in nondisplaced femoral neck fractures.

Objective: The aim of this literature review is to examine the evidence for or against posterior tilt as an independent predictor of failure in Garden I and II fracture patterns.

Methods: The posterior tilt angle is measured as an angle between the mid-column line and the radius-column line on a lateral radiograph. Through meta-analysis, this paper examines prospective and retrospective systematic reviews, cohort studies and case control studies and reports the data found.

Results: Increasing amount of posterior tilt angle can predict failure in patients with classified Garden I or II femoral neck fractures. Most literature has found significant correlation of fixation failure to posterior tilt angles at or above 20 degrees.

Conclusion: These results hold significance to orthopedic surgeons treating hip fractures, as posterior tilt is not factored into the Garden classification which classically guides treatment in femoral neck fractures. Failure of internal fixation for femoral neck fractures include fracture malunion, non-union, screw cut-out, loss of screw purchase and avascular necrosis, all which require subsequent operative intervention. Patients with these post-operative complications often undergo a subsequent surgery. Arthroplasty has been discussed as an alternative primary treatment plan with less risk of failure in patients with Garden I or II fractures with posterior tilt over 20 degrees. This may especially be relevant in elderly patients to prevent subsequent surgeries. The question of treatment plan in Garden I and II femoral neck fractures may come down to thorough preoperative assessment and patient lifestyle/expected lifespan consideration. Further research will help support or combat these findings and possibly incorporate posterior tilt into the Garden Classification system using the mid column and radius column lines as reliable evidence-based landmarks.

Title: **Factors Associated with Emotional Health in Osteopathic Medical Students During COVID-19**
Authors: Michelle Lanspa, MBA, OMS2; Robin J. Jacobs, PhD, MSW, MS, MPH
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: In March 2020, the World Health Organization declared the novel coronavirus disease 2019 (COVID-19) outbreak a pandemic. Due to the rapid spread, strong contagion, high incidence of lethality in severe cases, and the lack of a pharmaceutical prevention or cure, COVID-19 has posed a serious threat to human life and health. It has also had a tremendous impact on mental health, including fear and worry, difficulty sleeping or concentrating, and increased use of poor coping mechanisms. Osteopathic medical students have had additional concerns regarding the interruption of their studies, closing of clinical rotations, and postponed licensing exams. To date, few reports have focused on osteopathic medical students and their reactions to the outbreak.

Objective: To assess resilience, coping, health behaviors, and emotional wellbeing of osteopathic medical students during the onset of the COVID-19 pandemic.

Methods: In this cross-sectional study, we distributed an anonymous online survey to all medical students enrolled at Nova Southeastern University in May 2020 (N=1,310) via an e-mail invitation using the institution's student listservs. Our major study variables were based on published reports and anecdotal evidence; we subsequently developed the Emotional Wellbeing in Healthcare Professions Students Questionnaire (EWB-Q). This EWB-Q contained validated scales to assess the contribution of levels of coping strategies used, personal resilience, and health behaviors on the emotional wellbeing of osteopathic medical students. Multiple linear regression and other statistical analyses were conducted using SPSS v.26.

Results: Of the 1,310 students invited to participate, 335 (25.5**%**) surveys were returned. Of those, 133 had more than 33% of the necessary data missing and were removed, resulting in 202 (15.4**%**) completed questionnaires. The mean age of the participants was 26.7 years. About half (n=92; 45.5%) were in the clinical phase (years 3 and 4) of their medical school training (in rotations). A significant regression equation was found, $F(4,171) = 17.481$, $p < .000$, $R^2 = .290$, $R^{2\ \text{adjusted}} = .274$), indicating that levels of coping, personal resilience, and health behaviors (i.e., not sleeping more than usual, not exercising less than usual) accounted for a significant amount of the variance in emotional wellbeing scores in osteopathic medical students. Higher levels of resilience, greater use of coping strategies, not sleeping more than usual, and not exercising less than usual were predictors of emotional wellbeing.

Conclusion: Cultivating positive mental health should be a high priority for medical educators as they develop and implement curriculum-based initiatives to help medical students bolster their personal resilience and to encourage healthy coping behaviors during times of crisis and beyond. A proactive position that assists with building personal resilience and developing stress management habits is paramount in assisting students who are grappling not only with the challenges of rigorous medical training, but also with the uncertainty and stress that exists during any major global health or socioeconomic crisis.

Title: **Liquid Gastric Emptying of Preoperative Complex Carbohydrate Beverage**
Authors: Zachary Lin, OMS3; Gregory Kunis, OMS3; Joshua Berko, OMS3
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Overnight fasting has been routine practice to reduce aspiration risk before elective surgery. However, this routine has been challenged because fasting is uncomfortable and leaves patients metabolically unprepared for surgical stress. Recent anesthesiology guidelines now allow, and even encourage, patients to consume clear fluids until two hours prior to elective surgery. Despite these updated guidelines, patients are still routinely asked to undergo prolonged fasting periods before elective surgery for fear of increased aspiration risk.

Objective: The aim of the present study was to examine liquid gastric emptying of a preoperative complex carbohydrate, and to confirm safe gastric volumes at two hours after consumption.

Methods: Four healthy volunteers were given a 400 mL carbohydrate-rich drink (114 mOsm/kg, 12.5% carbohydrates) that contained a minimal amount of radioactive tracer (0.2 mL Tc99m sulfur colloid). Participants consumed the drink over a 5-minute period in a seated, upright position. Using a gamma camera (Infinia, GE Healthcare), static gastric images of participants were acquired

immediately following consumption of the drink, and at 45, 90 and 120 minutes. Blood samples were drawn immediately prior to consumption, and at 15, 30, 45, 60, 90,120, 150, and 180 minutes.

Results: Two hours after consumption, an average of 10.3 ± 4.2% (mean ± SEM) of isotope activity remained. Peak serum glucose (6.4 ± 0.4 mmol/L) and insulin (239.3 ± 55.7 pmol/L) concentrations were reached 30 minutes after consumption.

Conclusion: Healthy, fasted patients often have residual gastric volumes of up to 1.5 mL/kg without significant aspiration risk. With an average weight of 82.72 kg, participants' average residual volume could be as high as 124.1 mL without increased risk of aspiration. In this study, participants had an average of 10.3 ± 4.2% isotope activity remaining at two hours after consumption, indicating approximately 41.2 mL of gastric volumes. This is well below the expected residual gastric volumes of fasted individuals, and consistent with literature that confirmed safe preoperative gastric emptying of a fluid with similar composition. Additionally, 100% clearance of isotope activity is not expected in scintigraphic liquid gastric emptying studies because the sulfur colloid tracer may be left behind in gastric rugae or combine with new gastric secretions. Residual gastric volumes after consumption confirm this drink would not increase aspiration risk if administered according to the modern preoperative clear fluid fasting recommendation of two hours.

Title: **Proposal to Create the Florida Commission on Immunization Education**
Authors: Brittany Milo, OMS3; Samantha Rubin, OMS3; Christy Sanchez, OMS3; Patrick Frost, OMS3
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Physicians are seeing increasing numbers of parents who refuse to vaccinate their children, leading to outbreaks of vaccine-preventable diseases. In 2014, the Center for Disease Control estimated that among children born from 1994 to 2013, vaccinations would have prevented 322 million illnesses. Specifically, Florida has a vaccination rate of 93.5%. The five Florida counties with the lowest vaccination rates have an average of 90.5% compliance. Therefore, we have innovated the design of the Florida Commission on Immunization Education (FCIE) to allocate resources and funding towards educating parents about childhood vaccinations. Our meta-analysis involved 12 research papers including studies not only in Florida, but across the U.S. in states such as Ohio and Indiana. The FCIE will be composed of first having pediatricians provide video intervention on vaccine prevention, followed by a survey which is then completed at the 2-month well-child visit and assesses vaccination status. Second, a school nurse initiative to send letters home with students, notifying parents if they are not compliant with school immunization laws. Third, for school nurses to provide immunizations, with parental consent, to students. Fourth, to include personal stories and images of people affected by vaccine-preventable diseases in physician offices. One study recorded a rise in compliance from 66% in 2012 to over 99% in 2016, as a result of the school sending home informational letters with students. Additionally, having school nurses provide immunizations to students with parental consent increased compliance from 64% to 97%. Overall, our meta-analysis found that a wide array of education modalities increased the rates of vaccination compliance. The FCIE would decrease the rate of vaccine-preventable illnesses, as well as diminish the financial burden on Florida through a decrease in the utilization of health services for the treatment of patients suffering from such illnesses.

Title: **Osteopathic Medical Students Attitudes and Psychosocial Factors as Predictors of Perceived EMR Usefulness and Ease of Use**
Authors: Austin Moore, OMS2; Saleena Nasary, OMS2; Dana Pea, OMS2; Eliyah Pollak, OMS2; Kelsey Reinsch, OMS2; Michael Roth, OMS2; Jacob Scharf, OMS2; Karishma Sharma, OMS2; Lucia Soca Gallego, OMS2; Laurel Thomas, OMS2; Paige Webeler, OMS2; Robin J. Jacobs, PhD, MSW, MS, MPH
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Attitudes towards electronic medical records (EMR) may influence osteopathic medical students' (OMS) willingness to learn about these and other emerging technologies and successfully use them during graduate training; however, scarce information is available regarding students' attitudes that may facilitate or hinder their future proficiency in documenting patient care. One of the most widely used health information technology tools is electronic medical records (EMR), yet the issue of whether to grant students access to EMR is currently in question. The importance of its use in clinical practice is well-acknowledged in medicine, but perhaps not so much a part of the graduate medical education experience. This research addresses a gap in the medical education literature explicitly addressing students' perceptions of EMR use prior to graduate training.

Objective: The objective of this study was to assess what attitudinal and psychosocial factors predict OMS perceptions of usefulness/ease of use of EMR.

Methods: Cross-sectional data were collected from 604 OMS via an anonymous questionnaire using validated measures regarding attitudes toward their abilities to learn and interact with health information technology such as EMR. Under two major domains (attitudes and utilization), the following content areas were assessed: 1) perceived usefulness/ease of use of EMR (PU=PEOU), 2) attitudes toward mobile technology, 3) computer self-efficacy, and 4) flexibility. Data were analyzed using SPSS v.26. This study was approved by the Nova Southeastern University Institutional Review Board.

Results: The mean age of the participants was 25.4 years (SD=3.025; range 20-47 years); 48% were women. The majority (n=547; 90.6%) of the participants reported they did not major in computer science in any academic program prior to medical school. Multivariate linear regression modeling successfully explained the 24% of variance in predicting students' PU-PEOU (F (3,598) =62.639, p<.000, $R^{2(adj.)}$ =0.235. Students with greater computer self-efficacy, more flexible thinking, and higher acceptance of mobile technology use were more likely to perceive EMR software as useful and easy to use.

Conclusion: Findings from this study may help OMS understand the underpinnings of their perceptions about learning and using EMR to mitigate any ambiguity or misconceptions and better prepare them for clinical training. More research is needed to assess if innovative, tailored approaches to medical education that include fostering flexible thinking, promoting the use of mobile technology and enhancing computer self-efficacy could help demystify medical technology such as EMR. Policies surrounding student use of EMR should be revaluated to ensure future physicians are provided adequate training in patient care documentation.

Title: **DNSP-11 as a Therapeutic Agent for Dopaminergic Cell Survival: Role of Caspase-3/7 and ERK Dignaling**

Authors: Shreya Narain, OMS2; Kelsey Reinsch, OMS2; Michael Roth, OMS2; Jacob Scharf, OMS2; Karishma Sharma, OMS2; Lucia Soca Gallego, OMS2; Laurel Thomas, OMS2; Paige Webeler, OMS2; Jane E. Cavanaugh, PhD; Mayur S. Parmar, PhD, MS; Robin J. Jacobs, PhD, MSW, MS, MPH

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Glial cell-line derived neurotrophic factor (GDNF) has been shown to be a promising therapeutic molecule for the treatment of Parkinson's disease (PD). However, because of the failure of GDNF infusion in clinical trials, due to its poor bio-distribution, there was a need to develop other molecules with similar properties to GDNF that have improved bioavailability and administration. Dopamine neuron stimulating peptide-11 (DNSP-11) is a synthetic, amidated 11-amino acid neuroactive peptide derived from the human proGDNF domain. DNSP-11 has been shown to protect dopaminergic cells *in vitro* and restore dopaminergic activity *in vivo*. However, the neuroprotective effects of DNSP-11 against neurotoxin 6-hydroxydopamine (6-OHDA; mimic cellular toxicity observed in Parkinson's disease) have been elucidated in widely used human dopaminergic neuroblastoma SH-SY5Y cells. Also, the cellular mechanisms involved in DNSP-11 mediated protection has been not studied.

Objectives: This study objective was to evaluate the neuroprotective effects of GDNF and DNSP11 against 6-OHDA-induced toxicity in the human dopaminergic neuroblastoma SH-SY5Y cell line. In addition, to evaluate the modulation of neuroprotective MAPK/ERK (mitogen activated protein kinase / extracellular-signal-regulated kinase) signaling pathways by DNSP-11 *in vivo*.

Methods: The neuroprotective property of GNDP and DNSP-11 were determined by measuring the cell viability against neurotoxin 6-OHDA using cell viability assay. Modulation of the apoptotic pathway by GNDP and DNSP-11 was determined by caspase 3/7 activity assay. The modulation of neuroprotective MAPK-ERK signaling in dopaminergic brain regions by DNSP-11 was determine by performing western blot analysis.

Results: DNSP-11 reduced the 6-OHDA–induced increase in caspase-3/7 activity in SH-SY5Y cells at early time points, indicating possible protection against apoptosis. DNSP-11 also activated the cell survival signaling pathways, ERK1, 2, and 5 in SH-SY5Y cells. In addition, a single injection of DNSP-11 in the striatum of adult rat led to modulation of these ERK proteins in the substantia nigra. Overall, our results indicate that DNSP-11 protects human dopaminergic neuroblastoma cells against apoptotic cell death and activates neuroprotective ERK signaling pathways thereby suggesting its therapeutic potential against Parkinson's disease (PD).

Conclusion: This research suggests that DNSP-11 is a novel agent that needs further investigation to elucidate the potential benefits of conferring therapeutic benefits for preventing dopaminergic cell death, thereby, benefit Parkinson's disease patient.

Title: **Localized Effects of a Static Magnetic Field on Peripheral Pulse Properties: A Pilot Study**
Authors: Ovshay S. Ovshayev, OMS3; Aneil Tawakalzada, OMS2; Ted Frederic, OMS2; Harvey N. Mayrovitz, PhD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Static magnetic fields (SMF) produced by steady electric currents or by permanent magnets have been reported to impact several biological processes. One important possibility is its reported effects on blood flow with several interaction mechanisms being hypothesized to account for these. However, possible SMF effects on pulsatile properties of arterial blood flow, which are the dominant component of arterial blood flow, have yet to be investigated. Properties of peripheral pulses measured via finger photoplethysmography (PPG) have been studied in previous studies but the potential effect of localized magnet fields on these pulses has not been investigated. Such potential effects include those that might affect velocity of blood volume changes derived from the first derivative of PPG signals (dPPG/dt) perhaps related to both cardiac and vascular properties.

Objective: To investigate the effect of SMF on peripheral pulse properties.

Methods: Four male and four female medical students were evaluated during one, 60-minute session after they signed an approved consent form. Entry requirements were age 18-35, no skin conditions, and no use of vasoactive medications. Excluded were subjects with diabetes or implanted devices. With subject's supine one PPG sensor was placed on the right index finger and one was placed on the ipsilateral great toe. After a 15-minute control interval, data recording was begun for 45 continuous minutes. After 10 minutes of recording, a 5-minute pre-magnet interval was evaluated. Immediately thereafter one magnet was placed over the ulnar nerve and the other over the median nerve at the level of the wrist. Recording continued for 30 more minutes and three more 5-minute segments were analyzed starting at 5-15 and 25 minutes after magnet placement. During these intervals the PPG peak pulse amplitudes (Pmax) and the maximum rate of change (dP/dt) max were determined. The average of all pulses within each 5-minute intervals was evaluated via regression analysis with time as the independent variable to determine if there was a measurable change in pulse properties.

Results: As time (t, minutes) increased, finger pulse Pmax decreased relative to its pre-magnet exposure value. This change was expressible by linear regression as $Pmax=1.033-0.041t$, $r=0.986$, $p<0.001$. The maximum rate of change also decreased, and this was expressible as $(dP/dt)\ max=1.049-0.064t$, $r=0.973$, $p<0.001$. Toe pulse changes were equivocal with Pmax slightly decreasing and (dp/dt) max slightly increasing.

Conclusion: The decrease in both Pmax and (dP/dt) max is consistent with a possible static magnetic field effect operating via an effect on one or both of the underlying nerves (ulnar or median) or on the ulnar artery itself. However, because the design did not incorporate a specific time control, this pilot data is only suggestive of such a magnetically related effect. The study findings do support and warrant further investigation of such potential magnetic effects but would need to incorporate suitable simultaneously applied sham-magnets to the contralateral arm and the inclusion of a greater number of subjects.

Title: **Tissue Dielectric Constant Measurements to Assess Head-and-Neck Lymphedema: Dependence on Neck-to-Arm Ratios on Body Mass Index in Healthy Controls**
Authors: Ashini Patel, OMS2; Harvey N. Mayrovitz, PhD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Lymphedema due to cancer and its treatment, is a complication in breast, gynecological and head-and-neck cancers. Several methods can quantitatively assess limb lymphedema but there is a critical need for a method to conveniently and accurately assess head-and-neck lymphedema. Tissue dielectric constant (TDC) values which depend on localized tissue water are used to assess limb lymphedema but have not been used to assess head-and-neck lymphedema. The present work was undertaken to assess normal TDC ranges in healthy persons for future use in patients. Because such applications will be used on patients with a broad weight range, the specific aim here was to determine the dependency of key TDC values on body mass index (BMI). The focus on BMI is in part prompted by the fact that cancer-related lymphedema is impacted by BMI, possibly due to a connection with adipocytes hypertrophy and chronic inflammation.

Objective: The objective of this study is to determine the dependency of key TDC values on body mass index (BMI).

Methods: Sixty volunteer subjects (age 18-83 years, 32 females) with BMI range of 18.5 to 45.7 Kg/m^2 were recruited from medical students, staff and others and evaluated during a single session, after each subject signed a university approved informed consent. Absence of any skin condition or history of head-and-neck or arm lymphedema were entry requirements. Persons with diabetes, implanted wires or devices were excluded. Measurements were made with the subject seated. TDC was measured in triplicate, bilaterally at two standardized sites on the neck and one standardized site on the anterior forearm. Measurements were made by touching skin for about 5 seconds using a commercially available hand-held device (MoistureMeterD-Compact). This device measures TDC at 300 MHz to a depth of 2.0-2.5 mm using the principle of an open-ended transmission line. The correlation between each subject's BMI, the measured neck TDC values and the calculated neck-to-arm TDC ratios were evaluated using Pearson correlational analyses. BMI was calculated based on each subject's height and weight. The neck-to-arm TDC ratio herein used is a normalized parameter that is less likely to show subject to subject variability and provides a suitable neck arm index (NAI) to potentially set threshold values that when exceeded would define the presence of lymphedema.

Results: The overall average TDC of the four neck sites based on 240 site measurements was 37.4 ± 7.3 (mean ± SD) and for arm was 30.1 ± 4.7. Correlation coefficients based on each subject's average neck TDC value vs. that subjects BMI was not statistically significant ($r = 0.150$, $p=0.252$). However, there was a weak, but statistically significant inverse correlation between neck/arm TDC ratios and BMI ($r = -0.329$, $p=0.01$) with an average ratio of 1.25 ± 0.22.

Conclusions: The absence of a correlation between absolute TDC values and the weak negative correlation between neck-to-arm TDC ratios and subject BMI suggests that when this TDC ratio parameter (neck/arm) is used to detect early onset head-and-neck lymphedema or to track changes in such lymphedema with treatment, use of a correction factor for patient BMI or change in BMI is not a major consideration in interpreting such ratios.

Title: **Vaccination Rejection in Medicare Population**
Author: Darshak Patel, MD, PGY3
Program: Houston Medical Center, Family Medicine Residency Program

Background: There has been an alarming rate of vaccination rejection nationwide over the years, leading to the death of thousands that could have been prevented with vaccinations. In 2019 there was a Measles & Mumps outbreak, the reason for each outbreak was different. There are numerous reasons as to why the general population is rejecting vaccinations.

Objective: By conducting this survey this will enlighten us on as to why people are rejecting vaccinations. We can take that data to better educate the population on any misconceptions they may have about vaccinations and increase vaccination rates.

Methods: Vaccination questionnaire created by Dr. Patel has been provided to the wellness nurse at PFMC Ms. Lianne. At each wellness visit for the Medicare population Ms. Lianne goes over eligible vaccinations for the patient. If a patient declines a vaccination, she will ask the patient to take the questionnaire and store the survey. After 3 months the first round of data will be collected, and data analysis will begin. At 6 months the second round of data will be collected and will be analyzed. If there is insufficient data, will extend study to 9 months for more data to be collected.

Results: After nine months of data collections it became clear why the Medicare population was rejecting vaccinations. Data showed the number one reason for vaccine rejection was concerns of side effects, followed by what is the vaccine made up of and cost of vaccine. Smaller portion of the population identified other reasons for rejection such as doubtful of efficacy of the vaccine, scared of needles, & why get vaccinated if the patient is already healthy. Various reasons were identified for vaccination rejection by the population.

Conclusion: The study showed there are numerous reasons as to why the population is rejecting vaccinations. Several of those reasons with proper education from a trained medical provider can be clarified which should lead to increased vaccination rates. The goal is to increase vaccination rates by educating patients on misconceptions they may have so we can have global eradiation of viruses like polio which already exist in certain parts of the world.

Title: **Targeting Aging with Curcumin**
Authors: Harsh Patel, OMS2; Niyati Patel, OMS2; Heather Silverstein, OMS2; Bindu Mayi, PhD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: As we age, we increase our vulnerability to age-related diseases such as metabolic syndrome, obesity, and type II diabetes mellitus. We also see a rise in base-level inflammation which increases vulnerability to inflammatory disorders such as Alzheimer's disease, bone loss, fragility, chronic kidney disease, cancer, and cardiovascular disease. When addressed at the molecular level, aging has been shown to cause chronic activation of the innate immune system. Curcumin is naturally derived from the rhizome of the medicinal plant, *Curcuma longa*, a perennial herb in the family *Zingiberaceae*. Curcumin is the active ingredient of turmeric, a house-hold spice that has been in use in India for centuries for medicinal as well as culinary purposes. When first ingested, curcumin is metabolically inactive, but once metabolized, the oxidized byproducts attach to proteins involved with different diseases. Scientific data link curcumin and NF-kappa B (nuclear factor kappa-light-chain-enhancer of activated B cells; NF-kB) in addition to curcumin and IL-17 producing cells. IL-17 is produced by TH17, CD8+ cells, and some innate immune cells, with TH17 cells being the primary source of production. IL-17 functions to upregulate inflammatory gene expression and is a key cytokine that links T cell activation to neutrophil mobilization and activation. IL-17 can therefore mediate innate immunity or contribute to the pathogenesis of inflammatory diseases. IL-17 proinflammatory mechanisms include the activation and induction of NF-kB, as well as production of proinflammatory cytokines, chemokines, antimicrobial peptides, matrix metalloproteinases, and inflammatory effectors. NF-kB signaling pathway is the main regulator of inflammation-related signaling pathways.

Objective: Curcumin has pleotropic effects on NF-kB and IL-17 producing cells, this literature review's goal was to assess the impact of curcumin on aging, and consequently on age-associated diseases.

Methods: The data collected will be based upon results from various literature reviews.

Results: Testing of a novel microgranular curcumin formulation on human subjects showed that curcumin strongly and significantly decreases the serum level of IL-17 at one-hour post-ingestion. Studies point to the involvement of IL-17 in activation of NF-kB. Postmenopausal breast cancer in obese women can be attributed to inflammation associated with aging. At the outset of the pathophysiological process of this cancer, there is increased NF-kB binding activity along with elevated levels of other proinflammatory mediators and a key enzyme in the biosynthesis of estrogen in menopause, aromatase (estrogen synthase). This enzyme makes a strong link between inflammation, obesity, and an increased risk for hormone receptor-positive breast cancer. Lipolysis, which is increased in obesity, leads to increased concentrations of free fatty acids. Saturated fatty acids can trigger the activation of NF-kB in macrophages resulting in increased production of proinflammatory mediators which induce aromatase in preadipocytes. This increased activity of NF-kB can be modified by curcumin.

Conclusion: NF-kB signaling pathway is the main regulator of inflammation-related signaling pathways. Due to age-related, tissue-specific, brain inflammation regulated by NF-kB binding activity is increased with increased levels of proinflammatory mediators. Curcumin can modify the increased activity of NF-kB. The focus of this review is on turmeric/curcumin, as it is a compound that can be easily added to the diet of a person. The hope of this literature review is to corroborate the use of curcumin as a breakthrough therapeutic intervention in a variety of treatment options for age-related diseases.

Title: **Gastrointestinal and Vaginal Dysbiosis: A Catalyst for Neurodegenerative Diseases**
Authors: Shuchi Patel, OMS2; Eliyah Pollak, OMS2; Mayur S. Parmar, PhD, MS
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Neurodegenerative disorders (NDDs) are the second-leading cause of mortality around the world. These disorders are devastating and often debilitating diseases that consist of a complex network of primary and secondary injury processes. The secondary injury processes are centered mainly on inflammation and directly contribute to the severity of neurologic dysfunction and inversely to recovery. In recent studies, research has shown the causal relationship between specific gut bacteria and inflammatory responses leading to degradation of neural processes. The purpose of this study is to emphasize the prominent gut bacteria that are linked with neurodegenerative disorders and the underlying mechanisms of the innate immune system due to which these disorders occur.

Objectives: The current study will focus on understanding the role of the gut microbiota and its implication in neurodegenerative diseases.

Methods: The following search was first conducted in PubMed to determine which neurodegenerative diseases were associated with gut bacteria through all fields containing search words such as "neurodegenerative" AND "gut bacteria", "neural disorders" AND "gut microbes", "neurological disorders" AND "gut" AND "bacteria", "neural disorder" AND "gastrointestinal" AND "bacteria", "neurodegenerative" AND "gastrointestinal" AND "bacteria". This search exhibited the basis for potential diseases linked to gastrointestinal microbiota, thereby narrowing the preliminary search. The possible diseases included Alzheimer's disease, Parkinson's disease, and multiple sclerosis (MS). With the presented results, connections between specific neurodegenerative disorders and bacteria were outlined with a search like a statement above. These search words included the following: "Parkinson's disease" AND "gut bacteria", "Parkinson's disease" AND "gut microbes" and "Parkinson's disease" AND "gastrointestinal" AND "bacteria." To further narrow the search, additional studies that showed a recurrent association between a bacteria and neural disease were selected. For example, "Firmicutes" AND "Parkinson's disease". Searches were done on an identical basis for all three diseases with the following bacteria: Firmicutes, Bacteroidetes, Actinobacteria, Cyanobacteria, Fusobacteria, Proteobacteria, and Verrucomicrobia. All articles to date were considered. A similar search was conducted to associate findings with the vaginal microflora.

Results: Firmicutes and proteobacteria were found to be associated with AD, PD, and MS. Bacteroidetes and actinobacteria were associated with AD and MS. Cyanobacteria have been found in correlation to AD and PD. Fusobacteria were found in patients with MS. Verrucomicrobia was found in PD.

Conclusion: This research literature review presents an overarching summary of how alterations of the gut and vaginal microflora relate to the risk of developing neurodegenerative diseases. The literature pinpoints alterations in the gut, and the vaginal microbiome has a dominant role in the pathophysiology of NDDs, and the vaginal microbiome has a direct impact on the initial formation of the microbiome. In the future, dysbiosis could be tested as biomarkers in determining NDDs.

Title: **Transcriptional Changes in Peripheral Blood Mononuclear Cells of Men with Gulf War Illness in Response to Stress/Exercise**

Authors: Melanie Perez, OMS3; Oskar Zarnowski, OMS3; Derek Van Booven, MS; Leonor Sarria, MS; Fanny Collado, MS, RN; Kyle Hansotia; Sean Reigle; Tali Finger; Mary Ann Fletcher, PhD; Nancy G. Klimas, MD; Lubov Nathanson, PhD

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Gulf War Illness (GWI) is an idiopathic, complex, chronic, debilitating illness impacting many of the U.S. troops deployed the 1990-1991 Gulf War. The illness is characterized by medically unexplained fatigue. One hallmark symptom is post-exertional malaise as well as a spectrum of other symptoms affecting multiple organ systems. This spectrum suggests that ME/CFS is caused by an immune dysregulation with a genetic predisposition. As a result, diagnosis commonly relies on a process of elimination, rather than identification of specific biomarkers or unique biosignatures of disease activity. Treatment tends to be focused on alleviating presenting symptomatology as opposed to targeting fundamental biological processes.

Objectives: To identify changes in peripheral blood mononuclear cell (PBMC) transcriptomics in male GWI patients after exercise to help understand the currently unknown underlying mechanisms of disease.

Methods: In this study, we used RNA-seq to evaluate gene expression in the PBMCs of 19 male GWI patients and 20 matched (by sex, age, BMI) healthy controls post exercise. Blood draws after exercise were performed at the Miami VA Medical Center. After alignment using STAR, HISAT, and GSNAP, we used DESeq2 to evaluate differences in gene expression. We selected genes that were differentially expressed based on one of the following two criteria: either a fold change (FC) > |1.5| and false discovery rate (FDR) < 0.10 in one out of the three aligners and FC > |1.4| and FDR < 0.15 in the remaining two aligners, OR a FC > |1.5| and FDR < 0.10 in two out of three aligners. After significantly differentially expressed genes were determined, pathway analysis was performed using Metascape express analysis and further modified using Cibersort.

Results: *BRSK1* and *CLDND2* were under expressed in GWI patients at recovery compared to peak of exercise. At the same time *TMEM45B* was found to be overexpressed. Other genes of interest are *TNFSF9, IL1R2, IL1R1, CXCL2, CXCL8, CXCL4, CCR2, NFKBIA, and CXCL16,* which were all under-expressed in healthy controls. The healthy control (HC) group contained almost 600 genes, which were involved in multiple pathways pertaining to both immune and inflammatory functions. GWI patients did not have changed expression of these genes, indicating that GWI patients had only partial recovery from stress. The large number of immune and inflammatory related genes under expressed at recovery in HC, but not GWI patients, indicates a pathological response to exercise

recovery in GWI.

Conclusion: The marked dysregulation of signaling, immune, and inflammatory pathways we found in GWI patients post exercise supports the hypothesis that the symptomatology of the disease is largely due to chronic inflammation and immune dysfunction. Our findings provide insights into the molecular mechanisms of GWI onset/progression and pave the way for improved diagnostics and targeted therapeutic interventions.

Title: **Periodontal Flora and Neurodegenerative Disease: A Correlation**
Authors: Eliyah Pollak, OMS2; Shuchi Patel, OMS2; Mayur Parmar, PhD, MS
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: The adaptive immune response has shown to decline with age. As a result, the functions of the innate immune system tend to be amplified, thereby producing an exaggerated inflammatory response when an individual is exposed to antigens. Recent studies have examined the connection between the extent to which certain oral bacteria promote the activation of inflammatory cytokines, thereby influencing the development of neurodegenerative disease. This research literature review will highlight the prominent oral bacteria that are associated with brain disorders while also examining the possible mechanisms underlying the pathophysiology.

Objective: The objective is to investigate the available research literature about the role of various oral bacteria in neurodegenerative diseases.

Methods: The following search was first conducted in PubMed to determine which neurodegenerative diseases were associated with oral bacteria through search words such as “neurodegenerative disease(s)” AND “periodontal disease”, “Neurodegenerative disease(s)” AND “oral bacteria”, “neurodegenerative disease(s)’ AND “gingivitis”, “neurodegenerative disease(s)” AND “oral health”. This search provided the foundation for possible diseases linked to oral bacteria, thereby serving as a brief overview to base the succeeding searches. The diseases include Alzheimer’s Disease (AD), Parkinson’s Disease (PD, Amyotrophic Lateral Sclerosis (ALS), and stroke (hemorrhagic and ischemic cerebrovascular disease). Once associations were made between specific neurodegenerative diseases with an outline of their corresponding bacteria, an identical search was conducted as stated above that was specific to each neurodegenerative disease. These search words included the following: “Alzheimer’s disease” AND “periodontal disease”, “Alzheimer’s disease” AND “oral bacteria”, “Alzheimer’s disease” AND “gingivitis”, and “Alzheimer’s disease” AND “oral health”. This search provided the bacteria which were associated with each disease. Again, this method was performed for all four diseases previously mentioned. Additional articles which showed a frequent association between a bacterium and the neurodegenerative disease were selected. For example: “Aggregatibacter actinomycetemcomitans” AND " between a bacterium and the neurodegenerative disease was selected. For example: “Aggregatibacter actinomycetemcomitans” AND “Alzheimer’s disease”. Therefore, this search method was repeated across all four diseases for the following bacteria: Aggregatibacter actinomycetemcomitans, Porphyromanas gingivalis, Fusobacterium nucleatum, and Treponema denticola. There was no limitation regarding the publication date, as all possible articles were considered.

Results: Porphyromonas gingivalis was found to be associated with Alzheimer’s disease, Parkinson’s disease, Amyotrophic Lateral Sclerosis, and stroke (hemorrhagic and ischemic cerebrovascular disease). Additionally, Treponema denticola and Aggregatibacter actinomycetemcomitans were associated with both Alzheimer’s disease and stroke. Finally, Fusobacterium nucleatum was only associated with Alzheimer’s disease.

Conclusion: This research literature review provides a summary of the bacteria which are common among various neurodegenerative diseases. Knowledge of these bacteria will allow for a better understanding of disease pathophysiology by identifying possible risk factors.

Title: **The Impact of the COVID-19 Pandemic on Dry Eye and Contact Lens Utilization Authors**:
Ian Seddon, OMS3; Jillian Leibowitz, OMS3; Alokika Patel, OMS3; Chandra Mickles, OD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: The COVID-19 pandemic has had a significant impact on people's lives, changing daily routines and forcing interactions to become more virtual. Prolonging screen time as well as prolonged use of face masks have the potential to increase risk of dry eye symptoms due to increased air convection and evaporation of tears, leading to a dry ocular surface. However, the relationship between COVID-19 and dry eye symptoms has not yet been established. Although there is no evidence to assume that contact lens wearers are at an increased risk of infection by SARS-CoV-2, concerns that eyes are a potential entryway for infection and aid in viral transmission may have affected contact lens use during this period. Thus, the secondary aim of our study is to investigate contact lens utilization during the pandemic.

Objectives: The purpose of this research study is to assess the impact that the pandemic has had on ocular dryness, contact lens discomfort as well as contact lens utilization.

Methods: This IRB-approved study was designed as a one-time anonymous survey electronically distributed to Nova Southeastern University (NSU) students and NSU optometry clinic patients who were at least 18 years of age. All survey data was collected through REDCap, a secure online web application to store and analyze data. Our survey consisted of a demographic section, a contact lens section, and a dry eye section. The contact lens section assessed contact lens usage, stratifying among hours per day, days per week, and type of contact lens worn. The dry eye section assessed participant ocular symptoms, consisting of questions taken from the Ocular Surface Disease Index (OSDI) validated questionnaire. Each section was comprised of pre-pandemic and post-pandemic (peak quarantine) questions. Peak quarantine was specified as March 1st -September 30th, 2020 for this study. There are currently 207 completed surveys.

Results: Currently, out of the 207 completed surveys, there are 140 contact lens wearers. Our data indicates that contact lens usage significantly declined once the COVID-19 pandemic began, with the majority of participants decreasing their usage from 7 days per week to only 1 day per week. Similarly, before the pandemic the majority of participants wore contacts 12-18 hours, while during peak quarantine the majority of contact wearers wore them only 6-12 hours per day. Interestingly, 79% of participants plan to increase their contact lens time to pre-pandemic levels once the COVID-19 pandemic ends. Preliminary analysis has revealed no significant differences in dry eye symptoms when comparing pre-pandemic symptoms to during quarantine symptoms.

Conclusion: This research aims to obtain information that can be used by optometrists and ophthalmologists to improve their understanding on how the COVID-19 pandemic has affected their patients. Based on our results thus far, although there was a decline in overall contact lens usage during peak quarantine due to decreased need, a large percentage of the participants noted that they would resume prior usage as the pandemic slowly resolves.

Title: **Whole-Genome Sequence and Assembly of Multi-Drug Resistant Pseudomonas Aeruginosa Isolate**
Authors: Sameer Shaikh, OMS1; Ricardo Obando, DMD; Vanessa Aguiar-Pulido, PhD; Hansi Kumari, PhD; Mehul Jani, PhD; Giri Narasimhan, PhD; Kalai Mathee, PhD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: The unprecedented surge of antimicrobial resistance (AMR) in bacteria is a major global threat to public health. One of the clinically critical AMR organisms is a Gram-negative *Pseudomonas aeruginosa* bacterium. This leading opportunistic pathogen exhibits a multitude of virulence factors and is extraordinarily resistant to a gamut of clinically significant antibiotics. It is also one of the leading pathogens in morbidity and mortality rates in Cystic Fibrosis patients. Its ubiquity in nature and its ability to adapt to its environmental niche has led it to become one of the most prevalent nosocomial infections in the world. In this study, the genome of an extremely resistant *P. aeruginosa* isolate from a bacteremia patient, CDN118, was analyzed. It is not well understood how CDN118 became extraordinarily resistant to antibiotics.

Objective: This study aims to sequence and assemble *P. aeruginosa* strain CDN118 in efforts to understand how it became extremely resistant to antibiotics.

Methods: Strain CDN118 was isolated from Lagos State University Teaching Hospital in Ikeja, Nigeria, where it was extracted from a bacteremia patient. The strain resistance profile was then compared to a common laboratory strain PA01. After collecting the

minimum inhibitory concentration, the DNA sequence was then generated using a hybrid of Illumina and PacBio platforms. This novel approach helped generate a sequence assembly of one single complete genome. Annotations of the genome were then manually combined and curated by using two platforms, RAST and Prokka. A comparative genomic analysis was taken place against two prototypic sequenced *P. aeruginosa* strains, namely PA01 and PA14, to understand how CDN118 differed from other genomes. MAUVE's analysis provided greater insight into CDN118 novel findings for which polymerase chain reaction (PCR) was run to confirm the presence of a unique discovery. In tandem, PA14 was used as control. Regions of the CDN118 genome were also analyzed for genomic islands (GIs) where AMR genes were found. GIs were predicted using several GI prediction tools. A GC-map finally provided regions showing the percentage of GC content, which were plotted by CGview. This experimental research study was approved by the IRB.

Results: The hybrid sequencing and assembly platforms generated a complete genome of 6.8 Megabase pairs (Mbp) for CDN118. Within the genome, a total of 52 GIs were identified. Among these GIs, two had shown to harbor a multitude of resistance determinates that included aminoglycosides, spectinomycin's, streptomycin's, trimethoprim, bacillomyxin, β -lactams, sulfonamide, mercury, and tetracycline. Further comparative analysis had pinpointed out that between these two GIs was the presence of a 1.1 Mbp inversion. This inversion was confirmed through PCR and is known to be a novel finding.

Conclusion: The sequencing and assembly of the Nigerian *P. aeruginosa* CDN118 isolate provided insight into why it is extremely resistant to antibiotics. This is due significantly to the presence of GIs, which contained many genes that confer multi-drug resistance. The genome had also revealed a large novel inversion, which had shown to be flanked by two islands. This discovery would need to be analyzed as to why this inversion had occurred.

Title: **Finger Skin Blood Perfusion During Exposure of Ulnar and Median Nerves to a Concentric Multipole Magnet: A Pilot Study**

Authors: Elham Shams, MS, OMS1; Andrea Astudillo, MS, OMS1; Harvey Mayrovitz, PhD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Understanding the biological effects of static magnetic fields (SMF) remains an important and continuing effort. Although many possible uses of SMF-therapy have been previously described the present focus is on the possible role of SMF as a modulator of skin blood perfusion (SBP). Because some patients experience lack of circulation to digits of the hands, such an intervention might be useful in such cases to increase skin blood perfusion.

Objective: To investigate if a rare-earth concentric multipole magnet would alter finger SBP.

Methods: This was a randomized double-blind pilot study in which six male and six female subjects with age and body mass index (mean ± SD) of 26.0 ± 1.4 years and 23.2 ± 2.3 Kg/m^2 participated. They were evaluated during a single session after signing an approved Institutional Review Board consent form. Subjects were recruited from medical students and staff at NSU. To participate subjects needed to be 18-35 years with no abnormal skin conditions and not taking vasoactive medications. Persons excluded were those with diabetes or with implanted wires or devices. With a subject supine, a laser-Doppler probe was affixed to the 4^{th} finger of both hands and SBP recorded for 45 minutes. After 15 minutes of recording, a magnet was put overlying ulnar and median nerves at the wrist on one arm and sham magnets put at corresponding sites on the other arm. SMF's of the magnets was 0.28T perpendicular and 0.20T tangential at two mm from the magnet surface. Investigators and subjects were blinded to which arm was exposed to magnets and shams. Time-averaged SBF (arbitrary-units) was evaluated for each 5-minute interval of the 45-minute experiment. Tests for overall SBF differences among sequential intervals for each finger was done with the Friedman nonparametric test. Tests for possible differences between sham and magnet exposed sides was done by calculating the difference between sides for each interval and then testing for overall differences among them with the Friedman test. A p-value <0.05 was deemed evidence of a statistically significant difference.

Results: Magnet and sham side SBP values prior to device placement were 0.568 ± 0.128 vs. 0.644 ± 0.115, p=0.859 and during device placement 0.627 ± 0.135 vs. 0.645 ± 0.117, p = 0.857. Based on the Friedman test for related samples, there was no statistically significant difference in finger SBF among temporal intervals for either sham or magnet exposed sides. Chi-Square and significance values for the sham exposed side was 11.9 and 0.15 respectively. Values for the magnet exposed side was 4.7 and 0.78. No statistical difference was found between sham and magnet exposed sides (Chi-Square = 9.3 and significance = 0.32).

Conclusion: The present findings have failed to uncover any significant effects of the magnet's static magnetic field on skin blood perfusion in the young healthy adult population evaluated when ulnar and median nerves and ulnar artery were exposed to the field of

the magnets employed. Its potential for altering blood perfusion in a larger sample size or in more mature persons or those with underlying conditions affecting blood perfusion have not been evaluated but represent the next target of research inquiry.

Title: **A Qualitative Exploration of First-Year Medical Students Perceptions of Their Research Abilities and Skills**

Authors: Gong Shao, OMS2; William Tedjo, OMS2; Robin J. Jacobs, PhD, MSW, MS, MPH
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: An observed decrease of osteopathic physician scientists in medical practice has generated much interest in increasing the exposure of research programs in medical school. Osteopathic medical students' (OMS) research confidence in their ability to conduct research has been speculated to be a significant factor influencing successful engagement of research. Given the demands and competing interests of formulating an undergraduate medical curriculum and results of attitudes of learners during medical training, it appears pivotal to investigate factors that promote student research during the undergraduate years.

Objective: The objective of this study was to investigate first-year OMS experience and attitudes towards learning about and conducting research and their perceived goals and barriers to such endeavors during their undergraduate osteopathic medical training.

Methods: Three focus groups were conducted with 30 first year OMS via Zoom in October 2020. Pertinent published studies, anecdotal evidence, and findings from our previous studies with OMS guided the creation of the interview guide which consisted of open-ended questions designed to elicit rich descriptions to assess student attitudes towards research. An inductive thematic analysis (ITA) was conducted to allow for the patterns, themes, and categories of analysis to emerge and to reveal data about participants' views, opinions, knowledge, experiences, or values that may not be captured in quantitative assessments. Content from the interviews were coded by the researchers and cross referenced to uncover and evaluate emergent themes. Using an iterative process, the coded data were organized into themes. This study was approved by the Nova Southeastern University Institutional Review Board.

Results: All the participants were interested in learning about and conducting research while in medical school, but most reported low confidence in doing so. However, if directed how to do certain tasks they would be able to accomplish them, the felt sure they could do it. Some participants were unclear what research entailed, having experience only through assisting faculty with ongoing lab work during their bachelor's program. Others commented that understanding research might make them better physicians. The major themes that emerged from the interviews related to attitudes, knowledge, self-rated ability to conduct research, and barriers to doing research in medical school include: (1) competing priorities, (2) low confidence in conducting research, 3) time constraints, (4) research not part of the curriculum, and (5) difficulty finding accessible research mentors with compatible interests.

Conclusion: Findings from this study may help osteopathic medical educators better understand which attitudes and beliefs (e.g., perceived ability and knowledge to conduct research) are prevalent among first year OMS. Incorporating innovative curricular strategies to help students understand the relevance of research and how it impacts daily medical practice may be warranted. To develop the next generation of osteopathic physicians who will think critically, practice evidence-based medicine, participate in meaningful and ethical research, and pose thoughtful questions as life-long learners to enhance the care of patients, more thought needs to be given to how best to engage students in research early by implementing research curricula and opportunities for students to conduct their own research during the preclinical phase of medical training.

Title: **COVID-19 Cases Per Capita in Broward and Miami-Dade County, Florida Zip Codes as Based on Per Capita Income**

Authors: Jarrod Sheehan, OMS2; Lindsey Taylor, MBA, OMS2; Aysha J.M. Nuhuman; Rushil Nakhre, OMS2; Ariel Paz, MPH, OMS2; Brian Zacharias, OMS2; Erica Pieper, OMS2; Monica Tromer, OMS2; Isaac Wilks, OMS2; Iman Squires, OMS2; Radleigh Santos, PhD; Robin J. Jacobs, PhD, MSW, MS, MPH
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Socioeconomic status is an established predictor of infection rates and mortality disparities associated with pandemics, such as the 2003 SARS-CoV and 2009 H1N1 pandemics. The recent COVID-19 pandemic does not seem to be unique in this respect. Recent reports on the U.S. population have linked lower income as a risk factor for contracting the virus. South Florida, in particular

Broward and Miami-Dade counties, have a significant population suffering from poverty. Considering the findings of previous novel health crises as well as the national findings of the current pandemic, investigating the effect of income on COVID-19 infection rates in Broward and Miami-Dade counties might help officials better identify and treat those at increased risk.

Objectives: To determine the relationship between per capita income and COVID-19 cases in Broward and Miami-Dade County.

Methods: This retrospective cross-sectional study used data gathered by the Florida Department of Health and 2018 U.S. Census. COVID-19 cases (from 3/2/2020 through 11/1/2020) were tallied by zip code in Broward and Miami-Dade County and scaled per capita. An exhaustive regression analysis was performed using dependent variables of county, race, sex, median age, and estimated per capita income as from 2018 Census Data was performed for each combination of independent variables in MATLAB. Each potential model was evaluated using both adjusted R-squared and Akaike Information Criterion, which indicates if the data was the least likely to result in-sample prediction error.

Results: The following model had the lowest Akaike Information Criterion along with the near-highest adjusted R-squared and near-highest number of significant predictors: COVID19 Cases = - 0.1021 + 0.0730 (Black or African American) + 0.0870 (Hispanic or Latino) + 0.0601 (Male to Female Ratio) + 0.0011 (Median Age). The adjusted R-squared of this model was 0.2192. Using this predictive model, an increase in one Black or African American person per 1,000 total population resulted in an expected increase of 73.00 cases of COVID-19 per 1 million people, with a 95% C.I. of (34.50, 111.50). An increase in one Hispanic or Latino person per 1,000 total population resulted in an expected increase of 87.00 cases of COVID-19 per 1 million people, with a 95% C.I. of (59.40, 114.60). An increase in 0.1 of Male- to-Female ratio resulted in an expected increase of 60.10 cases of COVID-19 per 1 million people, with a 95% C.I. of (15.40, 104.90). An increase in one year in the Median Age resulted in an expected increase of 1.10 cases of COVID-19 per 1 million people, with a 95% C.I. of (0.00, 2.20). Per capita income and county based on individual population data was not statistically significant in any model tested.

Conclusion: The results of this study highlight that both racial and gender disparities may contribute significantly more to the number of COVID-19 cases than per capita income alone. Based on these pilot study results investigators should consider applying this model and, similar variables for future pandemics.

Title: **Ensuring Representation of Underserved Populations in COVID-19 Long Hauler Study**

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Program: Community Health of South Florida, Psychiatry Residency Program

Background: Long term sequela of infection with SARS-CoV-2 or COVID-19 are increasingly documented in the literature and often include symptoms similar to those of myalgic encephalomyelitis/ chronic fatigue syndrome (ME/CFS) including persistent fatigue, diffuse myalgia, cognitive difficulty, symptoms of depression, and non-restorative sleep. A large population cohort study is in development in South Florida to assess the frequency and severity of these symptoms post-infection. As the study protocol is developed, investigators are committee to enrolling a diverse sample, including people from lower socioeconomic status and minority populations who are disproportionately affected by COVID-19. These populations often face barriers to research not experienced by other populations. Addressing such barriers to enrolling underserved populations in relevant and timely research requires recruitment strategies that are designed to meet the cultural and logistical needs of the target population. In this abstract, we describe a recruitment approach that was informed by residents at a Teaching Health Center, one study recruitment site for the COVID-UPP study.

Objectives: Identify barriers and strategies to recruitment among a racially/ethnically diverse population who tested positive for COVID-19 and who continue to report symptoms of ME/CFS at three to four months post-infection.

Methods: The COVID-UPP study was designed to recruit people who tested positive with COVID-19 from several sources including the Florida Department of Health during surveillance database, provider offices and a large Federally Qualified Health Center (FQHC) in Miami-Florida who provide care to medically underserved and racially and ethnically diverse populations. At the FQHC, the protocol included resident physicians contacting people who tested positive with COVID-19 at three to four months post-infection to assess interest in completing an on-line screen to determine eligibility and interest in participating in a three-year longitudinal cohort study with a companion phenotype study. During training of resident physicians who would conduct outreach calls to patients, resident physicians and the attending physician identified several important recruitment strategies that should be implemented to support enrollment of a diverse population of participants. Over the next several weeks, the study team worked to integrate the outlined strategies.

Results: Barriers identified included distrust participating in research, health literacy, language barriers and transportation barriers. To address distrust with participating in research, resident physicians will contact potential participants via phone, utilizing a script developed by the survey team and refined during role-playing. Study materials and assessments were developed and selected with intention to be simple and in plain language to address participants with low health literacy. In addition, bilingual research coordinators who will be available via telephone. Language barriers will be addressed through a Spanish assessment platform developed through a modified WHO back-forth translation process, conducted by medical and public health students. Transportation barriers will be addressed through travel to the study site via Uber/Lyft as appropriate.

Conclusion: To improve generalizability of COVID-19 research, including the COVID-UPP study, research methods should incorporate recruitment strategies that address barriers unique to minority and underserved population who are disproportionally affected by the disease.

Title: **Human Trafficking Training for Graduate Healthcare Professions Students via Zoom: Results on Preparing Students for Clinical Action**

Authors: Jason Sreedhar, MS, MPH, OMS2; Michelle Lanspa, MBA, OMS2; Colleen Gorman, MS, OMS2; Jacquelyn Orr, OMS2; Robin J. Jacobs, PhD, MSW, MS, MPH

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Human trafficking (HT) entails recruitment, transportation, harboring, or receipt of persons by force, fraud, coercion, or other deceptive and/or threatening measures. HT victims are primarily used for the purposes of forced labor, commercial sexual activity, or organ donation. The International Labor Organization estimates that there are approximately 40.3 million HT victims globally, including over 10 million children. Moreover, Florida ranks third highest of all U.S. states in reported HT cases. Although HT awareness campaigns in Florida and the U.S. have increased awareness of the issue among the public, academic, and healthcare communities, studies show that healthcare professionals (HCP) and future HCP are still unclear about actionable best practices for identifying and assisting victims of HT. As such, 88% of trafficking victims in the U.S. are not correctly identified when seeking services from HCP.

Objectives: The goal of this study was to assess whether a brief, online, synchronous HT training guided by osteopathic principles would impact HT knowledge, comfort with best clinical practices, and adherence to service delivery guidelines in HCP students.

Methods: Based on the osteopathic medicine principle of holism (i.e., a "whole-person approach"), a 90-minute online synchronous multi-media training, developed by the researchers in collaboration with local HT victim advocacy organizations, was offered to HCP students via Zoom in November 2020. Based on professional guidelines from trafficking experts, content was organized under 3 domains: 1) self-reported comfort with HT service delivery, 2) knowledge about HT best clinical practices (i.e., support through trauma-informed care, optimal service delivery, documentation, and specific action items), and 3) HT epidemiological facts. The training incorporating facts, experiences, anecdotes, videos, and case studies to educate participants about HT, with emphasis on trafficking in the United States and Florida. Pre- and post-assessments were administered before and immediately after the live training via REDCap data management software. Using SPSS v.26, descriptive statistics, independent sample *t*-tests, and chi square analyses were used to explore differences between pre- and post-training assessment scores in the 3 domains. This study was approved by the Nova Southeastern University Institutional Review Board.

Results: The HT training was completed by 187 HPS from (primarily) osteopathic medicine, pharmacy, and nursing programs at Nova Southeastern University. Most participants were women (N=154; 82.4%). Twenty-four participants (12.8%) reported they had a patient disclose a history of trauma/abuse. Post-test results showed that participants scored statistically significantly higher in all domains: comfort with HT service delivery (p <.01), knowledge about HT best clinical practices (p < .05), and 8 of the 10 HT fact items (p < .05).

Conclusion: Findings from this pilot study indicate that a synchronous, online training to increase knowledge of and improve comfort with HT practice guidelines for trauma-informed care may prove useful, particularly in training health professions students. Given the increasing incidence of HT, the ubiquitous nature of online education, and the promising results of this pilot, a larger efficacy and feasibility study of this HT training may be warranted.

Title: **The Relationship Between Per Capita Income and COVID-19 Cases per Housing Unit in Broward and Miami-Dade County, Florida**

Authors: Lindsey Taylor, MBA, OMS2; Jarrod Sheehan, OMS2; Ariel Paz, MPH, OMS2; Aysha J.M. Nuhuman; Rushil Nakhre, OMS2; Monica Tromer, OMS2; Brian Zacharias, OMS2; Erica Pieper, OMS2; Isaac Wilks, OMS2; Iman Squires, OMS2; Radleigh Santos, PhD; Robin J. Jacobs, PhD, MSW, MS, MPH

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Background: Low socioeconomic status predisposes individuals to worse health outcomes as seen in both the 2003 SARS-CoV pandemic and the 2009 H1N1 influenza pandemic, during which poorer individuals were more likely to contract each disease. Additionally, a recent study found that deaths due to COVID-19 were associated with poorer areas across the United States. South Florida, in particular Broward and Miami-Dade counties, has experienced a significant burden of coronavirus cases, with about 270,000 reported during the first eight months of the pandemic. Investigating the effect of income on coronavirus cases in Broward and Miami-Dade counties may aid in identifying and treating those individuals at increased risk.

Objective: To determine the relationship between per capita income and COVID-19 cases in Broward and Miami-Dade counties.

Methods: This retrospective cross-sectional study used data gathered by the Florida Department of Health and 2018 U.S. Census. COVID-19 cases (from March 2-November 1, 2020) were tallied by zip code in Florida's Broward and Miami-Dade counties and scaled per housing unit. An exhaustive regression analysis using county (Miami-Dade or Broward), sex, race, ethnicity, median age, and estimated per capita income was performed for each combination of independent variables in MATLAB. Each model was evaluated using both adjusted R-squared and Akaike Information Criterion, along with the number of significant predictors.

Results: The optimal regression model chosen included sex, race, and ethnicity as the variables that best predicted COVID-19 cases per housing unit within a certain zip code. The adjusted R-squared of this model was 0.5062, indicating that within each zip code in Broward and Miami-Dade counties 50.62% of the variance in COVID-19 cases per housing unit can be explained by these variables. A significant relationship was found between the number of COVID-19 cases and individuals who were Black or African American ($p < 0.001$), individuals who were Hispanic or Latino ($p < 0.001$), and male to female ratio ($p = 0.016$). Per capita income and county were not statistically significant predictors in any model tested.

Conclusion: Results from this study highlight that racial and gender disparities may be more significant contributors to COVID-19 cases than per capita income in housing units. Based on these pilot study results investigators may consider applying this model to similar variables in order to inform the management and prevention of cases in present and future pandemics.

Title: **An Overview of Intrauterine Surgeries for Hypoplastic Left Heart Syndrome, Congenital Diaphragmatic Hernia, and Multifetal Pregnancies Emphasizing Change Over Time and Impact on Neonate Mortality and Prematurity**

Authors: Laurel Thomas, OMS2; Paige Webeler, OMS2; Laura Vanegas, OMS2; Suzanne Riskin, MD

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Neonatal care in the United States has been progressing rapidly since the 1960's. While the percentage of neonatal mortality is low, neonates with congenital conditions are at increased risk of prematurity and death. To combat this mortality risk, intrauterine surgery was developed. The first intrauterine surgery in humans was performed in 1981. From this landmark event, intrauterine surgery has grown into a diverse field that addresses numerous developmental problems in utero. This surgery can be lifesaving for fetuses with deleterious conditions. If successful, the repair of these anomalies can allow development of the fetus to occur normally. However, fetal surgery is not without risk, primarily premature birth.

Objective: To discuss the developments in intrauterine surgeries, namely for hypoplastic left heart syndrome, congenital diaphragmatic hernia, and multifetal pregnancies, over time and how their use has impacted neonate survival and prematurity.

Methods: PubMed was searched for articles between 1980 - 2020 with search criteria of (survival OR mortality OR viability) AND (neonate OR infant OR premature) AND (fetus surgery OR intrauterine surgery OR intrautero surgery). Following the output of 1,676 articles, each abstract was reviewed for relevance to the objective, which led to a reduction to 106 articles.

Results: Treatment for hypoplastic left heart syndrome is traditionally 3 successive post birth surgeries. Currently, intrauterine aortic valvuloplasty is being conducted at tertiary hospitals and shows improving survival and biventricular conversion rates. Original procedures aimed at repairing Congenital Diaphragmatic Hernias via primary closure yielded high rates of postoperative preterm labor, prematurity, and mortality. Over the past few decades, advancements in the Fetoscopic Endoluminal Tracheal Occlusion (FETO) aimed to mitigate the odds of these negative outcomes, yet prematurity still remains a major procedural risk. One important cause of multifetal pregnancy risk has to do with unequal distribution of blood supply to the fetuses. An example of this complication is Twin to Twin Transfusion Syndrome. Surgical treatments such as endoscopic laser ablation, bipolar cord coagulation, and Multifetal Pregnancy Reduction have been developed to combat the risks accompanying multifetal pregnancy.

Conclusion: Due to the small sample size of fetal surgical procedures, there is limited data on outcomes. Over time the success rate in utero and neonatal survival has increased, primarily due to better selection criteria of fetuses for surgery, improved technique by experienced surgeons, and minimally invasive approaches. With the advances in care that have led to an increased survival rate for preterm infants, prematurity is perhaps not the deterrent to performing fetal surgery that it was previously.

Title: **Spurious Elevations of Prostate Specific Antigen Levels Associated with Intraprostatic Vascular Narrowing**

Authors: Conner Thompson, OMS2; Preston Celico, OMS2; Temiloluwa Kowobari, OMS2; John Seligson, OMS2; Joseph A. Migliozzi, MD, PhD

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Current clinical practice utilizes prostate specific antigen (PSA) as a screen for prostate disease from benign to malignant conditions. This screening has high sensitivity but low specificity and remains an important screening test for prostate cancer. However, spurious elevations in PSA have typically been associated with exercise, older age, digital rectal exam, prostatitis, dysplasia, and medications such as HMG-CoA reductase inhibitors. Our hypothesis is that histological evaluation of prostate core biopsies in instances of elevated PSA, without linkage to any previous etiology, will reveal vascular stenosis. This association is not currently reported in literature, which we intend to investigate. Biopsies in this study were originally obtained for clinical purposes prior to the origin of this study.

Objective: Prostate core biopsies in instances of elevated PSA, without linkage to any previous etiology, have been found in histologic evaluation. The goal of this study is to determine an association between vascular stenosis and elevated PSA.

Methods: Histologic evaluation was performed on 12 core prostate biopsies to evaluate a correlation between PSA and vascular stenosis. 5 patients were used in this study, each with their own respective 12 core biopsy, due to elevated PSA levels. These biopsies have been retroactively examined after the patient biopsies were found to have no signs of cancer, pre-cancer, neoplastic changes, or blatant ischemic changes. Slides were stained with H&E, Verhoeff-van Gieson for elastic tissue, immunochemistry staining of type 1 and type 3 collagen, and Factor VIII staining. The resulting slides were scanned, and each slide's average highest diameter and lowest diameter arteries were grouped by sector according to the transperineal biopsy scheme. Analysis was performed using the Chi-Squared method for statistical significance between diameter averages and PSA levels.

Results: Evidence of vascular stenosis was seen on core biopsy. No evidence of hyperplasia, prostatic intraepithelial neoplasia, or prostate cancer was identified. Minimal inflammation was also noted. Summation of histologic findings include decreased luminal diameter, degenerated elastic fibers, increased smooth muscle, and type 3 collagen deposition. Medial hypertrophy was the major contributor towards vascular stenosis. Statistical analysis pending.

Conclusion: There is a recognizable association between arteriole stenosis and elevated PSA according to histological evaluation. We hypothesize that stenosis of the arterioles is the cause of the increased PSA levels. We believe this information can be used by practicing clinicians to clarify why some patients have elevated PSA without any known etiology. This will help further the body of knowledge in prostate research with the intent of providing necessary closure to patients with unresolved diagnoses.

Title: **COVID-19 Knowledge, Anxiety, and Impact in Older Adults with Low Health Literacy and Chronic Health Conditions**

Authors: Matthew Thornburg, OMS2; Amarilis Acevedo, PhD; Drenna Waldrop, PhD; Raymond L. Ownby, MD, PhD
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Background: Due to the danger that coronavirus (COVID-19) presents to older adults many have been rapidly forced to change how they live their day to day lives. These changes include socially isolating and social distancing whenever possible. Because of these measures, many older adults feel increasingly isolated from their families and local communities. Throughout this pandemic, it has also been important to provide older adults with sufficient knowledge about COVID-19. With this knowledge, older adults can more easily spot the symptoms of the virus and know the best possible methods to prevent infecting themselves and others with COVID-19.

Objective: The purpose of this study was to explore the knowledge, anxiety, and impact of the COVID-19 pandemic on older persons with low health literacy and chronic health conditions.

Methods: In this study we used a series of questionnaires to determine older adults' knowledge about COVID-19, their attitudes towards it, and the impact that COVID-19 has had on their lives, drawing on participants of a larger study of chronic disease self-management. In addition, we also asked older adults whether they were suffering from anxiety symptoms due to the ongoing COVID-19 pandemic. All participants were screened for low levels of health literacy. Data were placed in an electronic database and tabulated using SPSS 26 (Armonk, NY: IBM).

Results: Of 30 participants 40 years of age and older who completed the measures, 8 were white, 21 were black, and 1 was mixed race, with 12 men and 18 women. Their mean age was 60.6 years, and they had an average of 12 years of education. Most participants were aware of common COVID-19 symptoms, such as cough and shortness of breath (both 27 of 30), as well as changes in the senses of smell and taste (24 and 28). Thirteen indicated they had experienced major disruptions of their daily routines, and 10 stated they had experienced occasional or frequent problems in having enough to eat. Ten stated that their sleep had been affected, and 17 answered that they felt isolated at least some of the time. Twenty-three of the participants indicated that they had a loss of income due to the COVID-19 pandemic. A majority of the participants believed that washing their hands or wearing a facemask (26 and 23) would be effective or very effective at preventing them being infected with COVID-19. Fewer participants believed that avoiding public transportation or restaurants (17 and 19) would be effective or very effective at keeping them safe. Only four participants stated that they suffered from severe anxiety symptoms such as feeling nauseous or dizzy when they were thinking about COVID-19.

Conclusion: The results of this study showed that while the COVID-19 pandemic has directly impacted the lives of many of the participants, this has manifested in different ways, e.g., disruption of daily routines, increased food insecurity, sleep disruption, or loss of household income. Few participants endorsed severe symptoms of anxiety. In spite of limited health literacy, they were often accurate in their understanding of common symptoms of COVID-19 and recommended strategies for reducing its spread.

Title: **Attitudes Towards End-of-Life Care Planning During COVID-19 in a Sample of the General Population in the U.S.**

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Background: Planning for end-of-life (EOL) care can result in better patient outcomes and lowered healthcare costs. However, little is known and less is understood about what factors affect planning and decisions for EOL care, particularly in the time of COVID-19. To our knowledge, no study has explored the role of COVID-19 in planning for end-of-life care among young and healthy individuals from diverse backgrounds in the general population. This study thus aimed to bridge this gap of knowledge and examine factors that may influence EOL planning during the pandemic.

Objective: The purpose of this study was to evaluate certain factors (i.e., demographic, knowledge, previous experiences with EOL care, attitudes toward hospice, attitudes toward death and dying, and fears about COVID-19) that may influence attitudes towards end-of-life care planning and decision making in the context of the COVID-19 pandemic.

Methods: Cross-sectional data were collected from a diverse sample of the U.S. general population from December 2020-January 2021 via an anonymous, online questionnaire using REDCap software. The survey included validated measures (end-of-life care,

hospice, communication about death and dying, COVID-19 fears) and demographic items. Participants were recruited via social media, snowball, and convenience sampling strategies. Data were analyzed using SPSS v.26. This study was approved by the Nova Southeastern University Institutional Review Board.

Results: Although almost all the participants (*n*=220; 94.4%) had heard of advanced care directives (living wills), the majority (*n*=188; 80.7%) did not have one. Most of the participants (*n*=194; 83.3%) were not employed as a health care professional/first responder, but 25.3% (*n*=59) reported their occupation routinely exposed them to individuals with suspected COVID-19 infection. Moreover, 29.6% (*n*=71) reported having one or more risk factors for contracting the virus. Linear regression modeling using this small (*N*=233) but religiously, economically, and racially/ethnically diverse sample of the U.S. population aged 18-78 years (*M*=37.8; *SD*=14.96) showed that favorable attitudes toward hospice care, more comfort in communicating about death and dying, and being female successfully explained 20% of variance in predicting limited medical interventions at EOL (F (228) =15.359, p<.000, R^2=*.212,* with an $R^{2(adj.)}$ =.198. Interestingly, fear and anxiety about COVID-19 did not contribute to the model.

Conclusion: This study provides new and useful information about factors that influence planning for EOL care. Data from our study suggest that positive attitudes toward hospice care, ease with discussing one's death in general, and being a female may contribute to favorable attitudes toward EOL planning. Interestingly, data from our study suggests that fear of COVID-19 and/or dying from COVID-19 is not associated with planning for the end. Education may be useful regarding EOL care planning prior to terminal illness for individuals to recognize options for increased advanced care planning (e.g., living will, health care power of attorney) and hospice services.

Title: **Alzheimer's Disease and Antidiabetic Drugs: A Comprehensive Review of DPP-4 Inhibitors, SGLT2 Inhibitors, and GLP-1 Inhibitors in their Use in Alzheimer's Treatment**

Authors: Paige Webeler, OMS2; Dhruti Hirani, OMS2; Andrea Siguenza, OMS2; Mayur Parmar, PhD, MS
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Background: The Alzheimer's Association estimates that 5.8 million people are living with Alzheimer's in the US. Alzheimer's disease (AD) is the most common neurodegenerative disease and the leading cause of dementia in the United States. The pathologic features of AD include amyloid-beta plaques and neurofibrillary (tau) tangles. Also, AD is often accompanied by vascular damage and atrophy. This condition is debilitating to both patients and their families. The rising concern about AD has fueled ongoing research into novel therapies along with a better understanding of the pathogenesis of Alzheimer's and possible associations with other comorbid conditions such as diabetes mellitus. Type 2 diabetes has been determined to be a risk factor for Alzheimer's disease. Current research efforts are exploring the relationship between diabetes and Alzheimer's and are investigating the possible use of antidiabetic drugs to prevent AD pathology. This comprehensive review aims to consolidate and present current research studies regarding antidiabetic drugs and their effect on the brain and cognition in Alzheimer's disease.

Objective: This comprehensive literature review aims to evaluate the effect of DPP-4 inhibitors, SGLT2 inhibitors, and GLP-1 inhibitors in Alzheimer's disease.

Methods: Thorough literature search, using electronic databases such as PubMed, was performed for research studies published past decade. Selection of articles depended on keywords: Exenatide AND Alzheimer's, Liraglutide AND Alzheimer's, Linagliptin AND Alzheimer's, Saxagliptin AND Alzheimer's, Sitagliptin AND Alzheimer's, Canagliflozin AND Alzheimer's, Dapagliflozin AND Alzheimer's, Empagliflozin AND Alzheimer's. In this review, articles analyzed and incorporated are primary research studies using in vitro, human, or animal models relevant to this review's objective.

Results: In animal models, DPP-4 inhibitor linagliptin was found to decrease incretin, tau phosphorylation, and beta-amyloid in the brain. *In vitro* study showed that linagliptin protected the neuronal cells from amyloid-mediated toxicity.

Conclusion: The link between Alzheimer's disease and Type 2 diabetes is one that needs continued exploration as there is great potential for treating the structural and cognitive effects of Alzheimer's disease using antidiabetic agents.

Title: **The Relationship Between Mold Toxin Exposure and Chronic Fatigue Syndrome: Analyzing the Prevalence of Mycotoxin in Urinalysis of CFS Patients**

Authors: Ting Yu Wu, MPH, MS, OMS2; Taura Khorramshahi, OMS3; Minh Chung, OMS2; Lindsey Taylor, MBA, OMS2; Betsy Rodriguez, OMS4; Irma Rey, MD

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Background: Chronic Fatigue Syndrome (also known as Myalgic Encephalomyelitis) is a complex multi-organ system disorder with a sudden onset. Patients typically present with disabling musculoskeletal pain and post exertional malaise (PEM) accompanied by severe fatigue lasting greater than 6 months that does not improve with rest. CFS is most prevalent among females between the ages of 40-50 years old. Although strong associations between chronic infection and CFS have been reported, the exact etiology of the disease remains unknown. Recent environmental studies have found that the majority of patients with CFS also reported a history of living in water-damaged buildings that subjected them to long-term mold exposure. Given the carcinogenicity, neuro- and immune-toxicity of mold toxins, it has become increasingly important to identify the link between chronic mold exposure and its role in the development of CFS. Mold toxicity is found in individuals who are susceptible to its effects when they cannot process mold toxins through the Biotoxin pathway. Since mold is ubiquitous, most patients have had some form of exposure. In recent mycotoxin studies, more serious problems arose from "Sick Building Syndrome," when an individual is chronically exposed to indoor molds that thrive from a lack of competition (Nathan 2015). Symptoms of mold toxicity can present as fatigue, muscle weakness, headaches, sinus congestion, chest pain, SOB, abdominal pain, and diarrhea. In CFS research, studies have shown that a sudden increase in cytokines causes the flu-like symptoms seen in CFS patients (Gray, 2015). The association between level of mold toxicity and severity of CFS calls the need to further investigate the prevalence of mold toxin exposure in patients diagnosed with CFS.

Objective: The aim of this study is to establish the prevalence of mold toxin exposure among CFS patients with a history of having lived or worked in mold-infested, water-damaged buildings.

Methods: In a retrospective IRB-approved study, a total of 209 CFS patients were recruited for urine analysis of mold exposure. Mold types of Ochratoxin (OTA), Aflatoxin (AF), and Gliotoxin (Gli) were chosen for mold infections in urinalysis. Patients recruited for this study were selected using the following criteria: those with medical insurance coverage, a concurrent diagnosis of Chronic Fatigue Syndrome, and a history of living or working in water-damaged buildings.

Results: Using the data compiled, the overall prevalence among CFS patients with at least 1 mycotoxin exposure (OTA, AF, Gli) among a sampled population of 235 patients was calculated at 85.1%. On average, prevalence for female patients with at least one mold exposure is comparable to that of male patients. In both gender groups, OTA had the highest prevalence of exposure, while AF had the least. The similarity in prevalence between gender groups was likely due to large differences in the sampling sizes of female versus male patients.

Conclusion: Despite its unknown etiology, there has been a growing number of studies aimed to further investigate the causes of Chronic Fatigue Syndrome. The link between mold exposure and chronic fatigue reveals a possible explanation of how multi-system immune disorders like CFS develop over time. CFS is a complex disorder with a disproportionately high, yet unexplained prevalence among female patients. By establishing the prevalence of mycotoxin exposure, this preliminary study aims to explore the relative risks of chronic mold toxin exposure and its predisposition for CFS.

Title: **Changes in Peripheral Blood Mononuclear Cell Transcriptomics of Male Gulf War Illness Patients**

Authors: Oskar Zarnowski, OMS3; Melanie Perez, MS, OMS3; Derek Van Booven, MS; Leonor Sarria, MS; Fanny Collado, MS, RN; Kyle Hansotia; Sean Reigle; Tali Finger; Mary Ann Fletcher, PhD; Nancy G. Klimas, MD; Lubov Nathanson, PhD

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Background: Gulf War Illness (GWI) is a complex, chronic, debilitating multi-system illness impacting as many as one-third of the 700,000 U.S. troops deployed to the Middle East during the 1990-1991 Gulf War. The condition is characterized by medically unexplained fatigue and a wide range of other symptoms affecting multiple organ systems. Currently, the underlying mechanisms of disease activity have yet to be fully elucidated. As a result, diagnosis commonly relies on a process of elimination, rather than identification of specific biomarkers or unique biosignatures of disease activity. Treatment tends to be focused on alleviating presenting symptomatology as opposed to targeting fundamental biological processes.

Objectives: To identify changes in peripheral blood mononuclear cell (PBMC) transcriptomics in male GWI patients to help understand the currently unknown underlying mechanisms of disease.

Methods: Our study protocol was approved by the Institutional Review Boards of the Miami Veteran Affairs Human Research Protections Program and Nova Southeastern University. In this study, used RNA-seq to evaluate gene expression in the PBMCs of 19 male GWI patients and 20 matched (by sex, age, BMI) healthy controls. Blood draws were performed at the Miami VA Medical Center. After alignment using STAR, HISAT, and GSNAP, we used DESeq2 to evaluate differences in gene expression. We selected genes that were differentially expressed based on one of the following two criteria: either a fold change (FC) > |1.5| and false discovery rate (FDR) < 0.10 in one out of the three aligners and FC > |1.4| and FDR < 0.15 in the remaining two aligners, OR a FC > |1.5| and FDR < 0.10 in two out of three aligners. After significantly differentially expressed genes were determined, pathway analysis was performed using Metascape express analysis and further modified using Cibersort.

Results: We found a total of 38 differentially expressed genes in the PBMCs of GWI patients. Multiple signaling genes (*ADGRG3, AUTS2, DUSP16, EZR, ITPKBIT1, JMY, PPP1R16B*, and *THBS1*, etc.) were significantly under expressed while other signaling genes (*GBP1, GBP1P1*, and *GCNT2*) were overexpressed. We also identified changes in genes involved in cytokine binding. Specifically, *IL1R1* was significantly under expressed in GWI patients at baseline, while *CX3CR1, GBP1*, and *GBP1P1* were overexpressed. Following pathway analysis, we found that six of the 38 differentially expressed genes were involved in regulation of the MAPK cascade (a pathway with a central role in regulating inflammatory processes).

Conclusion: The marked dysregulation of signaling, immune, and inflammatory pathways we found in GWI patients supports the hypothesis that the symptomatology of the disease is largely due to chronic inflammation and immune dysfunction. Our findings provide insights into the molecular mechanisms of GWI onset/progression and pave the way for improved diagnostics and targeted therapeutic interventions.

CASE STUDY ABSTRACTS

Title: **Elevated Troponin Levels in a Patient with Multiple Malignancies**
Authors: Mandi Abdelahad, OMS3; Brooke Alexander, OMS3; Don Woody, OMS3; Tye Barber, DO
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Cardiac metastases have received scarce representation in the realm of medical literature. Because the tumors are insidious in their clinical presentation, they are often overlooked because symptoms of a primary malignancy predominate. For this reason, most data on cardiac metastases derives from postmortem studies. A review of autopsy studies since 1975 has shown a cardiac metastases incidence in only 7.1% of bodies with an otherwise confirmed primary tumor. The described site of metastasis in this case study, extending from the myocardium and into the papillary muscle, is also especially unique, considering the majority of metastatic tumors to the heart (69.4%) involve just the pericardium.

Case Description: Described is a case of a 59-year-old male with a history of hypertension, squamous cell carcinoma, basal cell carcinoma, melanoma, and newly diagnosed stage IV non-small cell adenocarcinoma of the lung, who presented to the hospital with hypotension. On admission, troponin and creatine kinase-MB (CK-MB) were elevated, however the patient did not experience any chest pain or other symptoms of myocardial ischemia. Electrocardiogram showed normal sinus rhythm with no signs of infarction. Transthoracic echocardiogram identified a myocardial mass measuring 2.74cm x 1.66cm within the parasternal right ventricular wall that extended into the papillary muscle, associated with a mild to moderate-sized anterior pericardial effusion. The prognosis was determined to be poor as surgical intervention was not an option, and if the mass continued to grow, there would be a high risk of rupture and subsequent exsanguination.

Discussion: This case demonstrating elevated troponin and CK-MB levels unrelated to myocardial ischemia, may be used to shed light on other etiologies of elevated cardiac enzymes. Metastases to the myocardium and pericardium can mimic acute coronary syndromes, presenting with chest pain, elevated cardiac biomarkers, and ST and T wave abnormalities that mimic coronary artery disease. Elevated troponin levels are concerning, and an emergent workup must be completed to rule out infarction, however, this case demonstrates the essential nature of a wide list of differential diagnoses and the consideration of all etiologies of even rare pathology. Thus, clinicians should be weary of diagnosing myocardial infarction based on biomarkers alone. With the diagnosis of cardiac metastases in mind, patients not only avoid unnecessary testing, such as potentially harmful treatments like cardiac catheterization or anticoagulant but are also treated with appropriate measures like surgery. If unrecognized, cardiac metastases can lead to fatal complications such as heart failure, arrhythmia, or embolism. Healthcare providers should be suspicious for cardiac metastasis in patients with a known malignancy exhibiting unexplained positive cardiac biomarkers and no evidence of myocardial infarction.

Title: **The Use of Intrathecal Topotecan to Treat Leptomeningeal Disease in the Setting of Primary Ovarian Cancer: A Rare Experience**
Authors: Andrew Abraham, OMS1; Sohni Pathan, OMS2; Andrew Ardeljan, OMS2; Assad Ali, OMS2
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Ovarian cancer (OC) typically has a 5-year survival rate of 48.6%, with metastatic disease the rate drops to 30.2%. It is extremely rare for patients with ovarian cancer to develop central nervous system (CNS) metastasis. It has been reported that the incidence of leptomeningeal metastasis (LM) ranges from 0.3% to 6%. As a result, treatment for such cases is poorly understood. In any type of cancer, the presence of LM greatly decreases overall survival. Currently, treatment options for LM include intrathecal or systemic chemotherapy (i.e., methotrexate [MTX]) and radiation therapy. We discuss a patient with a history of LM from primary OC who initially received intrathecal MTX and was switched to intrathecal topotecan as a result of CNS complications. In this report we illustrate the unique course of care for this rare presentation of OC, and discuss the success found in using intrathecal topotecan to treat LM disease.

Case Description: We present a 67-year-old female patient with a history of ovarian cancer that was diagnosed in 1997. The patient was in remission until 2016 where she developed low back pain, numbness, and tingling along her left leg. Imaging revealed leptomeningeal disease (LMD) that was later noted to be metastasis of her primary ovarian cancer. Her MRI demonstrated intradural enhancement within the sacral thecal sac, conus medullaris, cauda equina, and distal upper thoracic spinal cord. No metastasis outside of the CNS were noted. The patient's LMD was stabilized with bevacizumab, gemcitabine, and cisplatin. In 2018, the patient showed progression of her LMD, and was placed on intra-thecal olaparib and methotrexate (MTX). While on these medications, the patient's serum CA-125 began to rise, indicating that her ovarian cancer was progressing, as a result the patient was switched from olaparib to a combination of carboplatin and docetaxel. The patients LMD has been stable since 2018 and was clinically stable on a combination of intrathecal MTX, carboplatin, and docetaxel. However, in early 2019 the patient developed severe leukoencephalopathy demonstrated by diffuse T-2 hyperintensity in white matter tracts. Due to the suspected MTX induced leukoencephalopathy, after 17 doses of MTX

the decision was made to switch the patient to intrathecal topotecan. The patient has remained stable on intrathecal topotecan and has shown a marked decrease in serum CA-125.

Discussion: In this case there are three areas of importance. Firstly, our patient was diagnosed with primary ovarian cancer which has a very low likelihood of developing LM. Further, patients with any sort of CNS metastasis generally have an overall survival on the order of months. Secondly, our patient was treated with a myriad of pharmacologic agents, ranging from traditional anti-neoplastic agents that cross the blood-brain-barrier to drugs that spare CNS activity. Thirdly, our patient has been maintained on intrathecal topotecan, which is not a traditional agent used in the setting of LMD. Our case represents a unique course of LMD in the rare setting of ovarian cancer in which a non-traditional pharmacologic agent (topotecan) has kept the patient clinically stable for over 16 months since being switched off of MTX, a more traditional agent used for the treatment of LMD. Lastly, serum CA-125 has historically been used as a biomarker for primary ovarian cancer progression, with little indication of the extent of CNS involvement. In our patient, serum CA-125 levels seemed to correspond with not only the progression of her primary ovarian cancer, but also involvement of CNS metastasis. We hope that this case illustrates the need to further study the use of non-traditional agents such as topotecan in the setting of LMD in not only ovarian cancer, but potentially others as well.

Title: **The Heart Finds a Way: A Strange Presentation for Endocarditis**

Authors: Glenda Abreu, DO, PGY1; Alejandro Dominguez, DO, PGY2; Laura Llabre, MD, PGY2; Diana Clabots, MD, PGY1; Rolando Monteverde-Diaz, MD, PGY1

Program: Palmetto General Hospital, Internal Medicine Residency Program

Introduction: This is a case of endocarditis with a unique presentation of paradoxical septic pulmonary emboli with aortic valve vegetation. Aortic valve vegetations are classically associated with left-sided predominant embolic phenomena. Rarely, a left-sided vegetation can be shunted to the right side of the heart, causing septic pulmonary emboli (SPE). Discussion of the mechanism of presentation and the pathophysiology behind disease is critical when evaluating a patient, two concepts that are demonstrated in this case.

Case Description: A 60-year-old male with no significant past medical history presented to the emergency department complaining of chest pain and shortness of breath that began earlier that morning. The chest pain was sharp and primarily radiated to the epigastric region, which was reproducible with palpation. He also presented with shortness of breath, chills, and night sweats. He denied any sick contacts at home, recent travel, or previous incarceration. Social history was negative for drug, tobacco, or alcohol abuse. On physical exam, the patient was tachycardic. He was afebrile, non-tachypneic, and normotensive. Lung exam revealed diffuse rales in both lung bases. He was tachycardic with a regular rhythm; no rubs, murmurs, or gallops were appreciated at that time. No rashes or lesions were appreciated on skin examination. Ophthalmologic exam showed sharp disc margins; no hemorrhages or exudates observed. Troponins were minimally elevated at 0.066, 0.050, and 0.040. Electrocardiogram revealed sinus tachycardia with right bundle branch block. CTA chest showed multiple parenchymal opacities bilaterally, suggestive of an infectious process. Eight total blood cultures were drawn with over twelve hours apart between collections, all growing methicillin-resistant staphylococcus aureus. Initial white blood cell count was at the upper limit of normal 11.4. QuantiFERON-Tb Gold Plus and Acid-Fast Bacilli tests yielded negative for Mycobacterium tuberculosis test. Thoracentesis revealed a bloody exudate with laboratory markers suggestive of exudative effusion. His transesophageal echocardiogram was remarkable for vegetation of the aortic valve of both the ventricular and aortic sides. Thoracentesis and bronchial washings both revealed acute and chronic inflammatory cells; no evidence of malignancy. Duke Criteria for endocarditis were positive for sonographic evidence of vegetation and staphylococcus aureus bacteremia in this patient. Interventional Radiology was consulted for CT-guided biopsy of the lesions, but declined intervention given high suspicion of infection, small size, and geographic location of the lesions. The cardiothoracic surgical team was consulted but declined intervention due to the patient's positive response to antibiotic management.

Discussion: This case focuses on the pathophysiology and mechanisms behind a seemingly paradoxical presentation. A paradoxical emboli is a rare phenomenon, or rare behavior of the embolus, which travels from the right side of the heart into arterial circulation causing a myriad of symptoms based on where the embolus lodges. CVAs being the second-most leading cause of death in these patients. Structural defects such as patent foramen ovale, ASD's, VSD's, and pulmonary arteriovenous malformations can allow an embolus to cross into the arterial circulation. In our case, this patient was found to have a septic vegetation, as determined by clinical signs and symptoms of endocarditis as well as diagnostic thoracentesis, lodged into the aortic leaflets which was confirmed by echocardiography. The particularity of this case is that he developed exudative pleural effusions (consistent with septic embolization from a right sided heart valve) but had vegetations only on a left sided valve (i.e. the aortic vegetation). As previously mentioned, structural defects in cardiorespiratory circulation can allow for this rare manifestation of septic embolization to occur. Our patient had no evidence of PFO, ASD, or VSD on transesophageal echocardiogram. However, pulmonary arteriovenous malformations cannot be ruled out without a bubble study. Therefore, the presence of arteriovenous malformations is a plausible mechanism for his presentation, allowing a septic vegetation to perform right-to-left- shunting and lodge in the aortic valve. Said AV malformation would have to be further explored as they can form congenitally and are largely asymptomatic. Diagnostic studies for AV

malformations include: Bubble study (the bubbles would normally be filtered out by lung circulation, but if found, suggest AV malformation as a pulmonary bypass system) followed by CT angiogram/ IR angiography if bubble study is positive. Treatment for AV malformation is artery embolization. Our patient had a left-to right shunt from an aortic source in the setting of no PFO, ASF, and/or VSD.

Title: **Spontaneous AngioVac Cannula-Related Thrombosis**
Authors: Zenith Haq Alam, DO, PGY4; Priscilla Wessly, MD, PGY6; Angelo LaPietra, MD; Christos G. Mihos, DO
Program: Mount Sinai Medical Center, Internal Medicine Residency Program

Introduction: Management of TV endocarditis is multidisciplinary, but the role for surgery in right-sided endocarditis is less clear than that of left-sided endocarditis. For patients who are deemed unsuitable for surgery, a noninvasive approach using the AngioVac suction device is an FDA approved approach to remove soft thrombus or emboli. Despite its longstanding use of removing undesirable intravascular materials, there are only a handful of case reports and one study of 33 patients reported where AngioVac was used for vegetation debulking/removal in patients with TV endocarditis. In all of the aforementioned reports, there are no reported cases enveloping the side effect of vascular thrombosis secondary to angiovac use. Herein, we describe the development of spontaneous AngioVac cannula-related thrombosis during treatment of TV endocarditis.

Case Description: 36-year-old male with history of intravenous drug use presented with fever and chills. Transesophageal echocardiography (TEE) revealed a 1.7 cm x 1.0 cm mobile vegetation attached to the posterior TV leaflet with moderate tricuspid regurgitation. Veno-venous extracorporeal membranous oxygenation with AngioVac debulking was performed. During the intervention, multiple spontaneous mobile chord-like thrombi were visualized extending from the cannula and prolapsing through the TV, right ventricle, pulmonary valve, and into the pulmonary artery (Figure 1A). The AngioVac was used to perform a thrombectomy with concomitant administration of intravenous heparin.

Discussion: The patient had aggressive TV endocarditis with sepsis and embolic complications necessitating invasive management. The AngioVac system allowed for safe and effective vegetectomy; however, extensive spontaneous cannula-related thrombosis was observed. This was treated by using the AngioVac with concomitant intravenous heparin with resolution of the thrombosis (Figure 1B). This case highlights the imaging diagnosis of spontaneous AngioVac cannula-related thrombosis, and the successful use of the AngioVac system to perform a thrombectomy with concomitant heparin administration.

Title: **Neurological Type Wilson's Disease: A Case Report**
Authors: Kaitlyn Alessi, OMS2; Miranda Pfautsch, OMS2; Mayur Parmar, PhD, MS; Mary Ellen Shriver, DO
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Wilson's disease (WD) was defined in 1912 as a rare autosomal recessive disorder that leads to defective excretion of copper from the body. Normally, copper is absorbed in the small intestine by enterocytes and transported into the blood via ATP7A proteins. Any excess copper is directed to the liver and excreted via ATP7B within hepatocytes. However, in patients with WD, this ATP7B protein is mutated due to mutations in the *ATP7B* gene, and copper accumulates within the body, causing various symptoms. Wilson's disease can manifest in many different ways, such as neurological, fulminant hepatic fibrosis, ophthalmic, and even psychiatric presentation types, which makes it difficult to diagnose. WD is essential in the differential diagnosis of an individual expressing neurological symptoms because it is a treatable disease that can progressively increase in severity and risk permanent brain impairment if treatment is delayed.

Case Description: A 32-year-old female initially presented with symptoms of dystonia of the trunk, a wing-flapping tremor, cognitive dysfunction, and dysphonic speech. She stated the dystonia began three years ago, and the symptoms are progressively worsening. In terms of past medical history and past surgical history, no records were available, and she had no recollection of past genetic testing or brain MRIs. At the time of her appointment, she claimed to be taking Cuprimine (penicillamine) 250 mg twice a day, Artane (trihexyphenidyl) 2 mg twice a day for drooling, and oxycodone 5 mg as needed. Her family history is unremarkable for WD but significant for consanguinity. During the physical examination, the patient is noted to be well-nourished and well-developed. The left arm's contracture with profound flexion of the left wrist and the right hand's flapping movements with some degree of akathisia was observed. She scored a 30 out of 30 on the mini mental status examination, and all the cranial nerves were noted to be intact with appropriate gag and corneal reflexes. Sensations were intact to pinprick, proprioception, and vibration. The laboratory report revealed alkaline phosphatase, bilirubin, aspartate aminotransferase, and alanine aminotransferase levels with normal limits. Low copper diet

and blood levels were observed. A brain MRI displayed low signal intensities in the basal ganglia, thalamic nuclei, and red nuclei bilaterally consistent with copper's heavy metal deposition seen in WD. The MRI findings demonstrate the famous panda sign" seen in patients with WD, which is potentially due to the paramagnetic effect of heavy metal deposition within the brain. Other frontal hyperintensities in the left white matter were also noted. The diagnosis of WD was confirmed by genetic testing, and the patient was informed of the disease progression. The dosage of Cuprimine was changed to 500 mg twice a day and the patient was scheduled to review upon follow up. Sign of improvement and no disease progression was observed in the last two current visits.

Discussion: This case illustrates a classic presentation of neurologic type WD in the context of facilitating patient education and performing thorough physical examinations. By staying updated on the presentations of neurological type WD, abiding by the treatment guidelines, and overcoming potential language barriers, the clinician successfully managed a WD patient.

Title: **Extra-Cutaneous Calciphylaxis Manifesting as Dysuria and Hematuria**
Authors: Brooke Alexander, OMS3; Michael Downing, OMS3; Yash Raval, DO, PGY1; Jusong Choi, MD, PGY4
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Calciphylaxis, also known as calcific uremic arteriolopathy, refers to calcification and formation of microthrombi and fibrointimal hyperplasia of arterioles and capillaries. Most often, these vascular changes cause ischemia and panniculitis of the dermis and subcutaneous adipose tissue, and result in painful, non-healing, necrotic skin lesions. Calciphylaxis is a rare diagnosis, found in only 35 per 10,000, or 0.35%, of patients undergoing hemodialysis in the United States, but can also occur in those without renal disease. Risk factors include obesity, diabetes mellitus, female sex and hemodialysis. Calciphylaxis is associated with a high one-year mortality rate, ranging from 45-80%, with rates almost three times higher in those patients on hemodialysis. With limited literature regarding the pathogenesis, patient presentation, diagnostic and treatment plans, especially in regard to extra-cutaneous calciphylaxis, discussion of the following case is warranted in an effort to provide clinicians with useful information about this infrequent pathology.

Case Description: This is the case of a 64-year-old, African American male with a history of Autosomal Dominant Polycystic Kidney Disease diagnosed in 2015, hypertension and seizures. He presented to the emergency department for emergency dialysis, for which he comes twice weekly, and additional complaints of hematuria and dysuria. Vitals obtained were a temperature of 98.3 F, heart rate of 103 beats per minute, respiratory rate of 20 breaths per minute, blood pressure of 96/72 mmHg, and oxygen saturation of 96%. He admitted to weight loss, nausea, and vomiting, but no costovertebral angle tenderness, chest pain, palpitations, shortness of breath, or cough. Electrocardiogram (EKG) showed sinus tachycardia. Urinalysis showed negative nitrites, negative leukocyte esterase, 2 WBC, and 3 RBC. Complete Blood Count (CBC) showed a Blood Urea Nitrogen (BUN) of 72 and Creatinine (Cr) of 14.1. Due to the symptoms of hematuria and dysuria, a kidney-ureters-bladder x-ray (KUB) was performed showing hyperdensities throughout the urinary tract, thought to be a calcified urolithiasis. Thus, a Computed Tomography (CT) scan was performed showing coronary arterial calcifications, diffuse small vessel calcifications in the peritoneum, and calcifications within cysts of the kidneys. Calcifications were also visualized in the bilateral cavernosal arteries of the penis likely causing the patient's hematuria and dysuria.

Discussion: In this case, the sole symptoms of calciphylaxis were hematuria and dysuria, resulting in imaging studies that determined the diagnosis. It is imperative to have a high clinical suspicion for the disease in its early stages because once necrotic, ulcerated lesions appear, the lesions are often irreversible and are associated with higher rates of mortality than in those without ulcerated lesions. Thus, it is important to emphasize the role that diagnostic imaging and early intervention could have on reducing morbidity and mortality among these patients. The subsequent findings of penile arterial calcifications in this case are even more rare, occurring in only 6% of calciphylaxis patients. If undiagnosed, calciphylaxis of the penis can lead to painful ulcers in the area, resulting in penectomy, and can even be fatal. Even though emphasis should be put on early diagnosis of calciphylaxis, high quality literature regarding treatment, especially when presenting in an extra-cutaneous fashion, is limited. The typical treatment regime includes a combination therapy of pain management, optimization of hemodialysis, and adjustment of medications that may contribute to calciphylaxis such as warfarin, calcium, iron supplements, and vitamin D. Medications such as sodium thiosulfate (STS) are suggested despite limited data regarding safety and efficacy. STS has vasodilatory effects, prevents adipocyte calcification of vascular smooth muscles, and antioxidant properties. This makes it a promising drug in its off-label treatment of calciphylaxis.

Title: **Chilaiditi Syndrome: A Misdiagnosis of Pneumoperitoneum and Other Diseases**
Authors: Gustavo Rivera Alvarez, MD, PGY1; Natalie Donn, DO, PGY2; Brian Nguyen, DO, PGY1
Program: Palmetto General Hospital, Internal Medicine Residency Program

Introduction: We present a case of a rare radiologic finding revealing an abnormally located portion of the colon between the liver and the diaphragm, termed Chilaiditi sign, which can be misdiagnosed with diaphragmatic hernia, pneumoperitoneum, or subphrenic abscesses.

Case Description: This is a 65-year-old Hispanic female with a past surgical history of partial hysterectomy who presented to the emergency department with right sided abdominal pain, nausea, and vomiting that began one day prior. She describes the abdominal pain as constant and colicky, worsening after oral intake. She endorses multiple episodes of non-bloody yellow emesis. Patient described a history of chronic constipation. She denies any fever, chills, chest pain, and urinary symptoms. On evaluation, the patient is afebrile, normotensive, non-tachycardic, and non-tachypneic. Abdominal exam revealed right upper quadrant and right lower quadrant tenderness to palpation. Murphy sign was positive. There were no peritoneal signs appreciated. Chest x-ray showed air underneath the right and left hemidiaphragm with mottled stool, favoring air-filled loops of colon abutting the hemidiaphragms. Laboratory workup was remarkable for a leukocytosis of 11.7 and a sodium of 136. Liver enzymes and bilirubin were within normal limits. CT of the abdomen and pelvis with contrast reported air-filled loop of colon seen interposed between the liver and the right hemidiaphragm, suggestive of Chilaiditi sign. A distended gallbladder with pericholecystic fluid was also seen, which was later confirmed with an ultrasound. IV fluids and antibiotics were initiated upon admission and the patient was taken to the operating room for acute cholecystitis. During the operation, the hepatic flexure of the colon was seen draped over the liver and under the right hemidiaphragm. There were severe cholecystitis findings, which led to the surgeon's decision for a partial cholecystectomy to avoid injury to the common bile duct. The pathology report was significant for acute necrotizing cholecystitis and cholelithiasis.

Discussion: This case highlights a radiologic finding suggestive of air under the diaphragm in a patient presenting with abdominal pain. Ruling out other similar appearing etiologies is essential when there is a clinical mismatch in order to prevent unnecessary procedures. On many occasions, Chilaiditi's sign can be confused with pneumoperitoneum, diaphragmatic hernia or a subphrenic abscess. Presentations can vary, ranging from concerning abdominal pain and respiratory distress to asymptomatic. The most commonly described symptoms are of gastrointestinal origin, but they can progress to respiratory distress and chest pain. With associated symptoms, the radiologic sign becomes a clinical syndrome termed "Chilaiditi's Syndrome." It has an estimated incidence of 0.25 to 0.28%. More complicated cases have been described with volvulus and perforation. Its etiology is thought to be due to anatomical variations of the suspensory ligaments of the transverse colon, falciform ligament, and congenital malposition. Treatment is based on the symptoms and many patients don't require therapy. In cases where treatment is needed, intervention can range from bowel decompression to bowel resection and hepatopexy.

Title: **Morgellons Disease: A Psychiatric or Dermatological Condition?**

Authors: Oussama Benalla, OMS3; Brandon LaPorte, OMS3; Sri Moturu, OMS3; Soling Li, DO

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Morgellons disease is a rare condition that is characterized by the presence of filaments within or projecting from ulcers on the skin. Symptoms include spontaneous appearance of ulcerative skin lesions with formication and pruritus. Patients often describe a biting or crawling sensation along their skin leading to deterioration in their quality of life. Morgellons disease is most commonly diagnosed in Caucasian middle-aged women and is associated with Lyme disease and Generalized Anxiety disorder. Diagnosis can be controversial as there is uncertainty of whether it is a psychiatric or dermatological disorder. Currently, there is no standard treatment protocol. Antibiotics are often initiated, but when laboratory results do not indicate an infection, a psychiatric etiology is recognized. We use this case to highlight that although the patient presented with a seemingly bizarre constellation of symptoms, a compassionate and non-confrontational approach can lead to a successful treatment plan.

Case Description: We present a case of a 47-year-old male with a four-month history of a progressive lesion on the dorsal aspect of the right hand and diffuse formication. His past medical history is significant for Generalized Anxiety disorder, which has worsened since the onset of this lesion since he has become fixated on it. Upon dermatological examination, a 5 cm erythematous patch was observed on the dorsum of the right hand with several 1 cm satellite lesions along the forearm. Dermoscopic examination indicated nonspecific findings. A gross examination of a specimen collected from his hand revealed brown hair-like fibers extruding from the skin. Laboratory tests revealed elevated white blood cells and negative serology for *Borrelia burgdorferi*. At this time, the patient was diagnosed with an epidermal infection and was treated with 1% topical clindamycin. The patient followed up 2 months later and his dermatological examination showed several similar lesions on his forearm and right lower extremity. The patient stated that he was scratching his lesions to remove what he believed to be a mite infection. As the patient's complaints were not supported by laboratory findings or diagnostic work up, a supportive and non-confrontational approach was taken to ensure that the patient was aware that he may require antipsychotic therapy for treatment for his condition. He was counseled on the potential psychiatric etiology of his condition and was encouraged to seek psychiatric evaluation. The patient was amenable to the suggestion.

Discussion: This case illustrates the obscure nature of the symptoms associated with Morgellons disease, which often causes a delay in diagnosis and treatment. With each passing day, patients struggle to cope with the condition and when the diagnosis is ultimately determined, they are reluctant to seek psychiatric treatment. Due to a lack of standard protocol, physicians may attempt a variety of treatments based upon suspicions of an infection and when the laboratory results do not support an infectious etiology, the psychiatric nature of the condition becomes apparent. The most important factor in attaining a successful treatment plan is to gain rapport with patients and ensure that their concerns are acknowledged.

Title: **An Investigative Diagnosis of Partial Hydatidiform Mole in a Clinical Setting**

Authors: Kimberly Bercy, OMS3; Geraldine Sequeira Grass, OMS3; January Moore, OMS3; Renee Alexis, MD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Partial Hydatidiform Moles (PHM) are a premalignant type of gestational trophoblastic disease. They are sporadic and result from abnormal fertilization. Here we describe a case with an unusual presentation of PHM with severe constipation and highly elevated beta human chorionic gonadotropin (beta-HCG) in the first trimester. Sonographic features and a pathological report indicative of PHM were not observed. However, further evaluation with genetic testing and immunohistochemistry of p57 gene confirmed a PHM diagnosis. This case illustrates the need for extensive investigation since a PHM may be erroneously diagnosed as a missed abortion and result in further complications.

Case Description: A 34-year-old African American female gravida 2, para 0010, presented at 9 weeks gestation by last menstrual period (LMP) for a follow up obstetric prenatal visit. Past medical history was significant for spontaneous miscarriage at the age of 31. The patient had presented three days earlier to the emergency department with complaints of severe constipation. Transabdominal ultrasound performed at the ED showed a single intrauterine pregnancy with a round and regular gestational sac which was approximately dated 5 weeks and 3 days. Laboratory studies were significant for beta-hCG of >200,000 mIU/mL (median range for 8-9 weeks: 105,954 mIU/mL). At prenatal follow-up, the patient complained of severe nausea and vomiting, as well as hypogastric pelvic pressure. She denied any current or prior abnormal vaginal bleeding and vaginal discharge. Physical examination revealed a patient in mild distress due to concern about the viability of the pregnancy with normal vital signs. An office transvaginal ultrasound demonstrated a yolk sac and a small indication of fetal pole. Beta-HCG was repeated and measured at a level of >400,000 mIU/mL. A consultative radiology ultrasound was ordered and performed at 10 weeks gestation, which confirmed a fetal pole measuring 3 mm, corresponding to a gestational age of 6 weeks 0 days. Subsequently, a perinatologist was also added to the case for further evaluation. At the time of the perinatology consultation, the patient was at 11 weeks and 4 days gestation and reported persistent nausea and vomiting with brown vaginal discharge. It was noted that an empty gestational sac was seen on transvaginal ultrasound which was consistent with a nonviable pregnancy. At this point, a partial molar pregnancy was highly suspected due to the elevated beta-HCG level and regression of pregnancy, however no sonographic features of a molar pregnancy were noted on the ultrasound. Based on the findings, the patient was taken to the operative room two weeks later for a dilation and curettage procedure. The products of conception were sent to pathology which reported a small, immature villi with focally edematous stroma and no significant trophoblastic proliferation. However, genetic testing via FISH analysis confirmed a triploid karyotype and immunochemistry was positive for p57 gene expression which is consistent with a PHM.

Discussion: This case demonstrated that ultrasound findings should not be relied upon to confirm PHM diagnosis. Other methods, including pathological analysis and p57 immunohistochemistry, must be done to differentiate PHM from a non-molar hydropic abortus.

Title: **Tibial Tubercle Avulsion Fracture, an Uncommon Fracture Pattern with Great Restorative Potential: A Case Report**

Authors: Joshua Berko, OMS3; Gregory Kunis, OMS3; Jeffery Shogan, OMS3; Joshua Sharan, OMS3; Derek Jones, DO, PGY2
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Tibial tuberosity avulsion fractures are extremely rare fracture patterns accounting for less than 1% of all pediatric fractures. These fractures occur when there is a sudden unbalancing of mechanical forces through the patellar tendon that separates the tibial tubercle from the anterior portion of the proximal tibia. These forces are commonly introduced in sporting activities and show a

predominance for adolescent males. These fractures can be classified with Watson-Jones criteria modified by Ogden, defining Types I - IV based on the level of the fracture and fragment displacement with Type III being the most common. Several diseases like Osgood-Schlatter disease are postulated to be possible predisposing conditions by altering the biomechanical properties of the tubercle. However, no formal relationships have been established. Treatment with open reduction internal fixation commonly results in favorable outcomes with zero to minimal complications. In this presentation, we are going to explore a case of a tibial tuberosity avulsion fracture and give an in-depth review of all aspects concerning this fracture pattern.

Case Description: A 14-year-old male with no significant past medical history presented via emergency medical services after a ground level fall while playing basketball. The patient states he was playing basketball when he jumped up and then landed with his left knee in a flexed position. He immediately felt a "pop" in his left knee as well as immediate pain and swelling about the left knee. Radiographs of the left knee and tibia revealed an Ogden Type III, distracted avulsion fracture of the tibial tuberosity with suprapatellar effusion. Surgical intervention was achieved through open reduction internal fixation of the left tibial tubercle. At two days post-operative care the patient was seen and examined at bedside. The patient experienced zero pain at rest and with passive movement however, he experienced significant pain with active movement. The patient described an absence of numbness and tingling in the treated extremity with intact sensation to light touch over saphenous, sural, deep and superficial peroneal nerve distributions. Dorsalis pedis and posterior tibial pulses were present at 2+ and Homans sign was negative. Extensor hallucis longus, gastrocsoleus complex, and tibialis anterior all exhibited 5/5 strength upon testing and palpation revealed mild edema about the tibia, however all compartments were soft and compressible. No further orthopedic intervention was indicated at this time and the patient was advised to continue work with physical therapy.

Discussion: Although a relatively rare fracture pattern, this case demonstrates a classic presentation and treatment of a tibial tuberosity avulsion fracture. This case serves as a reminder that despite the rarity of the injury, a clinician with an appropriate index of suspicion can accurately diagnose and treat this exceptional fracture and achieve positive outcomes in returning the patient to pre-injury activities. For those reasons, we provide a comprehensive overview of all aspects regarding this fracture pattern including the anatomy, embryology, mechanism of action, predisposing conditions, treatment considerations, complications, and associated injuries.

Title: **Posttraumatic Myositis Ossificans in a Young Male Following a Motor Vehicle Accident: Case, Differential, and Considerations in Management**

Authors: Ahjay Bhatia, OMS3; Ashley Ryan Vidad, OMS3; Divy Mehra, OMS3; Oluwaseun Ogunjemilusi, MD, PGY1
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Myositis ossificans (or traumatic heterotopic ossification) is an uncommon non-hereditary pathophysiological result of muscular trauma that is detected by radiographic imaging 3-4 weeks following initial trauma. It is responsible for great global morbidity, with symptoms of prolonged pain, diminished flexibility, and stiffness often lasting for years. The goal of therapy is to rule out serious complications (such as compartment syndrome, large hematomas, etc.) and to restore strength and range of motion as soon as possible. We detail the case and pertinent management of a young male with leg trauma who presented with myositis ossificans that was missed at initial presentation, but visible on radiographic imaging four weeks after.

Case Description: A 32-year-old male with no chronic medical conditions presented to the Emergency Department (ED) complaining of worsening left lower extremity swelling and pain. One month prior to presentation, this gentleman suffered a motor vehicle accident (MVA), presented to the ED, and was discharged after exclusion of a deep vein thrombosis (DVT). At this presentation, the patient was afebrile, and his vitals were generally stable (excluding persistently elevated blood pressures of 140-160/80-90 mmHg). On physical exam, the left lower extremity was edematous and warm to touch with normal pulses, no limitations in range of motion, no calf tenderness, no motor or sensory deficits, and no other neurologic abnormalities. Laboratory workup revealed abnormal renal function (estimated GFR of 39, BUN of 37 mg/dL, creatinine of 2.00 mg/dL), transaminitis (AST of 107 U/L), an elevated D dimer, mildly elevated PTH, and mild decreased values of RBC count ($3.36*10^6$/uL), hemoglobin (10.1 g/dL), and hematocrit (30.4%). Based on labs and clinical picture, we determined he had a general impression of mild acute kidney injury and rhabdomyolysis with secondary hyperparathyroidism and transaminitis. A CT scan with contrast of the left lower extremity revealed subcutaneous and intrafascial edema (particularly in the anterior compartment of the proximal thigh); further, curvilinear calcifications within the distal vastus intermedius, vastus lateralis, and vastus medialis, proximal lateral gastrocnemius, soleus, fibularis longus, flexor hallucis longus, and tibialis posterior muscles. A cleft was noted between these calcifications and underlying bone. This overall impression was of myositis ossificans involving the distal anterior compartment of the thigh and posterior anterior compartment of the lower leg, suspected as a result of prior trauma (MVA). The patient was admitted, given fluid hydration, pain control, and antibiotics. Electrolytes were monitored, leg ultrasound was negative for DVT, compartment syndrome was ruled out, and the patient was discharged once stable to follow with his primary care physician.

Discussion: This case effectively details the appropriate comprehensive workup for an individual that developed myositis ossificans in the muscular tissue proximal and distal to the left knee joint. Special attention must be paid to this diagnosis, given its potential for serious long-term complications and a necessity for interdisciplinary care in management (i.e. primary care, physical therapy, orthopedics, and more).

Title: **Caregiving: The Female Burden**
Authors: Erin M. Burden, OMS3; Matthew W. Scales, OMS3; Oshin Rai, OMS3
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: The CDC found that unpaid family caregivers experience worse mental health outcomes and more suicidal ideation than the average adult. According to the National Alliance for Caregiving, of the 53 million Americans who served as caregivers for their relatives in 2020, 61% were female. More women than men reported that they served as the primary caregiver, had no choice in taking on their caregiving role, and cared for two or more adults at a time. Dr. Jennifer L. Yee found that female caregivers report higher levels of caregiver burden, role conflict, and role strain than their male counterparts.

Case Description: A 49-year-old female with a past medical history significant for major depressive disorder presented under involuntary hold to the psychiatry unit at Largo Medical Center after calling her sister and "saying her goodbyes." When emergency services arrived, the patient was unresponsive, surrounded by multiple empty liquor containers and an empty bottle of alprazolam. Upon psychiatric evaluation the next day, the patient reported she had been feeling overwhelmed by life stressors prior to the incident. For six years, the patient served as the primary caregiver for her ill parents. Her mother battled stage 4 colon cancer twice, arthritis, and chronic kidney disease, for which the patient managed her ambulatory peritoneal dialysis. The patient was also responsible for driving her father to his oncology appointments, which took approximately 12 hours each week. Since the passing of her parents within the last two years, she had most recently been caring for her sister who had been diagnosed with stage 4 cancer. The patient was started on a regimen of duloxetine BID and doxepin daily during her hospital stay. In addition to pharmacotherapy, the patient engaged in group therapy. Ultimately, the patient was discharged once her involuntary hold expired, but was looking forward to continuing with her medication and therapy in the outpatient setting.

Discussion: This case illustrates the emotional and mental stressors of caregiving that more often affect women. It is imperative that physicians recognize how the caregiver burden disproportionately affects women in order to best equip this population with accessible psychological, emotional and social support before it is too late.

Title: **Neurosyphilis in a Patient with Right Lower Extremity Paresthesia and Cervical Spine Pain**
Authors: Kellen Creech, OMS3; Komal Patel, OMS3
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Tabes dorsalis was the most common form of neurosyphilis in the pre-antibiotic era, although now it is quite uncommon. As such, late and late latent syphilis were reported by the CDC at 12.3 cases per 100,000 in 2018. This case was elected due to an unusual presentation of neurosyphilis in a patient with multiple autoimmune conditions. This case highlights the importance of taking a thorough history, where it was revealed this patient had a history of an untreated sexually transmitted infection many years ago, which led the clinician to suspect neurosyphilis.

Case Description: We present the case of a 56-year-old African American female with a history of SLE, Sjögren's syndrome, Rheumatoid arthritis, Fibromyalgia, NIDDM who presented with right foot ascending paresthesia and posterior, inferior cervical spine pain that began the same day. The patient was then admitted for further workup and Neurology and Infectious Disease were consulted. An MRI of the Cervical/Thoracic spine demonstrated T2 hyper-intensity within the lower cervical and upper thoracic cord, extending from levels C7-T6. MRI of the Brain was negative. However, CSF VDRL was positive, which is very specific for neurosyphilis. Prior to the positive CSF culture, the patient's symptoms were thought to be due to her autoimmune history and would have been treated with steroids, but considering the positive CSF VDRL, infectious disease recommended starting Penicillin G. The patient began to show significant clinical improvement and was subsequently transferred to an acute rehab facility to begin aggressive physical therapy.

Discussion: The rare occurrence of latent syphilis and the presentation of tabes dorsalis, which occurs in only approximately 25-40% of patients with untreated syphilis, were reasons for choosing this case. In the future, it is important to take a thorough and complete history in order to perform the appropriate tests for an accurate diagnosis. This case is osteopathically relevant because it embodies the first tenet of osteopathic medicine, that the body is a unit. A further interest in listening to this patient and her story led the clinician to consider the possibility that the patient's symptoms were sequelae of a prior sexually transmitted infection.

Title: **Wrong at First Sight: The Elusive Atrial Tachycardia**
Authors: Alejandro Dominguez, DO, PGY2; Derek Almendares, DO, PGY2; Vy Nguyen, DO, PGY4
Program: Palmetto General Hospital, Internal Medicine Residency Program

Introduction: Supraventricular tachycardia (SVT) is difficult to differentiate in the acute setting and can often lead to incorrect management. One of the lesser common SVT is atrial tachycardia. We focus on the importance of arrhythmia identification, rarity of atrial tachycardia, and the extensive management and follow-up these patients are subjected to.

Case Description: This is a 51-year-old female with no significant past medical history who presents to the emergency department complaining of palpitations for one day. She reports having had palpitations for one year, but the symptoms had previously resolved with bearing down. There were no inciting events, as well as no alleviating or aggravating factors. She endorses mild associated dizziness and lightheadedness. She denies any fever, chest pain, shortness of breath, or syncope. During physical exam, the patient appeared to be in mild distress. Cardiac examination revealed tachycardia with no rubs, murmurs, or gallops. Lung fields were clear to auscultation bilaterally. The initial electrocardiogram revealed supraventricular tachycardia with a rate of 245 beats per minute. She was administered Adenosine and Diltiazem, reducing the frequency to reveal an irregular rhythm interpreted as atrial flutter with 2-1 atrioventricular block. After careful examination and repeat electrocardiogram, the patient was deemed to have atrial tachycardia. The patient was started on Metoprolol and discharged home. She returned one month later with continued symptoms, having failed medical management at home. Electrophysiology was consulted and successfully ablated the cavotricuspid isthmus, correcting the underlying mechanism of the patient's tachycardia. She was then discharged with Metoprolol and Flecainide. Five months later, the patient again returned with a similar presentation and her hospital course resulted in successful ablation of the atrial tachycardia originating from the mid-crista terminalis. The patient was then discharged on Sotalol to follow up in the outpatient setting.

Discussion: Atrial tachycardia (AT) is a supraventricular tachycardia with an atrial rate above 100 beats per minute. The arrhythmia can be further subdivided into multifocal and focal. Focal AT accounts for 5 to 15% of the studied paroxysmal SVTs. The origin of the arrythmia is located outside of the sinus node; the tricuspid annulus accounts for 35% and the crista terminalis for 34% of the site involved, the two locations ablated in our patient. This differs from the macro-reentrant atrial flutter and the multi-site atrial fibrillation by its anatomy and orientation. The mechanism of action is proposed to involve a combination of enhanced automaticity, a micro-reentrant circuit, and a triggering event. The diagnosis is made on electrocardiogram and treatment depends on hemodynamic stability and disease persistence. Treatment can be initially attempted with vagal maneuvers or intravenous adenosine. Cardioversion is preserved for the hemodynamically unstable and recalcitrant cases. Intravenous beta blockers and non-dihydropyridines can be attempted as initial outpatient therapy. With failure of medical management, ablation therapy is considered next. We highlight an uncommon arrhythmia in the SVT spectrum and showcase the vast array of treatment modalities.

Title: **Rare Case of Mixed Neuroendocrine- Non-Neuroendocrine Neoplasms**
Authors: Natalie Donn, DO, PGY2; Gustavo Rivera Alvarez, MD, PGY1; Harry Nguyen, DO, PGY5; Amit Sastry, MD
Program: Palmetto General Hospital, Internal Medicine Residency Program

Introduction: Mixed neuroendocrine- non-neuroendocrine neoplasms (MiNEN) are defined by the heterogeneity of cell types of which at least two cell morphologies differ, including one neuroendocrine and one non-neuroendocrine counterpart (i.e. adenocarcinoma, signet ring cell carcinoma, and squamous). MiNEN accounts for less than 5% of all digestive neuroendocrine neoplasms, and less than 0.5% represent the pancreatic subtype. Patients with a higher NET component have a more aggressive form of disease, with an overall survival of 13 months. The difficulty in diagnosing these tumors involves sampling bias during surgical biopsy resections for successful identification of both cell types due to the neuroendocrine component burrowing itself into the deeper digestive wall layers. Moreover, there is a higher level of pathological expertise required to correctly pair immunohistological techniques to synonymously recognize the morphological features of the juxtaposed neuroendocrine components as the more aggressive tumor drives treatment decision.

Case Description: An 80-year-old female with a past medical history of GERD, hypertension, and asthma who presented to the

emergency department with progressively worsening abdominal pain. The patient reported the pain as dull and constant that was not alleviated or aggravated with any noticeable routines. On physical exam the abdomen was soft, nontender, with active bowel sounds, and no evidence organomegaly. Initial laboratory findings revealed leukocytosis at 17,000, prerenal azotemia, and hyperglycemia. Radiological imaging was consistent with a large soft tissue density mass in the distal body and tail of the pancreas measuring 4.2cm x 2.4cm x 3.3cm in addition to a small hiatal hernia. The patient subsequently underwent robotic distal pancreatectomy with staging to assess for primary or metastatic malignancy. Biopsy results revealed 70% neuroendocrine tumor (NET) and 30% non-neuroendocrine tumor of the ductal adenocarcinoma histological type. Metastatic neuroendocrine tumor was identified in 3 of 6 peripancreatic lymph nodes. Expression of Ki-67 was 3-4%. Histological grade of the NET was 2 out of 3 and the ductal adenocarcinoma was a moderately differentiated, grade 2 out of 3 section, with mucin production. Given the metastatic involvement of the peripancreatic lymph nodes, the patient was determined to have predominant NET disease and is currently pending NET-specific treatment.

Discussion: MiNEN represent a small number of gastrointestinal malignancies but their diagnosis and subsequent management presents a challenge. Management is driven by the most aggressive neoplastic component. However, treatments have not been formally stratified due to the scarcity of cases. Therefore, these cases should be discussed in a collaborative tumor board setting with treatment decided based on best evidence among practitioners based on both tumor characteristics, patient profile, and any possible treatment toxicities. Clinicians should always maintain a broad differential as appropriate management of this heterogenous disease can greatly impact overall survival rate and the lives of patients.

Title: **An Unusual Appendicitis-like Presentation of Adenocarcinoma with Colorectal Origin in an Elderly Woman: A Case Study**

Authors: Marcos Clavijo Fernandez, OMS3; Ashley Ryan Vidad, OMS3; Hasnan Ijaz, MD, PGY1
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Appendicitis is described as the inflammation of the Vermiform appendix that typically presents with non-specific, dull, periumbilical pain that lateralizes to the right lower quadrant. Other associated symptoms include mild fevers, nausea, vomiting, and anorexia. Routinely, CBC and CRP are ordered to confirm the diagnosis. Radiologic studies such as ultrasound can be used to show any abnormal enlargement of the appendix and CT scans can show calcified appendicoliths or they could also demonstrate thickening and inflammatory changes like fat standing in the surrounding tissue. This case describes a female complaining of appendicitis-like symptoms such as right lower quadrant pain, nausea, and vomiting but with normal WBC count and temperature, and was ultimately diagnosed with intraluminal adenocarcinoma of colorectal origin.

Case Description: Patient is a 79-year-old female with a past medical history of significant hyperlipidemia, hypertension, and deep vein thrombosis on Eliquis, presented to the Emergency Room with midepigastric pain that radiates to the right lower quadrant. Vitals and laboratory exams were unremarkable except for a normal temperature of 36.6^{o} Celsius and a normal WBC count of 5.1x10^{9}/L. Based on history and physical, a CT scan of the abdomen showed inflamed appendix, thickened wall with a diameter greater than 5mm. Given the patient's prolonged use of anticoagulant therapy, surgery was delayed for 48 hours and managed conservatively with antibiotics to optimize for surgery. Due to the patient’s atypical appendicitis presentation, the appendix was sent to pathology for further observation. The specimen showed positive for caudal related homeobox (CDX2) with patchy positivity for cytokeratin 20 (CK20) which elicited intraluminal adenocarcinoma with a colorectal origin. Based on the pathology report, the patient was referred to hematology/oncology, gastroenterology, and surgery for which she had an endoscopy and right-sided hemicolectomy. The colon specimen was also sent to pathology and showed well-to-moderately differentiated adenocarcinoma, tubular adenoma, melanosis coli, and benign unremarkable omentum with focal hemorrhage. Patient is now following with an oncologist.

Discussion: This case describes a female with atypical appendicitis presentation of right lower quadrant pain with nausea and vomiting but with no fever and a normal WBC count. Other studies showed that only 0.85% of patients with appendicitis presentations were found to have colorectal cancer, when adjusted for age over forty, the rate more than doubled to 1.76%. Even though the atypical appendicitis presentation is rare, the consequences of missing a diagnosis such as intraluminal adenocarcinoma with colorectal origin can have dire consequences for patients if left undiagnosed and untreated. This case aims to highlight the importance of appendiceal biopsy for atypical appendicitis presentations.

Title: **A Case of Bitemporal Hemianopia in a Patient on Ziprasidone**
Authors: Carla Forns, OMS3; Rashmi Prasad, OMS3; Anton Gomez, DO
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Ziprasidone is an atypical antipsychotic with a high affinity for dopaminergic, adrenergic, and histaminergic receptors. Ziprasidone is typically used for the treatment of schizophrenia and more recently, autism related disorders and insomnia. We present a case of a 17-year old female with a past medical history of autism, insomnia, and juvenile rheumatoid arthritis, who presented to the ED for sudden onset dizziness that started the same morning. Vital signs were normal, and labs were unremarkable. On physical exam, the patient had bitemporal hemianopsia. MRI of the brain showed no evidence of ischemia, intracranial mass, mass effect, or midline shift. Of note, the patient was on Ziprasidone and the dosage was changed from 20mg to 40mg due to her unresolving insomnia, three months prior. This medication was stopped and the patient's bitemporal hemianopsia as well as dizziness resolved within 24 hours. Given this temporal relationship, it is suggestive that the cause of the bitemporal hemianopsia and dizziness is likely the increased dosage of the Ziprasidone. This case raises awareness of the potential relationship between Ziprasidone and bitemporal hemianopsia. While bitemporal hemianopsia is typically due to a compressive lesion in the sellar region, inflammatory lesions may be a rare cause. In the absence of a tumor, drug toxicity should be ruled out to prevent visual loss.

Title: **A Peculiar Case of Kaposi's Sarcoma**
Authors: Jegan Gabbidon DO, PGY2; Peter Cohen, DO; Lissette Lazo, DO; Shane Williams, DO
Program: Palmetto General Hospital, Family Medicine Residency Program

Introduction: Kaposi Sarcoma (KP) is a rare angioproliferative disorder that primarily affects middle aged males of European descent. KP is an extremely interesting malignancy as it's one of the few cancers which requires prior infection by a virus, in this case Human Herpesvirus 8 (HHV-8). According to the American Cancer Society, there are four classically defined types of Kaposi's Sarcoma in existence. (1) HIV associated KP which occurs in individuals previously diagnosed with HIV. (2) Mediterranean KP which occurs in individuals of European descent. (3) Endemic KP, which occurs in people living in Africa (4) Iatrogenic KP which occurs in transplant patients. As you will learn, the case presentation does not fit any of the defined categories. Furthermore, he did not exhibit risk factors such as smoking, immunosuppression, or high-risk sexual activities.

Case Description: A 67-year-old African American male with a past medical history of Prostate cancer, NIDDM, prostate cancer, and hyperlipidemia presents to the family medicine clinic with left foot pain for 1-week duration. Symptoms localized to the medial calcaneal region gradually worsen causing the patient to seek medical intervention. Severity scaled at a 7/10 and constant in nature. Pain described as sharp with radiation to the mid plantar aspect of the left foot. Associated symptoms include intense pruritus. He denied paresthesia, swelling, or discoloration of the foot. At the time of examination, he was observed to have difficulty ambulating secondary to pain. The patient stated this has never occurred in the past and denied trauma to the extremity. He has tried over-the-counter naproxen and an unspecified topical medication with minimal relief of symptoms. Patient had no documented history of diabetes-associated peripheral neuropathy and was compliant with yearly diabetic foot exams. He denies use of tobacco, alcohol, or drugs. The patient is married and monogamous with his wife. They do not use protection regularly. He denies any history of sexually transmitted disease. Upon arrival at the family medicine clinic, a physical exam revealed an antalgic gait and a 3x3cm macular plaque localized to the left medial calcaneal region. The center was ulcerated with irregular borders and a dark purple discoloration. Vital signs were within normal limits and STD panel including HIV, RPR, and Hepatitis were negative. His shoes were examined which showed proper fit and no irregular wear pattern on the soles. Neuro exam showed decreased sensation to light touch, pinprick, and vibration in the left lower extremity. The patient was given a course of antibiotics for suspected infection and sent to podiatry for a biopsy. Pathology reports confirmed the presence of Stage 1 Kaposi's Sarcoma.

Discussion: Kaposi's Sarcoma is typically associated with HIV infection and an immunosuppressive state. Our patient was HIV negative and not immunosuppressed. Given this patient's strong personal and family history of cancer we are extremely interested in investigating whether factors such as history of cancer, and co-morbid conditions are increasingly becoming better predictors of Kaposi sarcoma risk. Perhaps, with a better understanding of Kaposi Sarcoma risk factors we can implement yet another category of Kaposi Sarcoma which would ultimately improve risk stratification.

Title: **Hyperosmolar Hyperglycemic Syndrome and New-Onset Diabetes in a Patient Following COVID-19**
Authors: Anirudh Gajjala, DO, PGY2; Freddie Prieto, OMS3; Stella Elberg, DO; Jegan Gabbidon, DO, PGY2
Program: Palmetto General Hospital, Family Medicine Residency Program

Introduction: During the initial outbreak of the Coronavirus disease 2019 (COVID-19) pandemic, there was an early understanding of a link between diabetes and an increased risk for severe disease. More recently, evidence has been mounting showing a converse relationship—namely that acquiring COVID-19 can predispose patients to developing new-onset diabetes and its metabolic complications, including diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic syndrome (HHS).

Case Description: This patient is a 56-year-old male with past medical history of pre-diabetes and hyperlipidemia who presented to our clinic for hospital discharge follow-up after being admitted at a local hospital for COVID-19, bilateral pulmonary embolisms and deep vein thrombosis in his right lower extremity. He was discharged on apixaban, 10 milligrams, twice daily for the first week followed by 5 milligrams, twice daily thereafter. The patient elicited vague complaints of fatigue and light-headedness for the preceding two days. History revealed that he had incorrectly been taking the 10 mg dose every day, beyond the first week mark. Physical exam was remarkable for tachycardia at 108 beats per minute and a lethargic appearance. Out of concern for a potential internal bleed due to the patient's improper intake of anti-coagulation medication, we decided to urgently send the patient back to the hospital. In the hospital, a chemistry panel was significant for a blood glucose of 1,620 mg/dL, anion gap of 17 and potassium of 6.0 mEq/L. Urine ketones returned negative. EKG revealed new T-wave inversions in the anterior leads as compared to the previous study. Arterial blood gas was remarkable for pH 7.302, pCO2 39.4 mmHg, pO2 85.3 mmHg and HCO3 19mEq/L. Hemoglobin A1c resulted as 9%, confirming a new diagnosis of diabetes as compared to the patient's previous value of 6% in our clinic, one year prior. The patient was treated in the ICU, rehydrated with intravenous fluids and placed on insulin drip, and recovered well.

Discussion: There have been multiple reports of a recent increase in cases of new-onset type 1 diabetes mellitus in pediatric patients following COVID-19. The current working hypothesis for the pathogenesis of this process is that severe acute respiratory syndrome coronaviruses (SARS-CoV and SARS-CoV-2) enter the islet cells of the pancreas via their angiotensin converting enzyme-2 (ACE-2) receptors and cause direct damage to the beta-cells. There is evidence to suggest that insulin resistance due to high levels of interleukin-6 and tumor necrosis factor alpha can affect glucose metabolism in patients with severe COVID-19 infections. Although less common, DKA and HHS do also occur in the setting of type 2 diabetes mellitus, but they very rarely occur without some kind of infection or precipitating event. Early recognition of DKA and HHS symptoms is necessary to improve the prognosis of COVID-19-related metabolic exacerbations. Moving forward, it will be critical to continue assessing for long-term sequelae in individuals who have recovered from COVID-19, with a particular focus to diabetes.

Title: **Disseminated Panniculitis with Distinctive Pathologic Findings Lead to Diagnosis of Pancreatic Acinar Cell Carcinoma: A Case Report**

Authors: Christopher Ghildyal, OMS2; Michael Morgan, MD; Joseph Migliozzi, MD, PhD; Lorie Masters, PA-C
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Pancreatic acinar cell carcinoma is an extremely uncommon malignancy that is often Misdiagnosed due to a vexing clinical presentation including arthralgia, diffuse abdominal pain, And nodules of the skin. These nodules are caused by enzymatic digestion of adipose tissue Following liberation of lipase from malignant pancreatic cells. Despite its location and Constellation of clinical symptomatology, this peculiar pancreatic carcinoma has an Exceptionally good prognosis compared to conventional pancreatic carcinoma and thus the Importance of its recognition. Herein, we present an unusual case of disseminated pancreatic Panniculitis where the distinctive histopathological changes observed at skin biopsy prompted an examination of the abdomen where the pancreatic malignancy was diagnosed.

Title: **Unusual Neck Pain: Acute Calcific Prevertebral Tendinitis**

Authors: Krisha A. Gupta, OMS2; Amit G. Gupta, MD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Acute calcific prevertebral tendinitis (ACPT) mostly affects individuals between the ages of 30 and 60 years and is caused by calcium hydroxyapatite deposition and inflammation of the longus colli tendon and muscle. The exact pathophysiology is not known but is thought to be due to repeated trauma and tendinous degeneration. The clinical presentation is nonspecific-acute onset of neck pain, dysphagia, odynophagia and low-grade fever, similar to presentation of retropharyngeal infection. Diagnostic imaging is essential to differentiate ACPT from infection and CT findings are often subtle but pathognomonic. The condition is self-limiting with NSAIDs as the first line therapy. Corticosteroids and opioid analgesics may be necessary. Prognosis is excellent if diagnosed

appropriately. Acute calcific prevertebral tendinitis is often misdiagnosed as retropharyngeal infection or infection in the prevertebral space and many times is erroneously treated with surgical drainage or antibiotics.

Case Description: The patient is a 44-year-old Caucasian male. He presented to the emergency room with sudden onset neck pain and difficulty swallowing. The pain did not radiate and there was decreased range of motion in the neck. There was no associated fever, recent trauma, or confusion. The radiographic findings were as follows: 1) X-ray: nonspecific prevertebral swelling; not very sensitive for longus colli muscle calcification, and 2) Non-contrast CT: curvilinear non-osseous calcific density along the longus colli muscle tendon especially the upper oblique fibers at the C1-C2 level; retropharyngeal edema with fluid expanding the prevertebral space. Upon imaging, the patient was correctly diagnosed with acute calcific prevertebral tendinitis. The patient was treated with NSAIDs and rest, and the symptoms resolved after two weeks.

Discussion: Acute calcific prevertebral often misdiagnosed so it is important to recognize it so appropriate treatment, NSAIDs rather than surgery or antibiotics, can be instituted. CT is critical for diagnosis and should be performed urgently. This case illustrates an accurate diagnosis that led to the appropriate treatment and a positive patient outcome.

Title: **Abnormal Presentation of Diffuse Large B Cell Lymphoma in an HIV Positive Individual**

Authors: Emma Hall, OMS3; Azhar Ghumra, OMS3; Brian Uzomba, MS4; Roya Garakani, DO, PGY1
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Diffuse large B cell lymphoma is the most common type of non-Hodgkin lymphoma among adults. It is a malignancy that typically presents as a rapidly growing, non-painful mass with nodal or extranodal involvement, as well as concomitant 'B symptoms' such as weight loss, night sweats and fevers. The median age of diagnosis of this lymphoid malignancy is 70 years of age with an increased incidence in males and Caucasian patients. Here we illustrate the potential for development of DLBCL in a well-controlled HIV-positive individual who does not fit the classic demographic. The atypical presentation of this case urges us to reflect on the importance of past medical history in identifying possible opportunistic infections or malignancy.

Case Description: We present a case of a 45-year-old African American female with a past medical history of HIV and chronic sinusitis who presented to the emergency department with left sided stabbing facial pain, diffuse facial swelling, bilateral epiphoria and chronic nasal drainage for 9 months. Treatment of her symptoms was previously attempted with the use of doxycycline, hydroxyzine, nasal steroid sprays, moxifloxacin and augmentin, all with little relief. The patient's labs showed recent CD4 antibodies were 200 cells/mcL, with an undetectable viral load two weeks prior to admission. On initial physical exam, the patient was alert and oriented to person, place and time and demonstrated acute swelling over the left maxilla and left upper eyelid. The patient denied fever, chills, vision changes or dizziness but admitted to left unilateral hearing difficulty. Based on her exam, a clinical diagnosis of severe rhinosinusitis in the setting of HIV was made. Upon further investigation, a CT of the face with contrast showed extensive sinus disease with erosions of portions of the left maxilla and medial orbit. The possibility of invasive fungal sinusitis such as mucormycosis was raised and the possibility of a malignancy involving the left maxillary sinus was found to be less likely. With these results, infectious disease specialists began treatment with flagyl, ciprofloxacin, piperacillin-tazobactam, vancomycin and posaconazole in order to cover treatment of possible bacterial or fungal pathologies. On her third day of hospitalization, after symptom improvement, a brain MRI confirmed an extensive sinonasal soft tissue mass with erosion and invasion of the skull base. Cytology results grew Achromobacter xylosoxidans which was treated with 3.375mg piperacillin tazobactam IV. The mass was then surgically biopsied showing sheets of large cells with hyperchromatic nuclei and occasional prominent nuclei with scattered mitotic figures. The outcome of this case is a diagnosis of DLBCL, positive for CD45, CD20, PAX5, Bcl-6 and weakly positive MUM1 with a Ki-67 of ~90%. The patient was discharged with referral to hematology/ oncology for chemotherapy, as well as ENT for possible surgical intervention.

Discussion: Current theory for treating the symptoms of rhinosinusitis shows that most cases are either self-limited or improve with anti-bacterial therapy. Initial treatment includes intranasal glucocorticoids and saline lavage for 1-3 months followed by oral antibiotics or oral glucocorticoids if refractory. However, in the setting of HIV, a patient with recurrent infections in the same location and unilateral worsening headaches with or without neurological deficits should be further assessed with imaging with a high index of suspicion for infection secondary to an obstructive tumor. This practice will allow possible neoplasms to be identified earlier in the disease process and will mitigate any delay in treatment of the patient's underlying pathology. In conclusion, the unusual presentation of DLBCL, without B symptoms, lymph node involvement, or viral load elevations, should caution providers to be vigilant when diagnosing and treating immunocompromised individuals.

Title: **Systemic Lupus Erythematosus: A Deeper Look into Posterior Reversible Encephalopathy Syndrome**
Authors: Ashrita Hanmiah, OMS4; Monica Singh, OMS3; Mark Fersch, DO; Naz Gandikal, DO
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Posterior reversible encephalopathy syndrome (PRES) is a radiographic process encompassing a range of clinical etiologies including headache, seizures, confusion and vision alterations. Pathogenesis is unknown however it is associated with disordered cerebral autoregulation and endothelial dysfunction. In PRES, neuroimaging will demonstrate posterior cerebral white edema. In systemic lupus erythematosus (SLE) patients, PRES is an underrecognized and reversible condition. Furthermore, 80% of patients also present with elevated blood pressure usually secondary to SLE nephropathy. PRES must be distinguished from neuropsychiatric systemic lupus erythematosus (NPSLE) as they have overlapping clinical presentations of central, peripheral, autonomic and psychiatric syndromes but different treatment and management approaches.

Case Description: We report the case of a 19 y/o female with a PMH significant for SLE presenting with new onset seizures with post-traumatic amnesia (PTA). The patient experienced two seizures with post-ictal state. The patient also reported having involuntary leg movements, feet numbness and headache. Vitals include HR 110 and elevated BP ranging in the 150s/100s. Blood count results were BUN 30, Creatinine 1.58, and GFR 54. On physical exam, patient had an altered level of consciousness being alert and oriented to her name only. The patient had an abnormal electroencephalogram with generalized delta-theta slowing, more focal in the left temporal region but no clear epileptiform activity. MRI of brain without contrast revealed symmetric T2/FLAIR changes and restricted diffusion along the bilateral medial parieto-occipital lobes and cerebellar hemispheres. CTA and CTV of the brain showed subtle occipital lobe white matter edema and stable patchy lucency in the bilateral cerebellum and parietal lobes. CT head of brain without contrast showed transcortical areas of hypoattenuation of bilateral parietal lobes and subcortical hypodensities in the bilateral occipital lobes. All neuroimaging was consistent with PRES. Azathioprine was discontinued and the patient was managed with diltiazem for blood pressure control, methylprednisolone and levetiracetam. Repeat MRI on admission day #4 showed stable appearance of PRES with no evidence of progression or microaggression. Patient was discharged with diltiazem, prednisone taper and levetiracetam.

Discussion: This case illustrates the importance of thorough workup for PRES with the need to order appropriate neuroimaging and suspicion particularly in SLE patients presenting with rapid rise of blood pressure and renal involvement. Although this condition is often reversible, timely diagnosis and treatment is essential in order to avoid permanent impairments. A significant number of neuropsychiatric manifestations such as seizures occurring in SLE patients might be due to PRES, but non-thorough diagnostic evaluation may lead to misdiagnosis. Identification of distinct clinical patterns between PRES and NPSLE is essential because immunosuppressives should be increased in NPSLE whereas they should be discontinued in PRES if possible. Management of PRES also involves antihypertensives and IV drugs such as benzodiazepines for seizures.

Title: **Desmopressin Acetate as Symptomatic Therapy for Menorrhagia in Hermansky-Pudlak Syndrome**
Author: Steven Harsaran, OMS3
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Hermansky-Pudlak Syndrome (HPS) is a rare, autosomal recessive disorder characterized by bleeding diathesis, pulmonary fibrosis, and oculocutaneous albinism. While HPS has a worldwide prevalence of 1-9/1,000,000, the Northwest & central region of Puerto Rico has a prevalence of 1/1800 with 1 in 22 people carrying the associated mutation involved in lysosomal trafficking. The average lifespan of patients with HPS is 30-50 years with hemorrhagic episodes accounting for 15% of fatalities. Bleeding is caused by a platelet storage pool deficiency leading to impaired secondary platelet aggregation which is confirmed via the absence of platelet dense bodies on electron microscopy. Platelet count is normal in these patients however, platelet function is compromised. The use of desmopressin acetate, a synthetic ADH analog, in these patients prior to surgical procedures is advised however, its use in decreasing the severity of menorrhagia experienced by patients with HPS has yet to be explored.

Case Description: This is a case of a 25-year-old female with Hermansky-Pudlak Syndrome (HPS), diagnosed at 12 years-old in Puerto Rico, here to establish care with a primary care physician as well as discuss recent bleeding episodes. The patient arrived in a wheelchair pushed by her mother. The mother reports the patient has recently moved to the area and was doing fine up until 2-3 months ago where she started having several instances of epistaxis, menorrhagia, and subsequent fatigue. The patient states she has difficulty staying asleep, not only due to aspiration during epistaxis but with reports of bleeding through up to 3 menstrual pads per night for roughly 18-20 days in length. The patient was previously on desmopressin acetate nasal spray to control the epistaxis and the mother stated she would administer this to the patient for her menorrhagia symptoms as well. Mother and patient confirmed an 8 to10

day duration of menses while using desmopressin acetate with an associated decrease of blood loss. This was discontinued by the mother several months ago due to a recall on desmopressin acetate nasal spray as a result of superpotency, or a higher dose than specified, which was found on routine testing. Upon physical exam, the patient was noted to have right beating nystagmus, bruising on her knees, and tachycardia. The patient was referred to hematology for further monitoring of bleeding episodes as well as pulmonology and dermatology to monitor for other HPS complications such as pulmonary fibrosis and skin cancer, respectively.

Discussion: Considering the high prevalence of the disease in Puerto Rico, a high index of clinical suspicion should be maintained in patients presenting with albinism and bleeding diathesis in patients from this region. This specific case presents an example of the possible therapeutic use of desmopressin prophylactically to control menorrhagia in patients with HPS. The literature focuses on desmopressin use before surgical procedures however, using this for menorrhagia and its subsequent consequences (e.g., anemia, fatigue, shortness of breath). While the recall for desmopressin nasal spray is currently under investigation, the subcutaneous or injectable form may be considered as a viable alternative.

Title: **Takotsubo Cardiomyopathy with Left Ventricular Thrombus in a 49-year-old Male**
Authors: Michael Hellman, DO, PGY2; Tasha Heller, MD, PGY1; Nick Lampasona, OMS3; Lee Phan, DO; Wilfred McKenzie, MD; Cristina Savu, DO
Program: Broward Health Medical Center, Internal Medicine Residency Program

Introduction: Takotsubo cardiomyopathy was first described in Japan approximately 30 years ago, with a predominant incidence in elderly women. This unique cardiac pathology can be described as transient left ventricular outward apical ballooning with elevated cardiac enzymes that can mimic a myocardial infarction. Findings on cardiac catheterization are typically insignificant for obstructive coronary artery disease, with echocardiographic results often revealing a focal hypokinetic myocardial wall with outpouching, confirming the diagnosis.

Case Description: A 49-year-old African American male presented to the emergency department (ED) with epigastric pain and intractable vomiting. Past medical history of non-insulin dependent diabetes mellitus, hypertension and chronic marijuana use. He was recently diagnosed, within the last 48 hours of this admission, with cyclic vomiting syndrome presented with epigastric pain at another facility. In the ED, the patient's epigastric pain began to migrate and became substernal pressure in nature. He became diaphoretic and endorsed radiation of pain towards his left arm. Family and social history were noncontributory except that he endorsed being a social drinker and habitually smoking marijuana. Initial vitals and labs were significant for a blood pressure of 202/116, a heart rate of 101 and a troponin of 107.03. EKG on admission was significant for ST elevations in leads II, III, V5 and V6; likely an inferolateral MI. The patient was emergently taken for cardiac catheterization. Results demonstrated mild to moderate non-obstructive coronary artery disease with no lesions that required PCI, apical wall akinesis and dyskinesis with an ejection fraction of 40% with a concern for left ventricular thrombus. An echocardiogram confirmed the presence of a large left ventricular apical thrombus. IV hypertensive therapy and full dose anticoagulation were initiated upon transfer to the ICU post procedure. Due to persistence of epigastric pain, further workup for peptic ulcer disease was undertaken, revealing biopsy positive for H. Pylori. In addition to the current regimen, the patient was started on triple therapy of omeprazole, amoxicillin and clarithromycin, with noted improvement of symptoms.

Discussion: This case report details a 49-year-old male who was found to have Takotsubo cardiomyopathy with a left ventricular thrombus, with likely inciting etiology secondary to cannabis hyperemesis syndrome with superimposition of H. pylori infection. Left ventricular thrombi are mostly discussed in the setting of acute myocardial infarction or dilated cardiomyopathy (Stokman 2001). A multicenter review of 541 cases Takotsubo cardiomyopathy found an incidence of left ventricular thrombi in Takotsubo cardiomyopathy in 2.2% all of which were female with an apical ballooning pattern. These patients were found with a higher prevalence of ST-elevation than those without thrombi (56% versus 16%; $P<0.001$). Further, these patients were found with higher troponin levels than those without thrombi (10.8±18.3 ng/mL versus 3.5±4.3 ng/mL; $P=0.001$) (Santoro 2017). Takotsubo cardiomyopathy secondary to cannabis hyperemesis syndrome is a phenomenon solely described in one case report (Nogi, 2014). There is a paucity of evidence to support not only the incidence of Takotsubo cardiomyopathy secondary to cannabis hyperemesis syndrome cases but further, the underlying mechanism as well.

Title: **Does Size Matter? Incidental Massive Prostate Enlargement**
Authors: Sarin Itty, OMS2; Evan Spencer, MD; Muhammad Choudhury, MD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Benign prostatic hyperplasia (BPH) is differentiated from prostate cancer by a negative transrectal ultrasound biopsy. According to the American Urological Association (AUA), BPH is a common condition seen in almost half of men above age 50, although this is not always clinically significant. The incidence of BPH increases as men age. However, an enlargement in prostate size can lead to several lower urinary tract symptoms (LUTS) including urgency, frequency, sensation of fullness, difficulty initiating stream, and nocturia. Our case is distinctive because this patient developed giant prostatic hyperplasia (GPH): defined as a prostate over 500 grams. This can cause acute urinary retention, bladder stones, constipation, and severe LUTS. In most patients, BPH rarely exceeds 100 grams (Ketabchi, 2012) and there are less than 10 cases of GPH over 700 grams within the medical literature (Maliakal et al., 2014). Our case report involves a prostate which is approximately 2700 grams.

Case Description: The patient is a 70-year old male with a past medical history of BPH and obesity who was transferred from a community hospital to a major tertiary care center for a higher level of care for management of choledocholithiasis. His labs were notable for leukocytosis, transaminitis, elevated bilirubin, and a Prostate Specific Antigen (PSA) of 11.1 ng/mL. The patient's past surgical history includes an arthroplasty, rotator cuff repair and prostate biopsies. The patient's medications include tamsulosin and dutasteride, for control of his urinary complaints. The patient denies a history or genitourinary or related malignancy except paternal colorectal cancer. A non-contrast CT of the abdomen and pelvis revealed cholecystitis and a $21x16x15cm^3$ heterogeneous soft tissue pelvic mass, with mild/moderate right hydroureteronephrosis. During the patient's hospital stay, a non-contrast MRI on post admission day 0 was conducted, revealing a poorly characterized T2 hyperintense mass. The patient underwent laparoscopic cholecystectomy on post admission day 1; his operative course was notable for a pelvic mass palpable around 8 centimeters above the umbilicus which complicated trocar placement. Clinically, the patient denied any voiding complaints or difficulty with bowel movements; aside from nocturia 3x. The patient reports "15+ years of highly enlarged prostate controlled by medication" with two prior negative Transrectal Ultrasound (TRUS) biopsies for elevated PSA. 5 years ago, his urologist estimated his prostate at 500 grams during TRUS. On post admission day 2, he had a repeat PSA of 16.5 ng/dL. A contrast MRI of the abdomen and pelvis for further evaluation of the mass revealed a $12x17x21cm^3$ pelvic mass (approximately 2700 grams of prostate tissue) with the epicenter in the prostatic bed. Additionally, the internal architecture resembled prostatic transition zone and no lymphadenopathy was appreciated. GPH management approaches include prostate artery embolization, 5α-reductase inhibitors, serial transurethral resection of the prostate, open simple prostatectomy, and minimally invasive robotic/laparoscopic simple prostatectomy.

Discussion: This case describes one of the largest reported cases of giant prostatic hyperplasia, amounting to nearly 2700 grams. While it is one of the largest prostates known, the patient's urinary symptoms were relatively mild (nocturia) compared to other GPH cases reported. The current Guinness World Record for largest prostate removed is 2410 grams. Similar case reports suggest obesity could cause metabolic deviations and chronic inflammation, which can exacerbate BPH possibly; also, an increased expression of prostate growth factors and diminished inhibitory elements can contribute (Anglickis et al., 2019). Understanding the mechanism of BPH to GPH progression can help reduce incidence and improve symptom management.

Title: **Home is Not Where the Heart Is: A Rare Case of Cardiac Paraganglioma**
Authors: Amit Jangam, DO, PGY3; Ankit Srivastava, OMS3; Anirudh Gajjala, DO, PGY2; Shane Williams, DO
Program: Palmetto General Hospital, Family Medicine Residency Program

Introduction: Paragangliomas, also known as extra-adrenal paragangliomas, are rare, sporadic neuroendocrine tumors that are composed of cells derived from neural crest. They can be benign, malignant, hormonally active or inactive. A secreting paraganglioma presents clinically similar to pheochromocytoma with symptoms of elevated blood pressure and heart rate, episodic headaches, and sweating. It is important to distinguish the tumors due to implications of associated neoplasms, malignancy risk, and genetic testing. The incidence of paragangliomas is between 1.5 - 9 cases per million people. Cardiac paragangliomas make up 2% of all paragangliomas.

Case Description: This patient is a 60-year-old male with past medical history of Hypertension, Gastroesophageal Reflux Disease, Deep Vein Thrombosis (DVT) of Right Lower Extremity who presented to the hospital with complaints of decreased appetite, night sweats, malaise and right lower extremity swelling for the preceding two weeks. Physical exam was significant for tachycardia at 139 beats per minute with a blood pressure of 176/79 mmHg. Bloodwork, including complete blood count and chemistry panel were unremarkable. EKG revealed sinus rhythm with short PR segment and anterolateral injury pattern. Venous ultrasound of the bilateral lower extremities revealed partial DVT of the right popliteal vein. CT angiography of the chest revealed a heterogeneously enhancing mass interposed between the right pulmonary vein, right middle lobe bronchus and the superior vena cava (SVC). Cardiac MRI revealed a heterogenous mass in the right atrium causing severe mass effect over the SVC with near occlusion—suspicious for a right atrial myxoma, primary neoplasm, metastasis or lymphoma. The patient was treated with heparin for the DVT and taken for cardiothoracic surgical intervention. He underwent resection of the intracardiac mass with radical reconstruction of the heart meshwork. Biopsy revealed the mass, 5 x 3.5 x 4.5 cm in size, with tumor cells positive for chromogranin and neuron-specific enolase (NSE), suggestive of a neoplasm with neuroendocrine features and favoring a paraganglioma. The patient followed up in our family

medicine clinic after hospital discharge and recovered well.

Discussion: In patients with cardiac paragangliomas, initial management involves treatment based on the symptoms, size, location, age and overall health of the patient. Before the patient is taken to the operating room, preoperative evaluation must be performed, including assessment of catecholamine secretion and utilizing imaging studies to localize the tumor. Biopsy of the tumor serves no clinical value and can further complicate the case with hemorrhage and fibrosis. It is imperative that the patient receive preoperative pharmacological treatment to prevent morbidity during the resection. This is accomplished by controlling elevated blood pressure, preventing hypertensive crisis, and providing adequate fluid volume. Medical preparation for the patient follows the similar guidelines as if the patient has a pheochromocytoma. The postoperative period treatment goal is to monitor blood pressure, heart rate, and blood sugar levels.

Title: **Reversal of Graves' Disease with a Whole Foods Plant-Based Diet: A Case Report**

Authors: Rishi Kalia, OMS2; Ravi Kalia, OMS1; Abdullah Elnaji, OMS2; Joshua Musih, OMS2; Abdullah Elnaji, OMS2; Soham Patel, MD

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: The implementation of a whole-food, plant-based diet (WFPBD) has led to a myriad of benefits ranging from cardiovascular, pancreatic and to thyroid health improvement. In a review article, Campbell and Campbell reported that WFPBDs have significantly reduced existing cardiovascular-related plaques as well the formation of new plaques. Furthermore, several studies have explored the benefits of a plant-based diet on reversal of insulin resistance and Diabetes Mellitus Type 2. Vitamin D consumption has also demonstrated increased immune system performance and suppression of the adaptive immune system in autoimmune disease including Graves' Disease. The benefits of a WFPBD on autoimmune disorders such a psoriatic arthritis and the potential hormonal regulatory properties, such as the diets effect on insulin response regulation, lead to the interest in investigating if the diet can potentially reverse an autoimmune condition that leads to a hormonal imbalance, such as Graves' disease.

Case Description: We present a case of a 51-year-old Filipino female who presented to the clinic with a history of recurring Graves' disease, diagnosed in 1998 after her pregnancy. After a period of Graves' disease remission that lasted until 2005, the patient was prescribed Methimazole as needed by her previous endocrinologist when symptoms arose followed by a period of several months in which medication was discontinued entirely. Under the care of Dr. Patel, the patient was placed back on 5mg of Methimazole in July of 2016 and a thyroid panel was conducted, indicating a TSH of 0.01 mIU/L, free T4 (FT4) of 1.8 nmol/L, and free T3 (FT3) of 6.8 nmol/L. At the next visit, a thyroid-stimulating immunoglobulin (TSI) panel, another marker to assess thyroid health, indicated a level of 309 %. In November of 2017, the patient agreed to adopt a fully whole-foods plant-based diet (WFPBD) and use of Methimazole was discontinued. The patient's last TSI measurement before beginning the WFPBD was 446 %. On the patient's return visit in January of 2018, her TSI had dropped to 288 %. Additionally, she reported feeling less bloated, fewer ocular symptoms and her hair loss ceased. By November 2020, labs indicated a TSH level of 2.89 mIU/L, FT4 of 1.3 nmol/L, FT3 of 3.4 nmol/L and TSI level under 89 %. A1c levels decreased from 5.9-6.2% pre-WFPBD to 5.0% post-WFPBD.

Discussion: This case report presents over 4 years of medical measurements highlighting the improvement and complete reversal of the patient's Graves' disease and prediabetes diagnosis. It demonstrates that by transitioning to a WFBPD, the patient was able to discontinue her Methimazole usage and lower her TSI level. Although there have not been many published reports available regarding thyroid or endocrine health while specifically on a WFBPD, the aim of this case report is to add to the current literature on the health benefits of WFPBD as related to Graves' disease and prediabetes and to encourage physicians to consider this dietary approach when prescribing patient care plans.

Title: **Implications of Primary Ovarian Insufficiency Manifested in the Third Decade of Life**

Authors: Karly Kindoll, OMS3; Richard Friefeld, MD

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Premature menopause occurs when a state of ovarian failure is reached before the age of 40. The average age of menopause in the United States is 51, with premature menopause before the age of 30 affecting only 1 in 1000 women. Menopause is diagnosed clinically after 12 consecutive months of amenorrhea but is confirmed quantitatively by an FSH level above 30-40. Menopause before the typical age is a pathologic condition that can often be attributed to primary ovarian insufficiency. The majority

of cases are idiopathic, but regardless of cause, the diagnosis spells out a dire situation for the patient. Hypoestrogenism has significant negative health effects throughout the body, including but not limited to hyperlipidemia, decreased bone density, psychoemotional changes, and vaginal atrophy, effects that all compound over time as the body continues to function in the absence of this vital chemical. Treatment with hormone replacement therapy is critical not only for the physical well-being of the patient, but also may help address the psychological and emotional challenges of entering the menopausal phase of life at such an early age.

Case Description: We present a case of a 27-year-old G1P0010 black female with a primary complaint of unexplained secondary amenorrhea. Prior to the cessation of periods, the patient had experienced regular cycles since menarche. Physical exam produced no significant findings, and urine hCG performed in office was negative. Blood specimen was obtained to evaluate b-hCG, TSH, FSH, LH, and Prolactin. Labs returned significant for FSH of 77.6 mIU/mL. At this time, the patient was prescribed a medroxyprogesterone challenge (10 mg x 5 days), after which she did not experience any withdrawal bleeding. Repeat labs obtained one month after initial labs showed even further elevated FSH of 130 mIU/mL. In context, this result effectively confirmed the suspected diagnosis of menopause at the early age of 27. The patient was counseled on the implications of this diagnosis, to include health risks and infertility, and the decided upon treatment was PremPro dual hormone replacement therapy along with Vitamin D and Calcium supplementation. Follow-up office appointment was scheduled for one year.

Discussion: This case illustrates the appropriate workup and accurate diagnosis of a young woman with new-onset amenorrhea. Premature menopause before the age of 30 is a relatively rare diagnosis, but one that necessitates prompt and proper treatment to lessen the patient's risk of future health complications.

Title: **Tracking COVID-19 with Wearable Devices: A Case Study**

Authors: Gregory Kunis, OMS3; Joshua Berko, OMS3; Jeffery Shogan, OMS3; Zachary Lin, OMS3
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Tracking the onset and progression of SARS-CoV-2 (COVID-19) is extremely important. Identifying the infection prior to it manifesting symptoms is critical to limiting exposure and taking appropriate care measures. Without medical equipment available at home, and an overextension of healthcare facilities, this can pose a challenge. Wearable devices like the WHOOP Strap can and have been used to not only identify symptoms of the disease before they progress in severity, but to track progression of the disease. Tracking progression is crucial as there have been multiple phases of the disease identified with some patients improving slightly before the rapid onset of the pulmonary phase which can end in severe shortness of breath and hospitalization. Identifying and tracking measures such as resting heart rate (RHR), heart rate variability (HRV), average heart rate (AHR), and respiratory rate (RR) can shed light on the disease onset and progression. This case studies a 27-year-old male who wore a WHOOP Strap during the onset, progression, and resolution of COVID-19 over the course of multiple weeks.

Case Description: A 27-year-old, otherwise healthy male presented with upper respiratory tract symptoms, a fever, diffuse myalgia, eyelid swelling, lethargy, and a sore throat. A polymerase chain reaction nasopharyngeal swab was positive for all three identified COVID-19 genes N gene, ORF_1ab, and S_gene. The symptoms progressed rapidly over the course of five days with increasing fever, myalgias, headache, and chest congestion being the most severe. The patients RHR increased from a baseline average of 44 beats per minute (bpm) to 49bpm during the peak window of symptoms, an 11% increase. HRV dropped from a baseline average of 90 milliseconds (ms) to 76ms, a 16% decrease. AHR increased from a baseline of 53bpm to 62bpm, a 17% increase. RR increased from a baseline average of 16 breaths per minute (Bpm) to 16.6Bpm, a roughly 4% increase. This patient’s temperature was also measured via an oral thermometer, with a range of 99.7°F – 102.4°F, as was his oxygen saturation via a portable pulse oximeter with a range of 97%-100%. The patient fully recovered over the course of about 10 days, with cough and chest congestion lasting the longest. The WHOOP Strap data returned to baseline levels the following week for RR and HRV, however the patients RHR and AHR stayed slightly elevated.

Discussion: This case demonstrates the application of tracking certain variables related to disease onset and progression with wearable medical devices. There have been studies identifying the WHOOP algorithm to estimate the probability of COVID-19 infection two days prior to symptom onset in 20% of patients, as well as in 80% of patients three days after symptom onset. There have been countless anecdotes from COVID-19 positive WHOOP Strap wearers reporting increases in RHR and RR days prior to symptom onset, as well as decreases in HRV. This case presents valuable information and identifies the efficacy of a novel way to track the onset and progression of symptoms of COVID-19 in unsure and urgent times. More research needs to be done in the area of wearable devices and detection of COVID-19, but this poses a quantitative way for individuals and healthcare providers to track symptoms of this disease from home, and even identify it pre-symptomatically.

Title: **An Example of a Shortcoming of Using Pelvic Ultrasonography to Identify if an Intrauterine Device (IUD) is Intact**

Authors: Katie Lamar, OMS3; Deirdre Gundy, MD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: According to a survey in 2014 reported by Guttmacher et al. about 4 million women use IUDs in the U.S. for contraception. IUDs are either hormonal or copper. Copper IUD fragmentation has been reported in case reports, frequently found upon removal of the IUD, though one study reported by Duovis et al. suggested the prevalence to be as high as 1-2%. The pathophysiology of IUD fragmentation is unknown. Ultrasound is typically used to evaluate if a patient's IUD is intact and properly positioned.

Case Description: Patient is a 51-year-old female G1P1 who presented to the clinic for a routine gynecological examination. Her last menstrual period was 12/20/2020 and she complained of missing cycles every 3-4 months and spotting for 2-3 weeks for her last 2 cycles. The patient had a Paraguard IUD inserted approximately 10 years ago. The patient denies any pelvic or abdominal pain, abnormal bleeding, urinary or bowel complaints, or vaginitis symptoms. Patient's vitals were stable with a blood pressure of 140/80 and patient denied fever. An ultrasound of the pelvis revealed the IUD in the endometrial cavity, which appeared to be broken into pieces. The arms were visualized in the fundus, then a blank space 9.8mm and a small section of the IUD, then a 7mm more blank space and another piece of the IUD. A hysteroscopy with dilatation and curettage as well as removal of the IUD was discussed with the patient. On 1/14/21 the IUD was removed and found to be intact in one piece.

Discussion: A 51year old female G1P1 presented for a routine gynecologic exam and complained of missing menstrual cycles every 3-4 months with spotting for 2-3 weeks for the past 2 cycles. There was no concern for perforation and infection due to the patient's stable vitals. Upon pelvic ultrasound the IUD was found to not be intact, but surgical removal of the IUD found it to be intact. Pelvic ultrasonography is frequently used for assessment of IUD placement, especially if a patient is complaining of pelvic pain or irregular menstrual bleeding. While the ultrasound is a quick, inexpensive, noninvasive technique to evaluate if an IUD is intact and properly placed, it still has limitations. One of the limitations of ultrasonography is that it has difficulty with visualization in larger patients because increased tissue disperses the waves. This patient had a BMI of 40.72. Therefore, ultrasonography cannot completely rule out if an IUD is intact/improperly positioned in the cause of metrorrhagia.

Title: **SIADH in the Setting of a COPD Exacerbation**

Authors: Alissa Laroche, OMS3; Amy Goodner, DO, PGY2; Aashish Dewan, MD, PGY1; Rebecca Cherner, DO
Program: Broward Health Medical Center, Family Medicine Residency Program

Introduction: Syndrome of inappropriate antidiuretic hormone (SIADH) is a condition marked by increased ADH (Vasopressin) activity that causes water retention, low urine output and hyponatremia. According to the literature, SIADH should be suspected in patients with hypoosmolar hyponatremia, low uric acid, a urine osmolality greater than 100mosm/kg, and a urine sodium above 40mEq/L and in the absence of acid base disturbances. There are many etiologies that can precipitate SIADH. Among them, lung diseases such as small cell lung cancer and pneumonia. This mechanism is thought to be linked to increased vasopressin secretion, which may be a reaction to the hypoxemia and hypercapnia associated with lung disease, among other factors. While hyponatremia can be a sign of poor prognosis in COPD patients, SIADH is not a typical manifestation of COPD exacerbations.

Case Description: We present the case of a 58-year-old White male with a history of alcohol and tobacco abuse who presented to the ED with a productive cough with sputum for ten days. The patient admitted to feeling warm, fatigued, short of breath, and altered mental status. He had been drinking six cans of beer a day and smoking 1.5 packs per day of cigarettes for the past 35 years, though recently he quit smoking. Of note, he was diagnosed with COPD on a previous hospital admission but had never taken any medications at home. In the ED, the patient was afebrile, with a pulse of 111 beats per min and a blood pressure of 164/103 mmHg. His respiratory rate was 18 breaths per min at 95% on room air. On physical exam, the patient was coughing and dyspneic with a prolonged expiratory phase on auscultation. On laboratory evaluation, CBC was pertinent for a hemoglobin of 12.9g/dL, and leukocytosis of 11.13x 10^3/uL. Inflammatory markers were elevated with a lactate dehydrogenase of 307units/L, ferritin of 906, and d-dimer of 0.96 ug/ml FEU. Procalcitonin was elevated. COVID-19, BioFire viral panel, urine legionella antigen, and urine strep pneumonia antigen were all negative. His chemistry panel was significant for a sodium level of 109. Serum osmolality was critically low at 240mosm/kg. Random urine osmolality and random urine sodium were 470mosm/kg and 68 mmol/l respectively. Urinalysis was benign. Imaging revealed bilateral interstitial opacities with a focal opacity within the right upper lobe. A CT brain and EKG were performed and were normal. The patient's COPD exacerbation was managed with IV steroids, breathing treatments, and antibiotics for

suspected pneumonia. Over the course of admission, his O2 saturation, shortness of breath and cough steadily improved. His mental status returned to baseline. Leukocytosis and anemia resolved. Due to his critically low sodium, nephrology was consulted, and he was given normal saline. His sodium level the following day improved only to 111mmol/L, so he was started on hypertonic saline. His sodium minimally improved to 120mmol/L. He was given one dose of tolvaptan and sodium levels increased to 130mmol/L that evening. On day four the sodium was 132 mmol/L and the patient was cleared for discharge by the nephrology team with orders for a 1500ml fluid restriction diet.

Discussion: This patient presented with a COPD exacerbation induced by pneumonia. He was found to have SIADH likely in response to the stress, hypoxemia, and hypercapnia associated with lung disease. While hyponatremia is a sign of poor prognosis, COPD exacerbations do not often present with SIADH. This finding should prompt the examiner to evaluate for precipitating factors, especially in elderly or immunocompromised patients who may have non-specific symptoms. We believe this case report is of interest for this reason, as pulmonary causes should always be evaluated in patients with SIADH.

Title: **Postinfectious Cerebellar Ataxia, Atypical Guillain Barre Syndrome in a Pediatric Patient**

Authors: Jillian Leibowitz, OMS3; Sebastian Shrager, MD, MPH, PGY2; Alexis Dietz, DO, MS, PGY3; Judith Cornely, DO
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Guillain-Barré Syndrome (GBS) is an acute, inflammatory, demyelinating polyneuropathy, most commonly caused by *Campylobacter jejuni*. It is characterized by progressive ascending weakness, areflexia or hyporeflexia, autonomic dysfunction, and less commonly, severe respiratory failure. Postinfectious cerebellar ataxia can be caused by Epstein Barr Virus (EBV) but is most commonly caused by varicella, resulting in sudden onset of ataxia, nystagmus, hypotonia, tremor, and scanning speech. EBV infection can present with fever, pharyngitis, and lymphadenopathy or remain asymptomatic. We describe a rare case of atypical GBS presenting as postinfectious cerebellar ataxia. The etiology of this condition was determined to be infection with Epstein-Barr Virus.

Case Description: A 5-year-old male with no past medical history presented to the emergency department with fever, non-bloody, non-bilious (NBNB) emesis and ataxic gait. Two weeks prior to admission, the patient had an upper respiratory infection, which had since dissipated. The neurological exam showed truncal ataxia and hyperreflexia in bilateral lower extremities and ankle clonus. Computed topography scan of the brain showed a dilated occipital horn of the left lateral ventricle. Magnetic resonance imaging (MRI) spine with/without contrast was unremarkable. MRI brain with/without contrast showed cystic dilation of left lateral ventricular atrium with effacement of the adjacent choroid plexus suggestive of intraventricular arachnoid cyst. Since admission, the patient remained afebrile. His absolute neutrophil count declined from 710 to 220 cells/µL, but steadily increased to stabilize at 1400 cells/µL. During his admission, he developed urinary retention and neurogenic bladder that resolved after two days with Foley catheter placement. Abdominal ultrasound showed moderate hepatosplenomegaly without mass. Upper endoscopy was performed due to continued NBNB emesis which revealed fundal and antral gastritis, and fungal candida esophagitis. Patient then developed areflexia of lower extremities and weakness of proximal muscles. His muscle strength declined to 4/5 bilaterally at hip and ankle levels. Patellar deep tendon reflexes were 0 bilaterally. Lumbar puncture revealed glucose 60mg/dL, protein 20mg/dL, and a negative fluid culture. Oligoclonal bands were noted in CSF and serum indicative of a systemic, rather than intracerebral synthesis of gamma globulins. Virology showed EBV VCA Ab IgM >160 units/mL (normal <36 units/mL) from blood. Results also showed borderline-high but inconclusive levels of Coxsackie B virus serotype-1. Cytomegalovirus IgG values presumptive positive with 1.2 and 3.7 levels 7 days apart. Patient was COVID-19 negative throughout admission. With these findings, we propose he had atypical GBS initially presenting as postinfectious cerebellar ataxia. The etiology of this condition was determined to be infection with EBV. Intravenous immunoglobulins (IVIG) 1g/kg/day for 2 days run over 8 hours each time with resolution of truncal ataxia and neurological findings as well as fluconazole for fungal esophagitis.

Discussion: In a twenty-year review of pediatric GBS patients, presenting symptoms were paresthesia, weakness, and myalgias. GBS is more common in adults with an incidence rate 0.4-2.4 cases per 100,000 for pediatric patients. While plasmapheresis and IVIG are among two treatment options, it is noteworthy that corticosteroids are of no therapeutic benefit in GBS patients as they would be for transverse myelitis, a potential differential diagnosis. Postinfectious cerebellar ataxia is an encephalitis confined to the cerebellum, more frequently caused by varicella (31%) than EBV (3%). More serious differentials like tumors, hemorrhage, drug toxicity, labyrinthitis, and metabolic diseases need to be ruled out before diagnosing postinfectious cerebellar ataxia. Our work up on this patient ruled out all other potential causes for his clinical presentation.

Title: **Leukostasis in Acute Monocytic Leukemia and a Review into Therapeutic Options**
Authors: Cynthia Lopez, MD, PGY2; Gustavo Rivera Alvarez, MD, PGY1; Qassam Jabbar, DO
Program: Palmetto General Hospital, Internal Medicine Residency Program

Introduction: A review of the pathophysiology, clinical manifestations, and therapeutic options in leukostasis in hematological emergencies.

Case Description: This is a case of a 72-year-old male with a history of hypertension, hyperlipidemia, type 2 diabetes mellitus who was sent to the ER for severe leukocytosis, dyspnea, and weakness. In the ER, the patient had a white blood cell (WBC) count of 157K, hemoglobin of 8.8, and platelets of 15K. On physical exam, the patient appeared fatigued, but otherwise unremarkable. Chest x-ray was unremarkable. Peripheral blood smear revealed a marked leukocytosis secondary to acute leukemia, myeloblasts, macrocytic anemia, and thrombocytopenia, no Auer bodies. Patient was transfused 6 units of platelets and underwent bone marrow aspirate and biopsy along with flow cytometry. On day 3 of admission, the patient had a WBC count of 171,000, worsening dyspnea and was placed on nasal cannula. That night, the patient worsened with an oxygen saturation of 82% and altered mental status. CTA chest and CT head without contrast were negative for any embolism or hemorrhage, respectively. Patient was placed on non-rebreather at FiO2 100%. New labs showed a WBC count of 217,000, hydroxyurea, allopurinol, and fluids were started. Day 4, the patient had worsened encephalopathy and labored breathing, and was intubated. Chest x-ray revealed bilateral infiltrates. A dose of cyclophosphamide was given, and rasburicase was added due to the patient meeting Cairo-Bishop criteria for tumor lysis syndrome. The WBC count dropped to 27,000. Unfortunately, the patient became hypotensive from septic shock, per family's wishes, no vasopressors were given, and the patient expired.

Discussion: Leukostasis is a hematological emergency that is seen in acute and chronic myeloid leukemia. This pathological process is defined by hyperviscosity within the microvasculature that manifests as hypoxemia and decreased tissue perfusion, resulting in respiratory or neurological distress. These symptoms are commonly seen with WBC above 100,000. Emergent treatment is indicated. Cytoreduction is imperative, and is done by induction chemotherapy, hydroxyurea, or leukapheresis. Although a decrease in WBC can be appreciated after treatment, once respiratory and neurological symptoms are present, mortality rate reaches 80-90% regardless of the WBC count. Leukapheresis may not always lower mortality and may not be beneficial once vascular damage is present. This is an invasive procedure in which improved survival remains unclear. An investigation into the survival improvement between treatment with hydroxyurea as opposed to hydroxyurea and leukapheresis would be of use when deciding therapeutic options in this patient population.

Title: **Atypical Clinical Diagnosis of Infective Endocarditis in a Pediatric Patient**
Authors: Breyonna Maddox, OMS3; Judith Cornely, DO
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Infective endocarditis (IE) is an infection of the endocardium of the heart or its valves, most commonly caused by a bacterial pathogen. IE can be classified as acute or subacute. Acute IE is distinguished by a deposition of vegetations on previously normal valves and is frequently associated with *Staphylococcus aureus*. Conversely, subacute IE is characterized by small vegetation deposition on congenitally abnormal or diseased valves, frequently due to infection by *viridans streptococci*, particularly after dental procedures. Symptoms of IE include fever, hypotension, and tachycardia, in addition to new onset murmur, Roth spots, Osler nodes, Janeway lesions, and splinter hemorrhages. In more severe cases, IE is associated with glomerulonephritis and septic emboli. We describe a case of infective endocarditis that was diagnosed clinically in the setting of two positive blood cultures only.

Case Description: A 20-month-old female, with a past medical history of a ventricular septal defect (VSD) and eczema, presented to the emergency department with a four-day history of subjective fever and decreased urinary output. Two weeks prior, the patient was admitted for bilateral pneumonia and successfully completed a course of Cefdinir and Azithromycin. Throughout her admission, the patient remained afebrile but tachycardic, and her physical examination remained benign except for a holosystolic murmur on auscultation, secondary to her VSD. Laboratory studies were remarkable for a normocytic anemia, a brain natriuretic peptide level elevated at 162 pg/mL (normal 100 pg/mL) that declined to 13 pg/mL over five days, and a C-reactive protein of 4.88 mg/dL (0.80 mg/dL) that declined to 0.59 mg/dL. A respiratory viral panel, a coxsackie virology panel, a gastrointestinal pathogen panel, stool cultures and C. difficile were all negative. The patient had two blood cultures positive for *Streptococcus mitis* and *Streptococcus viridans*, respectively. The initial transesophageal echocardiogram showed restrictive perimembranous VSD with left to right shunting, left atrium overload, trivial tricuspid, mitral and pulmonary valvular regurgitation, an ejection fraction of 70%, and a small pericardial effusion. There was no gross evidence of intracardiac vegetations. Subsequent repeat echocardiograms had similar findings, with resolution of the pericardial effusion prior to discharge. The patient completed a 14-day course of Ceftriaxone and repeat blood cultures

were negative. Five days prior to discharge, the patient developed a deep vein thrombosis involving the left brachial vein surrounding her peripherally inserted central catheter line. The patient was subsequently started on Enoxaparin, which adequately achieved Heparin Anti-Xa levels, and was discharged with the same treatment for eight weeks. With these findings, the patient was diagnosed with clinical endocarditis that initially presented as fever of unknown origin. The etiology of her condition was found to be secondary to a *Streptococcus mitis* and *Streptococcus viridans* infection.

Discussion: Infective endocarditis is rare in children, but prompt recognition is key to reducing morbidity and mortality. The annual incidence of IE amongst the general pediatric population is 0.3 - 0.8 per 100,000 children greater than 1 year of age, but in the setting of children with underlying congenital heart diseases, the incidence increases to 40 - 60 per 100,000 children per year. The Duke criteria can be helpful particularly in diagnosing infective endocarditis in children but in our case, our patient did not meet major or minor criteria so infective endocarditis would have been ruled out using that method.

Title: **Epstein-Barr Virus Infection in the Presence of Lupus**
Authors: Neville Mathews, OMS4; Jyoti Nair, OMS3
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Epstein-Barr Virus (EBV) is part of the herpes family of viruses, and it causes infectious mononucleosis. Symptoms commonly include fever, sore throat, lymphadenopathy, and fatigue. Transmission occurs via body fluids and the virus then infects B lymphocytes. The symptoms commonly associated with EBV infection result from B lymphocyte proliferation and the resulting T cell response. Ineffective T cell response can result in prolonged infection and possibly B cell lymphoma.

Case Description: We present a case of a 14-year-old African American female with no significant past medical history complaining of fluctuating fever onset two months. Patient also reports abdominal pain, sore throat, and gum swelling but denies any vomiting, rash, or joint pain. Menarche was at age 12 and regular every month until 2 months ago, she has not had a menstrual period for the last 2 months. Patient reports poor PO intake due to lack of appetite. Motrin temporarily alleviates the fever. The patient denies any allergies, recent travel, or sick contacts. She does not take any medication and denies family history of genetic disorders, anemia, or cancer. She denies any sick contacts and vaccines are up to date. On physical exam, all vital signs are within normal limits except for a temperature of 99.1 degrees Fahrenheit. The patient appears fatigued but is alert and awake. Petechiae are noted on the roof of the mouth along with anterior cervical lymphadenopathy. Broad lab work was ordered, and the pertinent results include positive IgG and IgM for viral capsid antigen, low numbers of red and white blood cells along with low hemoglobin, elevated inflammatory markers and liver function tests. Peripheral smear did not show the expected atypical lymphocytes. Due to a surprisingly low white blood cell count despite EBV infection, further lab work was ordered and returned with positive anti smith and dsDNA antibodies, positive ANA. The patient was admitted to the hospital for further evaluation and follow up with hematology and oncology due to the prolonged infection. A renal biopsy was completed due to mild proteinuria, but the patient was not found to have Lupus nephritis. The patient was placed on oral steroids and symptoms gradually resolved.

Discussion: The patient presented very similarly to the expected clinical picture of EBV infection, but her lab work indicated that wpossible deficiency in her immune response could explain the lack of symptom resolution after two months. Studies have shown that patients with Lupus can have elevated EBV viral loads along with impaired EBV specific cytotoxic T cells. In addition, Lupus patients have been found to have more frequent viral reactivation which can result in prolonged infection and increase the rise for future malignancy. As a result, it is recommended that the patient continue periodic treatment with oral steroids for treatment of Lupus and follow up with hematology for observation of white blood cell count due to risk for B cell lymphoma.

Title: **An Unsuspected Hemorrhagic Cyst in a 12-Year-Old Female with Presumed Appendicitis**
Authors: Michael Matli, OMS3; Najla Zayed, OMS3; Rajinder Persaud, DO, PGY1
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Ovarian torsion is a serious cause of acute abdominal pain that requires surgical intervention as early as possible to avoid permanent adnexal damage. They are the fifth most common of the surgical emergencies found in females and may occur in all ages. The pathophysiology of an ovarian torsion is when the ovary rotates around the utero-ovarian ligament and infundibulopelvic ligament, compressing the ovarian vessels. This in turn compromises blood and lymphatic flow. The right ovary appears to be more likely to undergo torsion than the left due to the right utero-ovarian ligament being longer on this side and the sigmoid colon allowing for less movement on the left. In this case, the patient presented with acute right lower quadrant pain around the area of McBurney's

point and episodic emeses typical of acute appendicitis.

Case Description: We present a case of a 12-year-old Hispanic female who presented to the emergency department with complaints of abdominal pain and loose stools. Two days prior she experienced a 10/10 acute sharp right lower quadrant pain, which resolved on its own and recurred the night before admission. Upon arrival to the emergency department the patient was tachypneic with otherwise stable vital signs. She received morphine, Zosyn and a bolus of normal saline. Basic labs revealed a leukocytosis of 17.2. The patient was hemodynamically stable. An abdominal radiograph was within normal limits, ultrasound of the appendix revealed a dilated appendix consistent with acute appendicitis. A pediatric surgery consult recommended surgery on the same day. Patient was taken to the operating room for a laparoscopic appendectomy. Inspection of the right lower quadrant revealed a slightly dilated appendix with minimal inflammation at the tip. Examination of the pelvis revealed necrotic tissue on the right side of the pelvis. Upon further exploration of the necrotic tissue it was determined that the patient had an 8-10 cm hemorrhagic cyst located in the mid-portion of the right fallopian tube and a 720-degree ovarian torsion. On examination, the ovary appeared normal and the fallopian tube was necrotic all the way to the fimbriae. At that point the appendix was removed, and the right ovary was detorsed without complication. Gynecology was then consulted. It was decided that a salpingectomy is preferred to a salpingostomy due to the increased risk of ectopic pregnancy with the latter. The necrotic portion of the fallopian tube and the cyst were dissected away from the mesosalpinx and ovary.

Discussion: In pediatric cases especially, right ovarian torsions can be mistaken for acute appendicitis since they present with similar symptoms, such as acute right lower quadrant pain. When compared to left sided torsions, right sided torsions are more common due to the sigmoid colon decreasing the amount of space for movement. In females presenting with symptoms indicative of appendicitis, it may be beneficial to obtain a pelvic ultrasound to rule out ovarian torsion.

Title: **May-Thurner Syndrome: An Important Cause of Venous Thromboembolism**

Authors: Veronica Matto, DO, PGY3; Yaswanraj Yuvaraj, DO, PGY1; Taleb El-Masro, DO, PGY3; Reina Solis Alvarez, MD, PGY2

Program: Palmetto General Hospital, Internal Medicine Residency Program

Introduction: May-Thurner syndrome (MTS), also referred to as iliac vein compression syndrome, occurs when the iliac venous structures are compressed by iliac arterial structures against the underlying bony architecture. The majority of the patients with MTS are typically asymptomatic or commonly misdiagnosed for their etiology of lower extremity venous insufficiency. In this case report, we present a 44-year-old Hispanic male who was found to have an embolic stroke in the setting of MTS and with a patent foramen ovale (PFO).

Case Description: A 44-year-old Hispanic male with no significant past medical or surgical history presented to the emergency room (ED) with an abrupt onset of expressive aphasia that lasted for about one hour. At the time of evaluation in the ED, his symptoms had already resolved. The patient otherwise denied any weakness, sensory loss, headaches, vomiting, nausea, twitching, decreased level of alertness, erratic behavior, or hemibody/hemifacial numbness or tingling sensation. He did not meet criteria for IV TPA or any neurovascular intervention given symptoms had already resolved. The patient does not consume tobacco, alcohol or use illicit drugs. The patient denied any family history of hypercoagulable disorders. Head computed tomography (CT) did not demonstrate hemorrhage and CT perfusion of the head and neck did not demonstrate any lesions or flow defects. Subsequently, the magnetic resonance imaging (MRI) revealed a left frontal lobe ischemic stroke. Given these findings of cortical stroke, cardioembolic work up was pursued. A transesophageal echocardiogram was performed, which showed evidence of a positive bubble study and PFO. The patient's ROPE score was calculated to be 8, indicating an 84% chance that the stroke is related to the PFO. To determine the origin of the embolism, venous ultrasound of the lower extremities was performed and demonstrated no signs of deep vein thrombosis. Furthermore, magnetic resonance venography (MRV) of the pelvis was obtained and demonstrated narrowing of the left common iliac vein between the right common iliac artery and lumbar spine, consistent with MTS. At that time, it was concluded that the patient would require a PFO closure followed by catheter-based venogram with intravenous ultrasound (IVUS) to confirm the diagnosis. IVUS demonstrated a 24% reduction in area of the right common iliac vein and 76% reduction in area of the external iliac vein. The patient was treated with balloon venoplasty of the left common femoral vein and left external iliac vein as well as stent placement in the left external iliac vein.

Discussion: The raw rate and prevalence of ischemic strokes among young adults (20-64) has nearly doubled from 1990 to 2013. Not only does this affect quality of life of one, but also decreases productivity and participation in society due to the disability caused by ischemic strokes. A young patient with an ischemic stroke warrants a work-up for cardioembolic etiology. A thrombus can form at the site of the PFO, or it can come from another source within the body. Therefore, lower extremity venous ultrasound allows us to search for deep vein thrombosis but is limited to the extremity. The pelvic region should be ruled out as one of the origins of the thrombus via MRV, but if clinical suspicion is high for MTS then a more invasive diagnostic procedure should be pursued to confirm. IVUS is the

current gold standard to diagnose MTS.

Title: **Electronic Vaping Acute Lung Injury Amid the COVID-19 Pandemic**
Authors: Taylor Mazzei, OMS3; Amie Cocoros, MD, PGY2; Anuj Khanna, DO, PGY1; Diana Varela-Margolles, MD, PGY1; Jehon Amen, DO, PGY2; Scott Nettboy, DO, PGY3
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Electronic Vaping Acute Lung Injury (EVALI) is a relatively new disease which was seen in many young adults during 2019. A few months prior to COVID-19, EVALI was of concern all over the United States. Per the CDC, the reported incidence for EVALI was approximately 2,711 hospitalizations and 68 deaths as of January 21, 2020. Although the pathophysiology is not fully understood, it is thought the inhaled/vaporized oils form radicals which interact with surfactant and phospholipids, thus damaging the delicate epithelial lining of the alveoli. This case report is unique because our patient's initial symptom presentation led us to believe he had COVID-19 infection. He presented with complaints of fever, diarrhea, and worsening shortness of breath during the peak of the COVID19 pandemic in South Florida. However, after 3 negative COVID test results, our primary differential became Hypersensitivity Pneumonitis secondary to electronic vaping.

Case Description: We present the case of a 27-year-old Caucasian male with past medical history of anxiety who presented to the emergency department with fever, nausea, and vomiting for five days, and worsening shortness of breath with diarrhea for two days. One week prior to presentation, he reported going out with a group of friends. The following day, he had a productive cough, fever, and vomiting. He attributed his symptoms to alcohol use the night before. After two days without improvement of symptoms, he decided to get COVID tested which resulted negative. He continued to have worsening shortness of breath which prompted a visit to the emergency room. His mother mentioned he had similar symptoms a year ago, during which he was treated for pneumonia and discharged home with antibiotics and steroids. On further investigation, he disclosed he smokes 3-4 cartridges of marijuana per week via electronic vape. On admission, he was profusely diaphoretic, tachycardic, and tachypneic with oxygen saturation at 80% on room air. ESR, CRP, D-dimer, and ferritin were elevated. Imaging of the chest showed diffuse patchy ground-glass opacities bilaterally suggesting interstitial disease. Based on imaging and lab results, COVID-19 infection was on the differential; however, he tested negative for COVID on three different tests. This led us to consider the diagnosis of Hypersensitivity Pneumonitis secondary to electronic vaping. There is currently no definitive test to diagnose EVALI; it is a diagnosis of exclusion. Three days into his admission, he became hypoxemic on 8L non-rebreather supplemental oxygen. He was transferred to Respiratory Care Unit (RCU) for closer monitoring which he later became further hypoxemic, saturating in the 50-60s on 60L High Flow nasal cannula. His respirations were 55-70 per minute. Due to increasing oxygen requirements he was transferred to ICU. On hospital day 7, he was intubated and sedated due to worsening respiratory distress. One month into his admission, he is still requiring supplemental oxygen via tracheostomy. Treatment options for EVALI are limited due to the permanent lung damage. Our patient was treated with corticosteroids, broad spectrum antibiotics, and supplemental oxygen. Due to the extensive damage to his lungs, a lung transplant will be inevitable for him at some point in his life.

Discussion: This case report aims to increase awareness of EVALI amid the COVID-19 pandemic. Health care providers should be concerned for patients still using electronic vapes and advise them to refrain from use. Future studies should focus to see if EVALI is caused by third party cartridges, different oil types, additives, and vape flavorings.

Title: **Ehrlichiosis: A New Great Imitator**
Authors: Alicia C. McCartney, OMS3; Carly P. Whittaker, OMS3; Erica L. Noyes, MD
Program: Magnolia Regional Health Center, Family Medicine Residency Program

Introduction: Ehrlichiosis is an uncommon tick-borne rickettsial illness most often seen in the southeastern and south-central United States. The most common causative organism is the gram-negative coccobacillus *Ehrlichia chaffeensis,* though it can rarely be caused by *Ehrlichia ewingii* or *Ehrlichia eauclairensis* as well. It is transmitted by the lone star tick (*Amblyomma americanum*) typically in the summertime, and the most commonly affected patients are older white males. The most common initial presenting symptoms are fever, headache, myalgias, and joint pains. Prompt recognition and treatment of ehrlichiosis is crucial as ehrlichiosis can develop into a severe disease with meningitis, meningoencephalitis, acute respiratory distress syndrome, toxic shock-like or septic shock-like syndromes, hepatic failure, coagulopathies, renal failure, and death if untreated.

Case Description: The patient is a 43-year-old female with a past history of migraines, insomnia, and psoriasis who presented to the

primary care office in November 2020 for chief complaints of fatigue, increased frequency of headaches, and recent psoriasis flares. She denied subjective fevers. She reported diffuse joint and muscle pain, including in her fingers, with changes to her nails. She had new twitching of her right eye and right side of her face with intermittent facial tingling and a new right-sided facial droop. She was afebrile on presentation. Her physical exam revealed slight drooping of the right corner of her mouth with flattening of the nasolabial fold on the right side. She had no swelling or palpable abnormalities in the joints of the hands. Otherwise, her exam was benign. She was worked up for anemia, thyroid disease, low vitamin B12, autoimmune disease, myasthenia gravis, and tick-borne illnesses. CBC and CMP were unremarkable. TSH, free T4, and vitamin B12 levels were normal. Connective tissue panel was negative. She was negative for acetylcholine receptor antibodies. On serology, she was negative for Lyme and anti-Rickettsial antibodies. She was also negative for *E. chaffeensis* IgG antibodies but positive at 1:20 for *E. chaffeensis* IgM antibodies. It was determined she had been recently infected with *E. chaffeensis* and was started on doxycycline 100mg twice a day for ten days. A follow-up visit one month after the initiation of treatment showed complete resolution of fatigue, headaches, myalgias, and joint pain. The facial droop persisted.

Discussion: The patient was an unlikely candidate to have ehrlichiosis considering her lack of fever, no known history of tick bite, and mismatch with the most commonly affected demographics. She was also presenting at an atypical time of the year to have recently acquired a tick-borne disease. The only features of this case which could lead to suspicion for tick-borne illnesses included her facial palsy and residence in Mississippi. Therefore, in an area where tick-borne illnesses are relatively common, clinicians should maintain a high index of suspicion when confronted with a patient with new-onset neurological symptoms, regardless of the absence of other suspicious features or the presence of chronic conditions with similar symptoms.

Title: **Saturday Night Palsy Leading to Renal Injury**

Authors: Meghna Mendu, OMS3; Jillian Leibowitz, OMS3; Anuj Khanna, DO, PGY1; Darcie Linder, DO, PGY1; Rajiv Chokshi, MD

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Acute compartment syndrome (ACS) is a surgical emergency that requires a high index of suspicion from clinicians. The diagnosis can predominantly be made clinically via the "6 P's" including pain, pallor, paralysis, paresthesias, pulselessness, and poikilothermia. An absolute compartment pressure >30mmHg is also diagnostic of ACS. Due to the risk of muscle necrosis and ischemia, immediate surgical fasciotomy is indicated at early signs of compartment syndrome. Concomitant rhabdomyolysis is of additional clinical concern in these patients due to crush injury or trauma to muscles inducing release of intracellular contents into the bloodstream. Due to the release of nephrotoxic agents such as myoglobin, acute renal failure can ensue. We present a case of (ACS) and rhabdomyolysis induced renal injury in a male after crushing his left upper extremity with his body weight after a Saturday night out with substance abuse.

Case Description: A 40-year-old Caucasian male with a past medical history of a subdural hematoma and polysubstance abuse including alcohol, cocaine, and heroin, presented to the Broward Health Medical Center Emergency Department (ED) with left upper extremity pain, swelling, and numbness. The patient stated that he woke up that morning on a front lawn with his full body weight crushing his left arm. He has no recollection of the previous night's events. On primary physical exam, his left arm was swollen, purple, painful, pulseless, with accompanying paresthesia and weakness during active range of motion testing. He also had no sensation along the median and ulnar nerves. Doppler Ultrasound of the left upper extremity arteries showed slow flow in patent radial and ulnar arteries. Venous Doppler showed edematous left upper arm musculature, but no venous thrombus. Total creatine kinase was >42,000, potassium of 7.3, BUN of 33, and creatinine of 3.6. An emergent pressure release was performed in the ED. Based on these findings, the patient required emergent fasciotomy due to suspected ACS. However, the severe hyperkalemia required emergent dialysis prior to surgical intervention. After one round of dialysis via femoral catheter, emergent fasciotomy was performed. Since admission, continuous dialysis treatments for possible Acute Kidney Injury due to rhabdomyolysis was needed. Clinically, the patient was not in distress or suffered any focal neurological deficits. His BUN/creatinine level remained consistently elevated. Foley catheter was needed due to oliguria. By day 15 of admission, he was able to maintain adequate urine output and void without the Foley. His BUN/creatinine improved daily as well as his Glomerular Filtration Rate. Electrolytes were closely monitored daily due to polyuria and improving renal function. Once his labs were stable, he was able to receive a graft placement post fasciotomy. With resolving renal function, he no longer required dialysis, so the catheter was removed, and he was discharged from the hospital.

Discussion: The patient's case followed the three stages of Acute Tubular Necrosis. The Inciting event was the Rhabdomyolysis brought on by the patient resting his full body weight on his arm overnight. The Maintenance phase was when he was oliguric and hyperkalemic, which lasted for a couple weeks. Finally, the Recovery phase was when his BUN and Creatinine values started to normalize after dialysis, and he regained good urine output.

Title: **A Rare Case of Intraductal Papillary Mucinous Tumor with Common Bile Duct Involvement**
Authors: Sushmita Mittal, OMS3; Karina Bidani, OMS3; Sri Moturu, OMS3; George Michel, MD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Intraductal papillary mucinous neoplasm (IMPN) is a rare, slow growing, cystic tumor that accounts for less than 2% of all pancreatic neoplasms. IPMN arise from the intraductal epithelial cells and are characterized by production of thick, mucinous fluid that can be seen on endoscopic examination. It is often diagnosed in the 7th decade with a slight male predominance. The risk factors for IMPN are not clear however some associated conditions that have been identified include diabetes, chronic pancreatitis, and smoking. IPMN is divided into three main variants based on its location – main duct, branch duct, or mixed duct with main duct IMPN having a 70% risk of progressing to malignancy. Clinically, IPMNs can present with epigastric pain, however, most cases symptomatic which contributes to its commonly delayed diagnosis as an incidental finding. These tumors have excellent prognosis (95% cure rate) however if not treated, they can undergo malignant transformation via the classic adenoma-carcinoma sequence.

Case Description: We present a case of a 72 y/o male presented to the Emergency Department with a one-month history of epigastric pain, diffuse skin itching, and fatigue. Upon further questioning, the patient also complained of gray colored diarrhea, fatigue, weight loss, and loss of appetite. Physical exam revealed scleral icterus and tenderness upon abdominal palpation. Inpatient labs were performed and revealed the following: total bilirubin (15.5 mg/dL), direct bilirubin (8.8 mg/dL), GGT (682 u/L), AST (115 u/L), ALT (176 u/L), and alkaline phosphate (201 IU/L). Concurrently, abdominal ultrasound was conducted which revealed dilation of intrahepatic and extrahepatic biliary ducts along with dilation of the common bile duct to 19.5 mm. Further examination with an abdominal CT showed a 1.2 x 1.2 x 1.4 cm cystic mass at head of pancreas. A follow up MRCP showed a 1.3 cm cystic lesion at the pancreatic head with communication to the main pancreatic duct. This finding indicated a possible "intraductal papillary mucinous neoplasm". The lesion was also obstructing the common bile causing structuring and stenosis for which an ERCP was performed for stent placement. A diagnosis of IPMN was confirmed with pathology specimens obtained with endoscopic ultrasound with fine needle aspiration and the patient was transported later that week for a whipple procedure for treatment of the neoplasm.

Discussion: This case exemplifies the importance of early diagnosis and treatment of intraductal papillary mucinous neoplasm prior to its progression to malignancy. We use our patient's case on IPMN to contribute to the limited literature on IPMN presentation and management to help prevent its progression to malignancy.

Title: **Rare Case of Early Onset Intracranial Stenosis Secondary to Uncontrolled Type 2 Diabetes Mellitus**
Authors: Jillian Montague, OMS3; Himadri Shah, OMS3; Sri Moturu, OMS3; Zoie Goldstein, DO
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Cerebrovascular accidents (CVA) are one of the leading causes of mortality and disability worldwide. In a review of 2,578 patients, the average age of a person experiencing a CVA due to intracranial atherosclerotic stenosis (ICAS) was 70 years old. Patients who have ischemic strokes due to ICAS have higher rates of hospital stays and stroke relapse than those with other types of ischemic strokes.[1] Diabetes mellitus increases a patient's risk of having a CVA 3-5 times more than non-diabetics, is associated with higher morbidity and mortality, and has been correlated to higher rates of ICAS.[2,3] Higher levels of systolic blood pressures, fasting blood glucose and HbA1c were associated with a higher risk of ICAS.[2]

Case Description: This case presents a 37-year-old African American male with two-day history of dysarthria and partial facial palsy and a 10-day history of intermittent right upper extremity paresthesia. Patient has a history of uncontrolled type 2 Diabetes Mellitus and a history of medical noncompliance. On primary survey, his heart rate was 95 beats per minute, sitting blood pressure of 158/101 mm Hg, glucose level of 293, H & H of 14.1g/dL and 41.8%, potassium of 5.5, sodium of 135, PTT of 29.8 and INR of 1.0. The patient's urine was negative for ketones, had >500 glucose molecules and had a urine protein level of 30. His total cholesterol level was 124 mg/dL, triglyceride level of 403 mg/dL, A1C 9.5%, and eAg of 225.95 mg/dL. Of note, the patient's blood pressure elevated to 190/107mm Hg. A carotid CT angiogram showed several foci of significant stenosis involving the M1 segment of the left middle cerebral artery and high-grade stenosis or occlusion at the right A1/M1 junction. A multisequence multiplanar MRI the following day showed numerous small punctate foci, of acute ischemia, restricted diffusion to the left frontal lobe along with numerous small foci of post-contrast enhancement in the left frontal lobe without a discrete mass. The patient was given Aspirin, Enoxaparin, and Insulin Human Lispro during his hospitalization and was discharged with a focused diabetes management, dual antiplatelets, Plavix and

started on a high-dose statin. He did not qualify for surgical management at this time.

Discussion: This case illustrates that hyperglycemia, secondary to uncontrolled type 2 diabetes mellitus, may contribute to early alterations in intracranial blood vessels, regardless of age, and highlights the importance of monitoring intracranial circulation and controlling glucose levels in similar patients.

Title: **Cavernous Hemangioma of the Spermatic Cord**
Authors: Jason Morris, OMS2; Cameron Mayell, OMS2; Shreya Narain, OMS2; Joseph Migliozzi, MD, PhD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Paratesticular tumors are rare findings, making up 7-10% of all intrascrotal tumors (A. Galosi et al, 2014). Of these tumors, 70% are benign and 30% are malignant (B. Khoubehi et al, 2002). These tumors arise from the spermatic cord, inguinal canal, testicular tunic, epididymis, or mesenchymal tissues with the spermatic cord being the most common site. Even more rare are cavernous hemangiomas, which are benign, paratesticular tumors. This case shines light on the presentation of a patient with a cavernous hemangioma and the clinical steps taken to successfully treat him.

Case Description: Cavernous hemangiomas of the spermatic cord are very rare, and few cases have been radiographically or histologically documented. A 46-year-old male presented to his primary care provider with a lump in the right groin. The patient noticed the abnormality 1 month previously and was unaware of any appreciable enlargement. Patient reported generalized groin discomfort, otherwise medical and surgical history were unremarkable. Upon referral to urology, clinical exam revealed a firm mass at the level of the external inguinal canal, which was related to the spermatic cord. Ultrasound with spectral doppler flow showed a 1.8cm mass of the right spermatic cord absent of dystrophic calcification. During surgical excision of the lesion via the inguinal approach, the spermatic cord and ipsilateral testicle were preserved. Postoperative recovery had no complications. Histopathologic studies confirmed the diagnosis of cavernous hemangioma of the right spermatic cord. Capillary hemangiomas of the spermatic cord are also rare. They have been reported previously on histologic exam without detailed reference to cavernous hemangioma or any mention of their sonographic appearance. Differentiation from malignant sarcoma, the most common paratesticular mass, in this area is difficult and confirmation by histopathologic exam is necessary.

Discussion: This case outlines histopathological features of a cavernous hemangioma of the spermatic cord and indicates prompt excision and biopsy to rule out malignant sarcoma.

Title: **A Routine Laparoscopic Appendectomy Turned Right Hemicolectomy for a Cecal Mass Masquerading as Acute Appendicitis**
Authors: Sri Moturu, OMS3; Himadri Shah, OMS3; Poonam Patel, OMS3; Jason Frost, DO
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Cancer of cecum accounts for 20% of colorectal carcinoma cases, commonly occurs in the sixth decade of life and is the second highest cancer related mortality in the United States for both males and females. Cecal cancer specifically has an insidious onset due to the anatomical features of the cecum that limit access of barium enemas and colonoscopies. The symptoms of cecal cancer include unexplained weight loss, abdominal discomfort, bloody stools, and changes in bowel habits. Cecal cancer is not characterized by specific clinical or radiological features, therefore diagnosis of these tumors often requires surgical resection and histological assessment to reach a conclusive diagnosis. If diagnosed early cecal cancer is curable, highlighting the importance of strict adherence to screening protocols and treatment.

Case Description: We report a case of an 82-year-old Caucasian female who had not had a colonoscopy for 18 years and presented to the emergency department with a four-day history of persistent abdominal pain, nausea and 3 episodes of emesis. On physical examination, she had fullness and tenderness in her right lower quadrant so a CT of the abdomen and pelvis with contrast was ordered. On imaging a distended and thickened appendix with peri-appendiceal inflammatory fat stranding, compatible with acute appendicitis was visualized. There was also significant thickening of the cecum. A diagnostic laparoscopy revealed a cephalad position of the cecum with dilation that extended across its surface and along the terminal ileum. There was immediate concern that this presentation was a neoplastic process. Along the posterior aspect of the cecum was a thickened and inflamed appendix. The appendix was then resected. At this point, a right paramedian incision inferior to the umbilicus was made, and the right colon was delivered to the

operative field. The terminal ileum, part of the transverse colon and numerous enlarged lymph nodes throughout the omentum were resected. The blood supply to the right colon was then divided and a widely patent and intact functional end-to-end anastomosis was created. Pathology reports of the specimen collected during the right hemicolectomy indicated a grade 2, invasive colonic mucinous adenocarcinoma arising within the cecum and involving the appendix. The tumor extended throughout the muscularis propria, into the pericolonic tissues and was continuous with the serosa. There was also extensive tumor lymphovascular involvement as 15 of the 22 pericolonic lymph nodes were positive for metastatic adenocarcinoma. A referral to an oncologist was ordered and they discussed the treatment plan and prognosis with the patient.

Discussion: We use this case to highlight the importance of the screening guidelines for colorectal carcinoma to allow for early detection and treatment of metastasis. Acute appendicitis is uncommon in older adults and may be the initial manifestation of an underlying colorectal carcinoma, therefore it is imperative to screen for malignancy in these patients. Educating patients on maintaining a strict adherence to screening guidelines is vital as it can prevent rapid metastases of colorectal carcinoma to other regions which can be deadly.

Title: **The Use of OMT in Treating Complex Regional Pain Syndrome**
Authors: Nishad Mysore, OMS1; Gregory Kunis, OMS3; Joshua Berko, OMS3; Patrick Barry, DO
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Complex Regional Pain Syndrome (CRPS) is a disease with a very convoluted course and complicated treatment regimen. The pathophysiology of CRPS is not quite clear which proves for a difficult treatment approach. There are three pathways that normally occur – aberrant inflammatory mechanisms, vasomotor dysfunction, and maladaptive neuroplasticity. The main features are hyperactivation of the peripheral nervous system which leads to central sensitization and sympathetic overdrive. This case study explores a patient suffering from CRPS for over 30 years, who exhibited a positive response to a specific OMT regimen.

Case Description: A 57-year-old male presented to the clinic with a 30-year history of CRPS affecting his right lower extremity, pelvis, groin and abdomen. Our patient was previously in the Army and had an accident after jumping out of a plane where he dislocated his right hip, shattered his right femur, tore most of the ligaments in his right knee, and broke his right ankle. A myriad of surgeries led to surgical complications, revisions, and post-operative infections, which culminated in the onset of complex regional pain syndrome. The patient was mostly wheelchair bound due to excruciating pain with movement, but able to get around minimally at home on crutches. On physical exam, our patient had decreased pulses in the right lower extremity, pitting edema of the right foot, no muscle strength or even contraction of the gastroc, and minimal contraction of the tibialis anterior on that side. He had no deep tendon reflexes at the patella or achilles, a + Babinski on the right foot, and his right lower extremity exhibited allodynia, as well as a lack of hair below the knee. The OMT consisted of a combination of constant limb traction, counterstrain, soft tissue and balanced ligamentous tension to treat multiple somatic dysfunctions the patient exhibited. The patient demonstrated increased passive range of motion and active range of motion at the hip and knee and expressed decreased pain from 8/10 pre-treatment to 4/10 post-treatment that lasted for a few hours. At follow-up appointments the patient demonstrated even more improvement in the lower extremity, with decreased pain and some increased active range of motion. At subsequent visits our patient also tolerated the treatment much better, with less apprehension and pain with passive range of motion from the start.

Discussion: OMT can assist in the treatment of muscle spasms and pain from CRPS refractory to standard medical therapy. Adding traction to our patient's leg acted as an activating force to shut off the cycle of overactivation and sensitization, allowing us to use various techniques to target numerous dysfunctions. One limitation is that we only treated this patient twice and believe he would benefit from more regular visits. However, we did see marked improvement in his pain scores and range of motion after these two treatments. We believe this approach can be an effective adjunct to treatment of CRPS and that using this technique may allow us more freedom of treatment modalities in the future.

Title: **Classic Findings of Wernicke's Encephalopathy Due to Alcohol Abuse**
Authors: Jyoti Nair, OMS3; Morsal Osmani, OMS3; Haroon Nawaz, MD, PGY1
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Wernicke's encephalopathy is caused by a vitamin B1 (thiamine) deficiency and presents with the classic triad of ataxia, oculomotor dysfunction, and encephalopathy. This typically occurs in alcoholism, malnutrition, hyperemesis gravidarum, and bariatric surgery. In alcoholism, absorption of thiamine from the gut is impaired, resulting in decreased phosphorylation to thiamine

pyrophosphate and excessive requirements for the metabolism of alcohol.

Case Description: We present a case of a 58-year-old white female with a past medical history of Hypertension who presented to the ED complaining of dizziness for the last week. She was recently hospitalized with recurrent falls and reported episodes of dizziness every time she walked or stood up. She reported drinking 2-3 glasses of wine on a daily basis. Upon arrival to the ED, she was well-appearing, verbal and her only abnormalities were vertical nystagmus and a blood pressure of 170/100 mmHg. She had a CT Angiogram without contrast performed which revealed negative enhancing lesion, dissection, occlusion or significant stenosis; the only positive finding was vascular calcifications. She was given Meclizine and admitted for an MRI and further workup of her dizziness. Once admitted, patient was without focal deficits but continued to have significant vertical nystagmus and was also found to have horizontal nystagmus. She was unable to have a steady gait and unable to ambulate even minimally. She continued to report dizziness. Neurology was consulted to the case. An MRI Brain without contrast, MRA, and US Doppler Carotid bilateral were performed and revealed no remarkable findings. An MRI with contrast was then ordered due to persistent symptoms, which revealed classic findings of Wernicke's encephalopathy. It showed abnormal flair signal in the medial thalami, periaqueductal regions, mammillary bodies, and around the third ventricle and tectum and thus the diagnosis was made definite.

Discussion: This case illustrates that accurate diagnosis of Wernicke's encephalopathy requires a high index of suspicion. Without treatment, Wernicke's encephalopathy can progress to Korsakoff syndrome which results in confabulations, the inability to form new memories, and hallucinations which can be irreversible. Early Thiamine repletion results in rapid resolution of symptoms and prevention of long-term disability.

Title: **The Fine Balance: Managing Violent Behavior in Schizoaffective Disorder**
Authors: Nicolette Natale, OMS3; Prachi Singh, OMS3; Sarthak Parikh, OMS3; Eric Robbins, MD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: In an inpatient setting, violent behavior places staff and other patients at risk of serious injury and can hinder proper and effective treatment for the patient. Individuals with schizophrenia, bipolar disorder, and schizoaffective disorder have been associated with an increased risk of violent behavior. In individuals with bipolar, aggression tends to occur during a manic episode. In contrast, individuals with schizophrenia often display violence due to the acute psychopathology of psychosis, which includes command hallucinations and/or paranoid delusions. Patients with schizoaffective disorder who display frequent violent outbursts present a unique challenge in selecting effective treatment as it is often difficult to identify which psychopathology, mania or psychosis, are the cause of this violent behavior.

Case Description: We present a 47-year-old male who has been treated at South Florida State Hospital since 2014. The patient is at the psychiatric facility for the violent crimes of burglary and domestic violence. Upon admission in 2014, he was non-cooperative, irritable, and tense. He exhibited flight of ideas, pressured speech, grandiose delusions, and had a lack of insight into his condition. He was involved in multiple incidents of aggression, including an incident of choking another individual. In 2014, his psychotropic medications included Chlorpromazine, Clonazepam, Haloperidol, and Trihexyphenidyl. Throughout his stay, he remained on the acute wing of the Combative Behavior Unit (CBU), as he was consistently attacking peers and staff. Throughout this period, he has been on a number of antipsychotic medications including Loxapine, Quetiapine, Iloperidone, and Olanzapine which yielded very little change in his behavior. In 2020, he was responsible for half of the events reported by his unit, in excess of 80 aggressive events. In October of 2020, Lithium and Carbamazepine were added to his medication regimen and the patient began to show significant improvement in regard to his aggression and violent behaviors. His distraction reduced, speech slowed down, and he became much more agreeable and cooperative in interviews with staff. His last incident of overt physical aggression was over a month ago, and for the first time in six years, the patient was moved to a less restrictive wing in the CBU.

Discussion: Schizoaffective disorder, bipolar subtype is marked by a combination of psychotic and manic symptoms. Patients with this diagnosis do have a higher likelihood of perpetrating violence and determining the root cause of this behavior can be quite challenging. Antipsychotics are used if psychosis is believed to be the main contributor versus mood stabilizers if mania is more prominent. Patients in the inpatient setting tend to have more severe and resistant conditions, adding complexity to determining the right mixture of medications needed to stabilize the patient's violent attacks. In our case, the patient had six years of failed treatment with numerous antipsychotics and it wasn't until two strong mood stabilizers were used in combination did the patient show a significant reduction in his violence and aggression towards others. It was quite apparent that his violence stemmed from poorly treated manic symptoms and once properly treated, his violence dissipated.

Title: **Diabetes and Lung Disease: Could Uncontrolled Glucose Levels be Related to the Development of a Patient's Organizing Pneumonia?**

Authors: Jorge Esteban Nunez, DO, PGY1; Veronica Matto, DO, PGY3; Rolando Monteverde, MD, PGY1
Program: Palmetto General Hospital, Family Medicine Residency Program

Introduction: Cryptogenic organizing pneumonia (COP) is a type of interstitial lung disease (ILD) that most commonly presents with symptoms of cough, dyspnea, malaise, and weight loss. It is considered cryptogenic when no specific cause is found. Other times, organizing pneumonia (OP) can be considered secondary when it is found in the setting of specific risk factors such as the use of certain medications, connective tissue disorders, or malignancy. Here we will focus on the effects diabetes mellitus has on the lung and its possible association with the development of ILD.

Case Description: A 56-year-old man with a past medical history of non-insulin dependent type II diabetes mellitus presented to the emergency department per recommendation of his primary care physician for hyperglycemia and hypertriglyceridemia seen on recent lab work. The patient stated that he had recently felt more tired than usual and reported an unknown amount of weight loss. He otherwise felt well and had no other complaints. He works as a truck driver and does not see his PCP on a regular basis. He denied any recent illness or sick contacts. On the physical exam, initial vitals were negative for fever, and the patient was hemodynamically stable and satting at 98% on room air. Cardiovascular exam was normal, and the lung exam was clear to auscultation bilaterally. A complete blood count was negative for any abnormality. A complete metabolic panel showed a mild hyponatremia of 135 mmol/L, elevation in alkaline phosphatase of 163 U/L, and an initial glucose level of 347. Hemoglobin A1C was elevated at 11.61%, lactic acid was elevated at 2.5 and a cholesterol panel showed elevation in the triglyceride level at 1,894 mg/dL. A chest x-ray done in the ER showed incidental findings of Ill-defined patchy infiltrates bilaterally with predominant peripheral distribution. Because of these findings, a CT of the chest was then done which confirmed innumerable pulmonary nodules throughout both lungs measuring up to 2.6 cm in size. Further labs were ordered to rule out causes such as infection, neoplasm, and inflammatory causes for these pulmonary nodules. The patient underwent CT guided lung biopsy for definitive diagnosis of these lung nodules. Pathology report of lung biopsy stated that there was cellular evidence of few pneumocytes and macrophages and diagnosed the patient with organizing pneumonia with a "BOOP" pattern. Because no specific cause was found, a diagnosis of cryptogenic organizing pneumonia was made. He was started on a prednisone taper to be continued for 6-7 months and was told to follow up outpatient for pulmonary function testing and repeat chest CT scan within 3 months.

Discussion: Cryptogenic organizing pneumonia is diagnosed based on a combination of clinical features, radiological findings, histopathology of organizing pneumonia, and exclusion of specific causes for the lung pathology. When causes such as infection, malignancy, and connective tissue disorders have been ruled out, it is important to think about how other comorbidities could be related. Though not specific to organizing pneumonia, diabetes mellitus has been associated with several lung diseases. Because of this association, it is reasonable to consider diabetes as a contributing factor to our patient's development of OP. Further studies are needed to establish a more definitive relationship between diabetes and specific lung diseases such as ILD. However, when no other specific cause for OP is found, diabetes could be considered as a potential risk factor and emphasis on glycemic control is important.

Title: **A Case of XYY Syndrome Related to Seizures**

Authors: Morsal Osmani, OMS3; Umar Chaudhry, MD, PGY1; Pallavi Aneja, MD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: XYY syndrome is a sex chromosome aneuploidy that occurs in about 1/850 male births. Males have 47 chromosomes instead of the usual 46 chromosomes due to an extra Y. The error of disjunction occurs either during paternal meiosis II or as a post-zygotic mitotic error. This chromosome abnormality is characterized by average or lower than average intelligence and behavioral problems. Additionally, many symptoms seen in autism spectrum disorder including speech-language impairment, verbal cognitive deficits, and social difficulties are also seen in XYY syndrome. Physically, males with XYY have a tall stature but otherwise no other significant differences. In comparison to XXY/Klinefelter syndrome they do not have hypogonadism or fertility problems. XYY syndrome however has been theorized to be related to the increase risk of seizures.

Case Description: The patient in the case is a 22-year-old male with past medical history of severe autism who presented to the ED with complaints of near syncope and suspected seizure like activity. His mother witnessed the seizure like activity and stated that he was walking on the treadmill when he began to convulse and become weak requiring support from her. She denied any incontinence or loss of consciousness. She did state he became sleepy after the event. CT scan of the brain without contrast was done that was negative. Due to the patient being combative, consent was obtained from parents for sedation of patient. Significant findings included a lactic acid of 2.7 and a white blood cell count of 17. He was diagnosed with potential sepsis as the triggering event for the seizure

and was given Ceftriaxone. He was admitted for further work up of sepsis. Once admitted, he was given IV fluids and IV antibiotics, as well as IV antiemetics as needed. Infectious disease was consulted for leukocytosis and antimicrobial management. Patient met SIRS criteria on admission due to elevated heart rate and leukocytosis without identifiable source of infection at that time. Urinalysis showed no pyuria. He had an MRI brain without contrast done which was negative. Meningitis workup was done, including a lumbar puncture, which revealed normal WBC, protein, and glucose levels. He developed post LP headache, which was controlled with IV Toradol and Fioricet. On day 4 of admission, his mother revealed patient has a XYY chromosomal abnormality when discussing why he is so strong that it required up to 5 nurses to hold him down to draw his blood.

Discussion: Although the presence of an extra Y chromosome in XYY syndrome is not a rare chromosomal abnormality, the connection between the extra Y chromosome and the increased risk of seizures is still not fully understood. This case is significant in that it highlights a subject who presented with seizures due to his predisposition of them solely based on his chromosomal abnormality of XYY. However, when he presented to the ED his mother forgot to mention his chromosomal abnormality as part of his past medical history. Thus, at the ED and then later when he was admitted to the hospital, he had a full neurology workup completed to find the root cause of his seizures. All his tests though came back negative. It was not until after doing a workup to rule out meningitis that his mother revealed in passing that he has XYY syndrome. Once this was revealed, his case became much clearer.

Title: **Necrotizing Pneumonia Secondary to a Multidrug-Resistant Gram-Negative Enteric Rod – Rahnella Aquatilis**

Authors: Alokika Patel, OMS3; Manasa Peddineni, OMS3; Sarafina Musto, OMS3; Adam Beeble, DO
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Necrotizing pneumonia is an uncommon complication of a bacterial lung infection carrying high potential for secondary sequelae. In the last 20 years, the incidence of necrotizing pneumonia in the United States has increased to 4% of all pneumonias. The link between *Rahnella aquatilis* and necrotizing pneumonia not associated with aspiration in adults has not been well established. The objective of this study is to highlight a unique case report of hospital-acquired necrotizing pneumonia due to an uncommon enteric pathogen.

Case Description: We present a case of a 65-year-old female who was originally hospitalized for pain secondary to a non-syncopal fall. Upon admission, the patient's CT spine lumbar indicated superior endplate fracture of L3 with approximately 25% height loss. CT abdomen/pelvis was reflective of infectious colitis. Conservative treatment was recommended for her fracture and colitis. During this work-up, the patient became febrile and was found to have *Staphylococcus aureus* bacteremia, likely secondary to diseased or fractured bones. She was then started on IV daptomycin and aztreonam for the bacteremia and IV metronidazole for potential anaerobic causes of infection. Soon after admission, the patient developed severe multifocal pneumonia with necrotizing lesions. Her management was changed to IV meropenem and linezolid awaiting sputum cultures which returned positive for *Rahnella aquatilis*: a rare gram-negative enteric rod, usually isolated in immunocompromised hosts. Two days after initiation of therapy, the patient began to desaturate rapidly, becoming progressively short of breath. She was started on heated high flow 40L of oxygen at 90% FiO2. After two weeks of little improvement, the patient was started on IV dexamethasone and levofloxacin due to previous research studies showing particular susceptibility for *R. aquatilis* infections. The patient subsequently improved clinically, resulting in a discharge to inpatient rehabilitation.

Discussion: This case demonstrates a unique presentation of sequential infections that seemingly were uncorrelated, ultimately leading to necrotizing pneumonia from an uncommon pathogen. A perplexing component of this case remains as the unconventional sequence of antibiotic treatment. Initial usage of broad-spectrum IV antibiotics, linezolid and meropenem were not known to clear the *R. aquatilis* pneumonia. Rather, a less-powerful treatment regimen, IV levofloxacin and IV dexamethasone, resulted in significant clinical improvement. The obscurity of this case is heightened by the question of how this patient was infected with such severity by an opportunistic bacteria which has been studied to impact predominantly immunocompromised hosts and pediatric patients with congenital heart defects. There has been one report of iatrogenically-acquired *R. aquatalis* in an immunocompetent host following a self-administered IV infusion of a vitamin complex which resulted in septic shock, which was successfully treated with a three-day course of IV imipenem and IV ceftriaxone. A significant challenge in this case was the lack of antibiotic susceptibility testing for the patient's *R. aquatilis* sputum culture. The broad coverage of her antibiotic therapy was presumed to be sufficient for the infection, but it likely was not specific enough in this case. In the future, antibiotic susceptibility could be tested in all pneumonia infections caused by uncommon pathogens. This could prevent unexpected deterioration and appropriate treatment for patients.

Title: **52 Years of Silent Scoliosis: Scoliotic Nerve Root Entrapment After a Motor Vehicle Accident**
Authors: Poonam Patel, OMS3; Sri Moturu, OMS3; Karina Bidani, OMS3; Anthony James Hall, OMS3
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Adults with asymptomatic scoliosis are commonly undetected but are at the greatest risk for spinal instability and potentially life-threatening respiratory complications. In an adult with new-onset scoliotic symptoms that arise after a motor vehicle accident, "silent" scoliosis should be considered a top differential. In rare instances, scoliosis can also lead to nerve root entrapment and has a reported incidence of 2.2%. Disc herniations from motor vehicle accidents worsen the scoliotic curvature leading to entrapment of the proximal nerve root. Early surgical intervention is important as these patients are already undiagnosed in their adolescence and are at risk for multiple or recurrent adjacent disc herniations. Surgical intervention has been found to drastically improve scoliotic curvature and decrease pain.

Case Description: We report a case of a 52-year-old, right-handed male who presented with a right lateral lumbar spine protuberance after a motor vehicle accident 6 months ago. The patient states that he had been experiencing lower back pain that radiated to his right buttock for the previous 6 months, but it had been worsening with right lower extremity paresthesia, unsteady gait, and consistent shortness of breath. He denies prior imaging and has not undergone physical therapy. On physical examination, the patient was found to have left thoracic rib protrusion and right lumbar vertebral protrusion. He had decreased and painful range of motion in all fields. His muscle strength was normal in all major muscle groups. However, the straight leg raise elicited a positive result bilaterally. He also had decreased sensation in the right L4, L5, and S1 dermatomes. Due to the physical examination findings, the patient was sent to perform radiographs of his spine. The radiographs showed a primary thoracic levoscoliosis with compensatory lumbar dextroscoliosis. An MRI was also performed as his symptoms began after his motor vehicle accident. The MRI showed right paracentral disc herniations and disc desiccations at L2/3, L3/4, and L5/S1. The L5/S1 herniation was the most severe with facet joint edema and foraminal stenosis that was compressing the proximal L5 nerve root. The patient's physical examination findings and imaging results confirmed the diagnosis of a pre-existing, asymptomatic scoliosis that was aggravated by his recent motor vehicle accident, resulting in entrapment of the proximal L5 nerve root. The patient was counseled on potential decompression of the nerve root via laminectomy and discectomy, as well as stabilization via spinal fusion. These surgical interventions were performed without incident and the patient achieved a significant reduction in scoliotic curvature and pain.

Discussion: This case illustrates a rare diagnosis of nerve root entrapment after a motor vehicle accident in a patient with asymptomatic scoliosis. Due to the fact that patients may present with sudden onset neurological pathology after years of being undiagnosed, it is imperative to include this as a potential differential while evaluating adults with new-onset scoliotic posture and symptoms. The proper imaging, along with neurological and musculoskeletal examinations are essential to avoid misdiagnosis of this condition.

Title: **Case Study: The Non-Aggravating Effects of Secukinumab on Pulmonary Sarcoidosis in a Patient with Psoriatic Arthritis**
Authors: Reema Patel, OMS2; Isabel Eaddy, OMS2; Mayur Parmar, PhD, MS
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Sarcoidosis is a systemic non-caseating granulomatous disease involving the lungs, skin, eyes, heart, and musculoskeletal system. These granulomas can form within the hilar lymph nodes and lung parenchyma, which can progress and cause restrictive lung disease. IL-17, a pro-inflammatory cytokine, has been found to be increased in bronchoalveolar lavage samples of sarcoidosis patients. The primary treatment for sarcoidosis is corticosteroid or immunosuppressive therapy. Secukinumab, a human IgG1 monoclonal antibody, selectively targets and inhibits the release of IL-17 to help reduce and regulate inflammation caused by these proinflammatory cytokines and chemokines. It is indicated for psoriatic arthritis, plaque psoriasis, and ankylosing spondylitis treatment.

Case Description: We present a 59-year-old woman with psoriatic arthritis diagnosed in 2010 and a long-standing history of stabilized sarcoidosis. Her psoriatic arthritis is currently managed with secukinumab, which has previously been reported to exacerbate pulmonary sarcoidosis. However, in this case, the patient's pulmonary function has remained stable. From 2010 through early 2019, the patient's psoriatic arthritis symptoms were managed with various immunosuppressive agents, including certolizumab, hydroxychloroquine, methotrexate, sarilumab, and apremilast. In March 2019, the patient was switched to secukinumab due to the prior drugs' lack of efficacy. The patient's sarcoidosis was monitored using pulmonary function tests (PFTs) obtained in 2011, 2017, and December 2019 (post-secukinumab). An analysis of these PFTs indicated that the severity of the patient's restrictive lung disease

worsened from mild (>70% FEV1 predicted) to moderate (60-69% predicted) prior to starting secukinumab, yet remained stable within the moderate range after nine months on secukinumab therapy (from 66% predicted in 2017 to 64% predicted in 2019). Chest CT results from 2017 showed a few small nodules in the upper and lower right lung that were similar to prior CT chest results from 2012, indicating over 4 years of surveillance stability. Chest CTs obtained nine months after initiation of secukinumab showed only a couple of subcentimeter nodules in the right lung, and these nodules were slightly reduced in size from those noted prior to starting secukinumab therapy. The PFTs and chest CT results indicate minimal pulmonary sarcoidosis progression after starting secukinumab. Additionally, the patient's psoriatic arthritis was monitored using Vectra scores, which were consistent from 2018 on certolizumab to 2019 on secukinumab at 42/100 (moderate range: 30-44), indicating stable disease activity. In this patient, we observed serum angiotensin-converting enzyme levels (found elevated in active sarcoidosis) within normal limits prior to and after starting secukinumab. These promising results show the efficacy of secukinumab after nine months of therapy in stabilizing disease activity of psoriatic arthritis without significant progression of comorbid pulmonary sarcoidosis.

Discussion: While previous case reports demonstrated secukinumab can exacerbate pulmonary sarcoidosis, here we show that the patient's sarcoidosis has remained stable. Since the patient's psoriatic arthritis has been effectively managed on secukinumab, it would be beneficial to continue this regimen with routine monitoring of her pulmonary function to detect any significant changes. Existing literature indicates that systemic treatment with IL-17 blockers is tolerated well by patients; thus, it would be advantageous to know the potential effects of secukinumab in diseases related to psoriatic and rheumatoid arthritis.

Title: **An Unsuspected Case of Hirschsprung Disease in an Adolescent Male with Constipation**
Authors: Sridhi Patel, MD, PGY2; Najla Zayed, OMS3; Christopher Aguirre, OMS3; Judith Cornely, DO
Program: Broward Health Medical Center, Pediatric Residency Program

Introduction: Hirschsprung Disease, also known as Congenital Aganglionic Megacolon, is a relatively rare disease occurring in 1 in 10,000 births. The diagnosis is made in 65% of the cases before the age of one month and in 95% of the cases before the age of one year. That leaves less than 5% of cases seen in patients over one year, and even less so in adolescence and adulthood. The pathophysiology is due to the absence of ganglion cells in the myenteric and submucosal plexuses of the distal intestine, resulting in lack of peristalsis and functional intestinal obstruction. In young children who commonly present with delayed passage of meconium beyond the first 24 hours or with a distal intestinal obstruction, the diagnosis is clear. However, in older children and adolescence, the disease presents as chronic constipation, and it may be difficult to discern between this and other more common causes.

Case Description: A 15-year-old male with a medical history of constipation and ADHD presented to the emergency department with complaints of constipation and crampy abdominal pain for 6 days. Prior to his arrival, he was seen at a nearby hospital where he was found to have fecal impaction of the rectosigmoid colon during CT scan of abdomen. He underwent attempts for manual fecal disimpaction which were unsuccessful resulting in transfer of care. At home, the patient was treating his symptoms with MiraLax three times a day, one rectal enema and one dose of magnesium citrate with no significant relief. The patient reported a high-fiber diet with good fluid intake. Interestingly, the patient had a history of chronic constipation with similar CT scan findings 1 year prior. At that time, he was admitted and received a bowel clean out with polyethylene glycol with resolution of his symptoms. He was sent home with a bowel regimen including MiraLax and was to follow up with gastroenterology. On the physical exam, his abdomen was nontender, a significant fullness palpated in the left lower quadrant and he had hypoactive bowel sounds throughout. No lymphadenopathy was found. Basic lab work was performed on which he was found to have iron deficiency anemia with Hg = 10.6, positive fecal occult blood, elevated sedimentation rate at 27, celiac screen negative, elevated IgA and a normal thyroid panel. Pediatric gastroenterologist and surgeon were involved in the case. Differentials for the patient included Crohn's disease, Cystic Fibrosis, Celiac disease, Hirschsprung disease, irritable bowel disease, and poor nutrition. The patient was started on a bowel clean out regimen including miralax (64 ounces mixed with electrolyte solution) and dulcolax daily with intermittent use of fleet enema. The sigmoid colon was successfully emptied after which, the pediatric surgeon performed a rectal biopsy. The rectal biopsies from the mucosa, submucosa and muscularis propria were found to be aganglionic which correlated with Hirschsprung disease.

Discussion: This case illustrates the prompt and accurate diagnosis of an uncommon presentation of Hirschsprung Disease in an older pediatric patient. Although this disease normally presents in very young children, there is still some prevalence in adolescence and adulthood that require further investigation. Therefore, it is beneficial to further investigate a common symptom like constipation in older children who are resistant to conservative management. Because Hirschsprung Disease is complex and heterogenous, creating a database of patients with information about genetic mutations, pathological findings, and clinical outcomes will be instrumental in furthering our understanding about this disease and optimizing our current therapeutic strategies.

Title: **Got Milk? A Diagnosis of Exclusion**
Authors: Veshesh Patel, OMS3; Divy Mehra, OMS3; Ankit Srivastava, OMS3; Brenda Ramirez, PGY1; Alfredo Lindo, PGY2; Manuel Suarez, MD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Milk-Alkali syndrome presents with a triad of hypercalcemia, metabolic alkalosis, and possible acute and chronic kidney injury. It is associated with the ingestion of calcium-rich medications and absorbable alkali. While milk-alkali syndrome is thought to make up less than 1% of hypercalcemia cases, recent case reports suggest a higher prevalence than previously appreciated. Hypophosphatemia, due to absence of phosphate load as well as phosphate binding to excess calcium, and hypomagnesemia, due to hypercalcemia inhibiting magnesium reabsorption by the renal tubule, are also common at presentation. PTH levels are frequently reduced due to negative feedback at the parathyroid glands from milk-alkali syndrome-induced hypercalcemia. However, making the diagnosis of Milk-Alkali syndrome requires ruling out other important causes of hypercalcemia, such as Multiple Myeloma, primary/secondary hyperparathyroidism, sarcoidosis, squamous cell carcinoma of the lung, Vitamin D toxicity, and more. This case details a noteworthy presentation and workup of a rare syndrome.

Case Description: A 70-year-old homeless man presents to ER complaining of pain in all four extremities with associated abdominal pain for the past five weeks. He also reported feeling nauseated for the past three days, with one episode of non-bilious non-bloody emesis, and alternating diarrhea and constipation for the past couple of weeks. He also states he has lost 40 lbs. in six weeks. On primary survey, his temperature was at 37.1 degrees Celsius with a HR of 69 beats per minute and blood pressure of 102/57 mmHg. On physical exam, there were decreased bowel sounds and tenderness in the epigastric region, but no rebound tenderness or fluid wave. Additionally, there was limited range of motion and weakness in the bilateral arms and legs secondary to bone pain. Clinically, the patient was in acute distress and anxious. Laboratory findings were remarkable for an elevated calcium of 15.1 mg/dL, acute kidney injury, and normocytic anemia. Serum phosphorus level was low at 1.8 mg/dL and serum magnesium was low at 1.3 mg/dL. Abdominal CT scan and CT angiography were unremarkable. First, the patient was given calcitonin 4U/kg x four doses, intravenous (IV) zolendronate, and aggressive IV hydration with normal saline. Patient was then admitted to ICU for close monitoring. Next morning, the corrected calcium serum level was 11.7 mg/dL and acute kidney injury had resolved on complete metabolic panel (CMP) labs; we thus discontinued zolendronate and calcitonin, while IV fluids were continued. Over the following days, calcium levels continued to trend downward, transiently becoming mildly decreased then correcting to normal after minimal amounts of repletion with calcium gluconate, the patient remaining stable. Esophagogastroduodenoscopy (EGD) showed a 1.5-cm duodenal ulcer secondary to NSAID use and evidence of prior bleeding. Protein electrophoresis showed no evidence of a monoclonal protein and PTHrp came back within normal limits. Bronchoscopy demonstrated no masses or lesion. Patient successfully recovered and was discharged after ruling out malignant causes of hypercalcemia.

Discussion: As exemplified in this case, causes of hypercalcemia can be viewed as life-threatening or benign. Laboratory and imaging findings to Milk-Alkali syndrome can present just like a malignancy. Therefore, workups of differential diagnoses are imperative. Timely correction of the elevated calcium, especially when >15 mg/dL, with calcitonin followed with infusion of isotonic saline showed rapid clinical improvement.

Title: **Don't Make Rash Decisions on COVID Patients**
Authors: Aline Pereira, DO, MBA, PGY1; Carlos Tornes Laria, MD, PGY2; Jorge Nunez, DO, PGY1
Program: Palmetto General Hospital, Family Medicine Residency Program

Introduction: COVID-19 was first seen in 2019 in China and rapidly spread worldwide. The spectrum of symptom severity ranges from asymptomatic to severe respiratory failure. Although it has been difficult to predict which symptoms each patient will have and how severe they will be, there is data indicating risk factors for severe infections and mortality. These risk factors include increasing age, diabetes mellitus, hypertension, chronic lung disease, cardiovascular disease, cancer, obesity, chronic kidney disease, and smoking. On initial presentation, the most commonly reported symptoms are cough, fever, and myalgias. Other symptoms commonly associated with coronavirus are headache, dyspnea, diarrhea, nausea, vomiting, anosmia, and ageusia. Some rashes have been seen in COVID-19 patients. However, the pathophysiology of cutaneous manifestations is still unclear. The American Academy of Dermatology's COVID-19 Registry has reported cases of morbilliform rashes, pernio-like acral lesions, urticaria, macular erythema, vesicular eruption, papulosquamous eruption, and retiform purpura.

Case Description: We present a case of a 62-year-old Hispanic female with a past medical history of hypertension, diabetes mellitus type II, diverticulosis, and hyperlipidemia who presented to the Emergency Department complaining of a pruritic rash for two days. The patient stated that the rash first appeared around her ears, arms, and legs, and quickly spread centrally. She denied any allergies,

recent travel, or sick contacts. The patient was not experiencing any associated symptoms, including shortness of breath, cough, nausea, vomiting, diarrhea, anosmia, ageusia, fever, or chills. On initial assessment, she was afebrile with a respiratory rate of 20 breaths per minute with an oxygen saturation of 100% on room air. Heart rate was 87 beats per minute with a blood pressure of 117/70 mmHg. On physical exam, her skin was warm and dry with a pink maculopapular pruritic rash on bilateral upper extremities, chest, and abdomen, and a purpuric rash on bilateral anterior thighs. The chest x-ray showed no radiographic evidence of acute cardiopulmonary disease and the electrocardiogram showed sinus rhythm with possible left atrial enlargement. On admission, the labs revealed leukocytosis and lactic acidosis without signs of sepsis. The d-dimer was elevated at 973, but Wells' Score was calculated to 0 indicating a low risk of Pulmonary Embolism and Deep Vein Thrombosis. The patient was found to be COVID-19 positive through a PCR test and was admitted to inpatient telemetry. The patient was given Benadryl and started on Solumedrol. The Infectious Disease service was consulted, who recommended symptomatic management and antihistamines. Due to the absence of respiratory symptoms, no oxygen therapy was administered. Further workup was done to rule out other etiologies for the dermatological symptoms. ANA, HIV 1/2 Antibody Direct, HIV 1 p24 Antigen Direct, C3 complement, C4 complement, and cryoglobulin were all negative. The viral exanthem was determined to be caused by the COVID-19 and was treated with topical hydrocortisone.

Discussion: This case illustrates a unique presentation of COVID-19 where a patient only presented with dermatological symptoms without the most common symptoms seen in the majority of patients, including fever, cough, and dyspnea. Understanding skin findings caused by COVID-19 can avoid over-treating, over-testing patients for other etiologies, and most importantly under-testing for coronavirus.

Title: **Hypertrophic Pulmonary Osteoarthropathy in the Absence of Digital Clubbing**

Author: Joseph Petkiewicz, MS, OMS3
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Hypertrophic pulmonary osteoarthropathy is a rare rheumatic condition that can occur in association with lung adenocarcinoma. Bone scintigraphy changes among a trial of 1226 lung cancer patients were present in 4.5% of patients, and 0.8% of patients had clubbing of fingers and joint pain. The subacute presentation causes symptoms to go ignored for long periods of time. Classically this syndrome presents with symmetric multi-joint pain with an insidious onset and clubbing of the digits. Imaging of the hands can show periostitis of the metacarpal bones. The classical physical exam finding of clubbing, however, is reported in only 29% of cases; and should not be used to rule out neoplastic syndrome. Management requires treatment of the underlying adenocarcinoma to reduce the severity of the patient's symptoms; otherwise care is supportive with pain along with antibiotics to treat any overlaying post obstructive pneumonia.

Case Description: A 57-year-old African American male with a past medical history of chronic knee pain and arthritis, presented to the emergency room complaining of severe pain that is progressing in his knees, ankles, shoulders, and elbows over the course of several months (how many? Can you be more specific). Additionally, the patient reports experiencing chest pain that is worse in inspiration that is new in onset. The joint pain is severe and is constant throughout the day. He took meloxicam for the pain control and it has not helped. Medical history is significant for a 30-pack year smoking history. His family history is significant for his father having lingual cancer. Review of systems patient reported melena, myalgias, and joint pain. He denies fevers, shortness of breath, chills, and night sweats. Vitals on emergency presentation were a BP of 116/66 mmHg, pulse of 97, temperature of 98.6F, RR of 16, and O2 sat of 96%. The patient appeared in no distress in bed. Heart rate was regular with no murmurs. Auscultation of the lungs revealed mild wheezing and rhonchi in the right mid lung field and decreased breath sounds on the right upper lung field compared to the left. Extremity exam showed full active range of motion. No clubbing of the digits. No focal defects, alert and oriented 3. CBC showed a white count of 9.4, hemoglobin of 11.8, platelets of 349. CMP showed sodium of 136, potassium of 4.7, BUN of 16, Creatine of 0.7, glucose 140, uric acid of 4.1, A1C of 5.8, Calcium of 9.3, AST 26, ALT of 23. CRP of 15.3 and ESR of 45. His initial work up in the emergency room the patient received a CT angiogram of the chest to rule out a pulmonary embolism. The CT angiogram revealed an incidental finding of a right hilar lung mass with associated right lymphadenopathy and an associated pneumonia. He was then admitted into the inpatient care team for management of his pneumonia, pain control, and further diagnostic work up of his lesion. Initial management of pneumonia was with a combination of azithromycin and ceftriaxone which the patient responded to. Pain management started with colchicine and dexamethasone. However, this was insufficient and pain control was consulted to begin an opiate pain management course which the patient tolerated well. The patient received a bronchoscopy brushing and washing that was negative for malignancy; followed by a CT guided core biopsy of the lesion; revealing moderately differentiated invasive pulmonary adenocarcinoma, solid pattern predominant. MRI of the brain revealed two enhancing lesions that are possible metastases. A nuclear medicine bone scan was performed and showed radiotracer uptake in multiple joints including bilateral lower legs and femur. Patient was seen by oncology – and was scheduled to have outpatient follow-up for management of his lung carcinoma. The patient's melenic stools were likely secondary to prolonged use of meloxicam; however, outpatient GI follow-up with endoscopy was scheduled. Patient was discharged home after a 22-day hospital course after resolution of pneumonia, pain controlled, and recovery

from the CT biopsy.

Discussion: This case showcases a rare paraneoplastic syndrome associated with adenocarcinoma of the lung. Subacute onset of symmetric pain with an extensive and recent smoking history should prompt chest imaging in part of the rheumatologic workup to rule out a malignancy – either from a yearly screening CT or a plain film chest x-ray. The presence of digital clubbing can help rule in this disease, but absence of clubbing should not be used to rule it out.

Title: **Atypical Optic Neuritis Associated with COVID-19**
Authors: Oshin Rai, OMS3; Anita Campbell, MD; Michele Riggins, MD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Optic neuritis (ON), inflammation of the optic nerve, can result from various etiologies and therefore has multiple presentations of pain, vision loss, imaging and visual recovery. The incidence of ON has been estimated to be up to 1 to 6 new cases per year per 100,000 population. The global pandemic COVID-19 typically has symptoms from the respiratory tract; however, research is expanding upon the other organ systems affected such as ocular and gastrointestinal involvement. A study claims that angiotensin converting enzyme 2 (ACE-2) receptors can be found in organs such as vessels, nerves and the eye, a possible link of optic neuritis produced by the virus. The incidence of unilateral optic neuritis due to COVID-19 has not been well described in the literature.

Case Description: A 59-year-old female presented to clinic with acute onset vision loss in the right eye. She was exposed to COVID-19, three days later experienced cloudy vision in her right eye and visited the emergency room. A diagnosis of central retinal artery occlusion versus central retinal vein occlusion was made and the patient was prescribed Aspirin 325mg once daily for 14 days. Five days after COVID-19 exposure, she presented to the clinic with only light perception. On exam, applanation tonometry to measure intraocular pressure was 11 and 12 mmHg in the right and left eye, respectively. Right eye showed optic nerve edema without disc hemorrhage and visual acuity was light perception at baseline. Optical coherence tomography (OCT) showed ganglion cell complex edema of the right optic nerve. Due to self-imposed quarantine restrictions, the patient did not complete lab testing and imaging until a few weeks after presenting to clinic. MRI showed no asymmetry bilaterally. CBC was normal with the exception of elevated white blood cell count at 10.5 x 10^3/mcL and chemistry displayed a high CRP at 1.7. The patient presentation did not meet expected symptoms over time and funduscopic evaluation only temporality showed optic edema. Typical optic neuritis is most commonly associated with multiple sclerosis, but the patient's MRI was inconclusive. The lab markers did not show a consistent pattern that matched an evidence based pathognomonic disease process. Patient was put on the Canadian protocol of steroids, a titrated dose of Prednisone 800 mg to 20 mg over 15 days. Recovery of vision was limited. On 30 day follow up, patient's vision was baseline of light perception in the right eye. On 60 day follow up patient had no visual improvement and at the six-month follow up, vision improved to counting fingers.

Discussion: This case highlights the possible correlation between COVID-19 and an acute ophthalmologic presentation when evaluating patients with acute unilateral vision loss. The patient's presentation did not meet expected symptoms over time, testing or lab markers of typical optic neuritis. Although COVID-19 literature is expanding, recognition of its ocular impact may raise suspicion for optic neuritis.

Title: **A Peculiar Case of Aquagenic Urticaria: A Case Report**
Authors: Warda Rana, OMS4; Andleeb Usmani, DO; Zahra Saba
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Aquagenic urticaria (AU) is a rare but, inducible form of physical urticaria. It occurs in reaction to cutaneous exposure to water including tap, salt, fresh, and chlorinated water and irrespective of the temperature. Symptoms often start in puberty and although both genders are affected, it has a female predominance. Patients typically present with characteristic 1-3 mm folliculocentric wheals with surrounding 1-3 cm erythematous flares within 20-30 minutes of contact with water. Associated symptoms include pruritus, burning, and paresthesia. Urticarial lesions typically resolve within 30–60 minutes of cessation of water contact. The affected areas are refractory to repeated stimulations for several hours. Although rarely reported, patients can experience systemic symptoms like wheezing, dyspnea, dysphagia or respiratory distress. Pathogenesis of aquagenic urticaria is not completely understood but is thought to be mediated by a histamine-dependent and histamine-independent manner. Predominant hypothesis is that

water interacts with sebum/sebaceous glands, generating noxious substances that stimulate mast cell degranulation and the release of histamine. A mechanism independent of histamine release has also been proposed as the histamine levels of several patients were not elevated during an aquagenic urticaria attack. The first-line treatment for AU is an oral administration second-generation H_1 antihistamines such as *cetirizine, loratadine, or fexofenadine* prophylactically, but require further interventions with topical steroids and hydrophobic barrier creams may be required for adequate symptomatic control. Barrier cream, especially petroleum-based ointments prevent the penetration of water into the dermis. In refractory cases, concomitant escalating doses of PUVA therapy for 2 weeks has proven effective. The efficacy of phototherapy is due to induction of immunosuppression, including a decreased mast cell response and epidermal thickening. Anticholinergics such as scopolamine patch may also alleviate pruritus associated with AU. ADifferential diagnosis includes aquagenic pruritus, which presents with intense itching after contact with water but *no* visible skin lesions and cholinergic urticaria, which causes wheals development in response to heat, sweating or emotional stress. Dermographism should also be on the differential as it is the most common physical urticaria which presents with linear, pruritic hives resulting from shear force[10].

Case Description: A 13-year-old previously healthy female was referred to the clinic due to recurrent episodes of urticaria. She reported a 2-year history of recurrent highly pruritic rash, confined to the palmar surface of her hands and plantar surface of her feet, occurring on contact with water. The lesions appeared about 10-15 minutes after contact with water (regardless of the source) and cleared spontaneously within 45 minutes leaving no residual marks. She reported prickling sensations concurrent with the dermatitis and described "pins and needles feeling". The water temperature and the time of exposure were irrelevant. She did not report angioedema, wheezing, dyspnea or dysphagia during these episodes. Water ingestion had no effect on the patient. There was no family history of atopy, or similar skin reactions related to water exposure. She reported personal history of penicillin allergy, but her symptoms were not associated with food ingestion or drug intake before water contact. She denied insect stings, minor trauma, infection, application irritant topical drug or penicillin ingestion. A general physical examination was unrevealing, and there was an absence of dermographism. Laboratory evaluation which included complete blood count, erythrocyte sedimentation rate, C-reactive protein, antinuclear antibodies, rheumatoid factor and total complement level revealed elevated ANA titers (1:320) and elevated total complement level. A shave biopsy of water induced lesion was performed on her left hand to rule out autoimmune causes of dermatitis. Dermatopathology was consistent with lymphocyte-predominant urticarial dermatitis. Periodic-Acid Schiff stain was negative for microorganisms. A diagnosis of aquagenic urticaria was established. Short baths, sensitive skin regimen and application of protective barrier creams were recommended. Patient was also prescribed medical treatment with triamcinolone 0.1% cream twice daily for 3 weeks and halting treatment for 1 week for symptomatic management while limiting adverse effects of topical steroid cream (i.e., atrophy of the skin) and systemic antihistamines successfully provided alleviation and control of her condition.

Discussion: This case illustrates that as clinicians, we will encounter unique presentations of diseases- that may vary only slightly *or* rather significantly from the "textbook presentation". Keeping an open mind while considering differentials and an accurate diagnosis can significantly improve the quality of life for patients and lead to better health outcomes. In the review of literature, AU cases are reported on the neck, upper trunk, and arms of the patients, sparing the palms and the soles, however in our patient *only* the palms and soles were affected. Water, generally regarded as innocuous and universal, but for our patient proved to be source of great discomfort. However, an accurate and timely diagnosis via clear and detailed clinical history, water provocation test and a biopsy and effective treatment with triamcinolone acetonide 0.1% cream twice daily and systemic antihistamine greatly improved the quality of living for our young patient.

Title: **An Overlooked Outbreak - West Nile Virus Neuroinvasive Disease in South Florida During the COVID-19 Pandemic**

Authors: Aliya Rehman, DO, PGY2; Lizy Paniagua, MD, PGY3; Julia Bini, MD, PGY3; Cynthia Rivera, MD
Program: Mount Sinai Medical Center, Internal Medicine Residency Program

Introduction: West Nile virus (WNV) is the most common arboviral infection in the United States. The spectrum of human disease caused by WNV is wide, ranging from subclinical to neuroinvasive disease including meningitis, encephalitis, and acute flaccid paralysis. Neuroinvasive disease develops in less than 1% of cases but carries a fatality rate of approximately 10% and is associated with considerable long-term morbidity. Since WNV first emerged in Florida in 2001, several cases of neuroinvasive disease have been reported yearly. In 2020, a total of 49 cases of WNV cases were reported in Florida, including 42 with neuroinvasive disease. Here we describe 3 cases of WNV neuroinvasive disease encountered between June and August 2020, during the COVID-19 pandemic.

Case Description: Patient 1 is a 79-year-old female who presented with altered mental status and decreased appetite for one day. She was only oriented to herself, moved all four extremities independently, and withdrew appropriately to noxious stimuli. Reflexes were nonpathologic, except for an extensor response on the right side. Patient was discharged home after prolonged hospital stay. She was non-verbal, but able to follow commands, and nod yes or no. Patient 2 is a 30-year-old male who presented with fever, chills, fronto-parietal headache, neck pain, nausea, vomiting, and decreased appetite for five days. He had a positive Brudzinski sign,

otherwise no focal neurological deficits or loss of strength or reflexes. Within two days, he quickly recovered and was discharged. Patient 3 is a 68-year-old female who presented with confusion, fever, chills, neck stiffness, body aches, fatigue, nausea, vomiting, and decreased appetite for four days. She was non-verbal, would not track with her eyes or immediately follow commands, but she did attempt to lift extremities when asked. She had a prolonged hospital course of about one month. Her condition at discharge was slightly improved; she was minimally verbal with hypophonia and delayed responses.

Discussion: Overall, all three patients were relatively healthy at baseline, residents of South Florida with no significant travel history, and exhibited signs of neuroinvasive disease. WNV neuroinvasive disease was confirmed in all patients via positive Ab IgM in both the serum and CSF. However, CSF WNV IgM is more sensitive for acute illness compared to serum CSF IgM, as serum antibody can be detected up to one to two months after clinical resolution. The treatment for WNV neuroinvasive disease is supportive care, which all three patients received. However, the outcomes at discharge were varied, ranging from full recovery to severe debilitation requiring ongoing rehabilitation. These cases illustrate a small WNV outbreak during the summer of 2020, which went relatively unnoticed as more attention was given to the ongoing COVID-19 pandemic.

Title: **Frozen in Time: A Case of Trauma Induced Catatonia in a Young Adult with Autism Spectrum Disorder**

Authors: Camilo Rodriguez, OMS3; Hong Diem Truong, MS, OMS3; Sheilin Hamid, OMS3; Gunnar Reichenberger, OMS3; Robert Moran, MD

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Catatonia is a psychiatric condition that can present with a wide spectrum of symptoms, ranging from agitation to stupor, mutism to echolalia, and repetitive motions to posturing. It is becoming something that is observed more frequently in patients with autism spectrum disorder (ASD); however, there is limited etiological information regarding predisposing factors or the likelihood of acquiring this condition. Traumatic events may play a role in inducing catatonia in ASD patients that may lead to permanent morbidity such as further cognitive deficits, apathy syndrome, and limb strictures. Thus, it is important to properly diagnose and manage these patients to prevent the development of more deficits. This case describes a patient with a history of delayed milestones and cognitive difficulties who present with catatonic behaviors after a traumatic incident and how it was better managed with various treatment plans such as psychotherapeutic interventions and electroconvulsive therapy (ECT).

Case Description: We present a case of a 19-year-old Caucasian male who has a developmental history of delayed milestones and cognitive and behavioral difficulties in school. He was diagnosed with high functioning autism, attention-deficit/hyperactivity disorder, and cognitive disability at the age of 4. His conditions were managed with various medications during his adolescence, and he was placed in an Individualized Education Program at his school. At the age of 18, after a traumatic event of being exposed to an active shooter experience at his place of residence, his behavior changed. He had episodes described as agitation, elevated mood, and inappropriate aggressive behavior, with auditory and visual hallucinations. There were moments of violence such as striking back when he was getting scolded by his parents and attempting to attack his caregiver with a knife. He had periods of insomnia that would last for several days and displayed unusual, repetitive actions such as snapping his fingers and doing cartwheels. After many involuntary hospitalizations, he was diagnosed with autism spectrum disorder with catatonia. Different medications were given to try to manage his catatonia such as clozapine and zolpidem. Lorazepam was seen to be the most efficacious medication in decreasing his agitated state during his catatonic episodes. However, to get better control of his condition, he was started on ECT every week for a total of eight treatments. The patient displayed significant improvement after each session but regressed if sessions were longer than ten days apart. The patient would show return of repetitive motions after 9 days and hallucinations after 12 days of no ECT sessions. Due to this, he was advised to receive a minimum of 6 months of ECT on a weekly basis. Along with this, his regimen also includes behavioral therapy which helped identify triggers to his symptoms. The patient has now been able to learn new life skills and is attempting to look for employment.

Discussion: This case shows that intense emotional distress from a traumatic event can be considered as a risk factor for catatonia in patients with ASD. This case also illustrates the benefits of weekly ECT along with behavioral therapy for the maintenance of this condition. The case promotes awareness that better treatment protocols are needed to improve outcomes.

Title: **Pediatric Pseudotumor Cerebri, A Possible Complication of COVID-19?**
Authors: Megan Rouse, OMS3; Katelyn Krolick, OMS3; Amanda Costa, MD, PGY3; Cristina Figallo, MD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: While pseudotumor cerebri is rare in pediatric patients with an incidence of 0.62/100,000, we present a case of pseudotumor cerebri in a 17 y/o female. During this current pandemic, many neurological complications were found following COVID-19 infection. Pseudotumor cerebri is a condition caused by elevated cerebral spinal fluid (CSF) opening pressures and papilledema that classically presents in obese, post pubertal females using retinoids and/or oral contraceptives. We present an unusual case of pseudotumor cerebri in a 17-year-old female with a recent diagnosis of COVID-19 two months preceding admission as well as history of juvenile idiopathic arthritis, raises thought about possible association of COVID-19 or predisposition of autoimmune disease with pseudotumor cerebri.

Case Description: A 17-year-old female with a history of COVID-19 2 months prior, juvenile idiopathic arthritis in remission, presented with worsening headaches for 2 months and blurry vision for one week. Patient has a BMI of 24 kg/m^2 and denied oral contraceptive use. She was afebrile and nontoxic appearing and found to have bilateral optic edema with no focal deficits. CT brain was negative, and CSF revealed an opening pressure of 46.5 cm H_2O. Diagnosis of pseudotumor cerebri was made. Patient was admitted to the pediatric floor and underwent brain and orbit MRI with and without contrast that revealed mild bilateral optic nerve sheath distention, flattening of the posterior sclera with slight optic nerve head protrusion and slight concavity of the superior margin of the pituitary consistent with idiopathic intracranial hypertension. CSF meningoencephalitis panel was negative. She was treated with 250 mg Acetazolamide Q8H and discharged with outpatient follow up for neurology, rheumatology and ophthalmology.

Discussion: As the COVID-19 pandemic continues to evolve, healthcare professionals are encountering patients with unique symptoms following the recovery from the virus. Manifestations of neurologic complications associated with COVID-19 include dizziness, headache, or stroke as well as post-infectious acute disseminating encephalomyelitis due to immune dysregulation. A novel set of inflammatory responses have additionally been identified in the post-COVID period coined Multisystem inflammatory syndrome in children (MIS-C). There has been one reported case of pseudotumor cerebri in a healthy 14-year-old girl presenting with MIS-C as well as papilledema and an increased CSF opening pressure of 36 cm H_2O. Furthermore, a study of pediatric patients with pseudotumor cerebri found the clinical presentation of increased intracranial hypertension to be associated with rheumatologic diseases. 4 of the 18 patients with secondary intracranial hypertension were diagnosed with rheumatologic diseases Since this patient has a history of autoimmune of disease, it is interesting to propose a possible association between post-viral complications of COVID-19 in patients with susceptibility for inflammatory disorders. While our case may be one of the first presentations of Pseudotumor Cerebri in a healthy pediatric patient with previous COVID-19 infection, this case demonstrates the importance of continuing to evaluate lingering symptoms following coronavirus as well as any association with patients predisposed to autoimmune diseases.

Title: **Unsuspected Pediatric Case of Periocular Herpes Simplex Virus**
Authors: Tyler Ruppel, OMS3; Oleg Tsvyetayev, OMS3; Rogerio S. Faillace, MD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Herpes simplex virus-1 (HSV-1) is estimated to affect 36% of children in the U.S. by age twelve. It is transmitted through oral secretions during close person-to-person contact. The manifestations of HSV-1 are broad and may include recurrent oral, skin, and mucous membrane lesions, as well as more life-threatening diseases such as encephalitis or multi-organ neonatal disease. Less than five percent of patients exhibit ocular HSV infections; however, it is the second most common infectious cause of blindness worldwide. Cutaneous lesions typically occur within or around the mouth and lips, involving small vesicles on an erythematous base that rupture to become painful ulcerations with possible crusting. Lesions are usually preceded by prodromal symptoms such as fever, malaise, myalgia, lymphadenopathy, and headaches. Outlined is a distinctive case of a seven-year-old male with herpes simplex virus presenting infra-orbitally with only swelling and erythema.

Case Description: A seven-year-old male with prior history of atopic dermatitis presented with a one-day history of an eruption below his right eye. The infraorbital surface of the right eye and lower eyelid appeared erythematous and edematous, measuring up to two centimeters in width and length. There was no associated pain, pruritis, conjunctivitis, fever, chills, or fatigue. The child attended school and his father denied any sick contacts, recent travel, or new household products or lotions. Six months prior, he did have a similar rash in the same location and was started on oral Augmentin for suspected bacterial infection. The treatment course did not provide expected timely resolution but did eventually clear. This time, a careful evaluation determined herpes simplex virus as the

likely causative agent and the patient was given oral acyclovir. The following day, redness and swelling of the eruption subsided by half a centimeter in width and length. The rash completely resolved within the next three days.

Discussion: The most common pediatric clinical presentation of HSV-1 involves orolabial lesions with a cluster of vesicles that evolve into pustules and ulcers, and ultimately crust over. Much more rarely, ocular infection from HSV-1 can occur, causing corneal ulcerations, keratoconjunctivitis, and increased risk for blindness. This case demonstrates a pediatric patient with an anomalous initial HSV distribution near the eye consisting of an erythematous, edematous eruption without any vesicles, ulcers, crusting, or prodromal symptoms. Initial manifestations presented similarly to chalazion or hordeolum given the acute, localized swelling and redness underneath the eye. However, failure of the initial rash to improve with antibiotics and subsequent resolution with acyclovir, as well as the recurrence of the rash in the same location suggest viral etiology. Due to initial misdiagnosis, appropriate treatment was delayed, putting the child at a lifelong increased risk for serious complications such as blindness, particularly due to the close proximity of the infection to the orbit. Thus, a high index of suspicion is necessary when presented with edema and erythema in the periocular region, as lack of vesicles, ulcerations, erosions, crusting, or prodromal symptoms cannot conclusively rule out HSV infection. The diagnosis of periocular HSV dermatitis can be challenging and should consider thorough history, careful physical inspection, and treatment response. Enhanced clinical knowledge of such atypical presentations of HSV will allow for better identification among providers and prevention of harmful outcomes, such as in this case. It is imperative to keep an open mind to a wide differential diagnosis for accurate dermatologic recognition and successful treatment.

Title: **Diagnosis of Eosinophilic Enteritis in the Setting of an Incidental Meckel's Diverticulum**
Author: Gregory Santos, OMS3
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Eosinophilic enteritis is a rare disease that was first described in 1937. Although the etiology is unknown, patients with a history of atopic hypersensitivities such as asthma, rhinitis, and eczema have a greater incidence. Common symptoms include abdominal pain, nausea, vomiting, diarrhea, and weight loss. Diagnosis is typically made by first excluding other GI pathologies followed by obtaining lab work remarkable for peripheral eosinophilia (>500 eosinophils/microL), imaging showing signs of mucosal infiltration, and biopsies with >15-50 eosinophils per high-power field.

Case Description: This is a 76-year-old male that was referred to general surgery for a diagnostic laparoscopy and full-thickness biopsy of the distal ileum due to malnutrition and chronic diarrhea x3 years. Patient has no known drug or seasonal allergies. No history of atopic hypersensitivities. Patient has had multiple esophagogastroduodenoscopies and colonoscopies since becoming symptomatic, all with negative biopsies. The most recent CT Enterography with contrast showed small bowel fluid distention and a thickened terminal ileum. Laboratory findings from the most recent admission was consistent with malnutrition and a normal eosinophil count. Physical exam was remarkable for epigastric tenderness and bilateral lower extremity edema. Stool was negative for blood, C. Diff, ova, and parasites. Celiac disease work-up was also negative. Three months later, an explorative laparoscopy was performed identifying an edematous small bowel extending to an incidental Meckel's diverticulum. A Meckel's diverticulectomy and biopsy was performed revealing eosinophilic enteritis. Patient was treated with a tapered course of Prednisone 40 mg postoperatively with symptomatic relief shortly after.

Discussion: This case illustrates the importance of an elevated suspicion for eosinophilic gastrointestinal disorders for a timely diagnosis and treatment in atypical patients with refractory diarrhea and malnutrition. Diagnostic guidelines for eosinophilic gastrointestinal disorders should be readily used with the goal of reducing morbidity and establishing a quicker diagnosis. At this moment we cannot completely rule out whether the Meckel's diverticulum contributed to the patient's symptoms. It is unlikely as there were no obvious signs of ulceration to the Meckel's diverticulum during the operation or suspicious findings of ectopic tissue on the pathology report.

Title: **Unusual Presentation of Gastrointestinal Stromal Tumor (GIST) in a Female with a History of Uterine Leiomyoma: Case and Differentials**
Authors: Kimberly Savoia-McHugh, OMS3; Ashley Ryan Vidad, OMS3
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: This case highlights an unusual presentation of a gastrointestinal stromal tumor (GIST) in a patient with previously diagnosed uterine leiomyomas. Intramural gastric tumors are typically of mesenchymal origin and include GISTs and leiomyomas. GISTs are the most common of mesenchymal tumors, however GISTs comprise less than 1% of gastrointestinal tumors. GISTs can arise along any part of the GI tract. The body of the stomach is the most common location, followed by the small intestine. Benign metastasizing leiomyoma (BML) is a rare disorder that affects women with a history of uterine leiomyoma, which is found to metastasize within extrauterine sites. The most frequent site leiomyoma metastasizes to is the lungs, although other parts of the body can be affected, including the small intestine. Abdominal pain is the number one presenting symptom of GIST. In addition to abdominal pain, patients usually present with melena, anorexia, nausea, vomiting, weight loss, epigastric fullness, and early satiety. Computed Tomography (CT) is utilized to differentiate GIST from other mesenchymal tumors, such as leiomyomas. On pathology, leiomyomas are identified as a benign proliferation of smooth muscle cells. This differentiates leiomyoma from GIST. GIST's are derived from a precursor of the intestinal pacemaker cells of Cajal. Distinguishing GIST from metastatic leiomyoma is clinically significant because GISTs are malignant tumors, whereas leiomyomas are benign.

Case Description: A forty-year-old female with a past medical history of bowel obstruction surgery at age five and at age thirty-three, presented with melena and lightheadedness once per week for the past three days. She reported an episode of loose, black, bowel movement every day and described her lightheadedness as a "feeling of about to pass out." She admitted to feeling full easily but denied nausea, vomiting, burning pain with meals, and any abdominal pain. She denied the use of NSAIDs. Vital signs were stable. Physical exam showed benign abdominal findings. Hemoglobin was 8 g/d on admission. Iron profile was ordered, and ferrous sulfate was administered to the patient for iron-deficiency anemia with serial hemoglobin and hematocrit. Lightheadedness slowly resolved and hemoglobin trended upward. A CT abdomen and pelvis showed an enlarged uterus with multiple large fibroids consistent with leiomyoma, and also identified a well-defined round lesion related to the second and third portion of the duodenum. Initially, it was considered that the round, duodenal lesion was a metastatic leiomyoma. An esophagogastroduodenoscopy (EGD) showed a vascular appearing tumor concerning for malignancy. No other source for bleeding was identified. EGD biopsy of the duodenal lesion was inconclusive. Open biopsy pathology revealed GIST. The patient was treated with chemotherapy followed by surgical GIST resection.

Discussion: This report aims to recognize an unusual presentation of GIST in the absence of abdominal pain.

Title: **Danger of Asymptomatic COVID-19 Pneumonia in the Progression to Fatal Cardiorespiratory Arrest**
Authors: Laxmichaya D. Sawant, MD, PGY3; Azhar Ghumra, OMS3; Michael Hinton, OMS3; Emma Hall, OMS3
Program: Broward Health Medical Center, Family Medicine Residency Program

Introduction: The presentation of COVID-19 has a very wide clinical spectrum and is often asymptomatic. The major morbidity and mortality rates from COVID-19 are largely due to acute viral pneumonitis. The most frequent, serious manifestations of this infection include fever, cough, dyspnea, and bilateral infiltrates on chest imaging which may evolve into acute respiratory distress syndrome. Other less common causes of morbidity and mortality includes pulmonary embolism, myocardial infarction, and sudden cardiac death. This case offers the opportunity to explore the unique link between COVID-19 pneumonia and cardiopulmonary arrest. Further examination is warranted on this topic due to the many factors which may have contributed to cardiopulmonary arrest as a result of COVID-19 such as myocarditis, acute coronary syndrome, hypoxia, metabolic abnormalities, coagulopathies, and direct arrhythmogenesis.

Case Description: We present a case of a 59-year-old male with a past medical history of untreated diabetes mellitus and hypertension who arrived at the emergency department in cardio-respiratory arrest. The patient was short of breath for 1.5 hours prior to EMS arrival. En route to the ED, the patient went into PEA arrest. Cardiopulmonary resuscitation was initiated, and oxygen, epinephrine and bicarbonate were administered, and a laryngeal tube was placed. Upon arrival to the ED, the patient was intubated with an endotracheal tube and ROSC was achieved. On primary survey, he was afebrile, hypertensive at 232/124 with a WBC count 17.24. COVID-19 antigen was negative. Chest x-ray showed moderate bilateral interstitial pulmonary infiltrates. CT brain without contrast showed no acute abnormalities. CT angiography of the pulmonary arteries showed bilateral lower lobe airspace consolidation and nodular ground glass infiltrates within the bilateral upper lobe and right middle lobe. The patient was started on IV fluids, vancomycin and Zosyn for sepsis, was sedated with propofol, and later admitted to the ICU for further workup and management. Further testing showed a positive COVID-19 RT-PCR and the patient was started on Vitamins C and D3, as well as zinc, atorvastatin, solumedrol, remdesivir, and lovenox for treatment of COVID-19 pneumonia. Zosyn was continued for possible aspiration pneumonia. On physical exam the patient was unresponsive with absent cough, gag, and corneal reflexes. The patient also became severely hypernatremic throughout his hospital course. A CT of the brain demonstrated diffuse edema consistent with anoxic injury and brain stem hemorrhage. The patient likely developed central diabetes insipidus secondary to anoxic brain injury and was declared brain dead shortly thereafter.

Discussion: COVID-19 can present in a multitude of ways, affecting distinct patient populations and making it very challenging to diagnose and intervene before detrimental effects take place. Asymptomatic cases of COVID-19 have been widely documented but have not been thoroughly studied. However, this case illustrates the likelihood of an asymptomatic COVID-19 pneumonia as a potential cause of cardiorespiratory arrest. Here we see a patient without conduction abnormalities, arrhythmias, or prior heart disease whose disease process rapidly progressed to cardiorespiratory arrest, illustrating the danger of the novel coronavirus. Understanding cardiorespiratory arrest as a result of COVID-19 pneumonia could provide valuable information to help better manage these patients in the future.

Title: **Intracranial Bleed Secondary to Underlying Pheochromocytoma**
Authors: Himadri Shah, OMS3; Jillian Montague, OMS3; Ahjay Bhatia, OMS3; Zoie Goldstein, DO
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Pheochromocytomas are extremely rare in the United States and are known to affect approximately 2 out of a million people every year. Men and women are equally affected, and it is most common in patients between the age of 30-50 years old. Hypertension is the most common presenting symptom, but other signs include shortness of breath, tremors, and dizziness. High clinical suspicion is necessary to identify pheochromocytomas as they often go undiagnosed leading to fatal complications. We detail the case and pertinent management of a middle-aged male who presented with headache and emesis with underlying pheochromocytoma that was overlooked at initial presentation, but evident on imaging and lab results 6 weeks later.

Case Description: We report the case of a 48-year-old male who presented to the hospital complaining of a headache and nausea. Despite an initial negative CT scan, his symptoms persisted. 6 weeks later, he went to the emergency room where his CT scan was consistent with a subarachnoid hemorrhage. His admitting creatinine level was 1.43 mg/dL. MRI of his brain showed a subarachnoid hemorrhage within the left central sulcus and in the right occipital lobe. Patient was admitted to Neuro ICU and was started on prophylactic Keppra. He has a past medical history of hypertension and more recently, hypertensive urgency. CT of brain showed a stable subarachnoid hemorrhage and CT of abdomen and pelvis revealed a 5.5 subacute right adrenal hematoma. Upon follow up with a primary care physician on July 6th, he complained of severe headache and had an episode of emesis in the office. He was noted to have an epinephrine level of 1013 pg/mL, norepinephrine level of 3145 pg/mL, dopamine level of 45 pg/mL, and a total catecholamine level of 4158 pg/mL. A diagnosis of pheochromocytoma was made and he was immediately taken to the emergency room. Repeat brain CT showed resolving subarachnoid bleed in the high left cerebral hemisphere. Chest x-ray revealed no acute cardiopulmonary process and abdominal x-ray showed mild right-sided ileus. Cardiac CT on July 11th revealed significant motion degradation of the visualized coronaries without any discernible plaque. The patient had negative syphilis serology, hepatitis panel, cryoglobulins, ANA, c-ANCA, p-ANCA, beta-2-GPI, and cardiolipin antibodies. Complement C3 was 142 and C4 was 44. Sodium was 139, potassium was 3.4, and glucose was 128. WBC was 12.4 and hemoglobin was 13.5. The patient's cerebral angiogram demonstrated multiple areas of focal arterial narrowing involving both the anterior and posterior cerebral circulation. The patient was seen by psychiatry, gastroenterology, and cardiology and was discharged once stable to follow up with his primary care physician.

Discussion: This case effectively details the comprehensive workup for an individual with subarachnoid bleed due to underlying pheochromocytoma. Special attention must be paid to this diagnosis, given its potential for fatal long-term complications and a necessity for interdisciplinary care in management.

Title: **Type II Necrotizing Fasciitis Caused by Methicillin-Sensitive S. Aureus**
Authors: Nisarg Shah, OMS4; Crystal Acosta, OMS4
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Necrotizing Fasciitis (NF) is an aggressive soft-tissue infection that develops after penetrating and non-penetrating injuries to skin and underlying soft tissue. The infection spreads rapidly via the superficial fascia, characterizing its friability, and presents with ominous signs. Patients will have pain out of proportion in the periphery of affected area, along with crepitus, emphysema, and systemic signs. The incidence of NF ranges from 15.5 per 100,000 in developing countries to 0.3 to 5 cases per 100,000 in developed nations. The etiologic organisms can be polymicrobial (NF Type I) or monomicrobial (NF Type II). The most common organisms in Type II infections are methicillin-resistant S. *Aureus* and group A streptococcus. Once a portal of entry is established, the organism releases exotoxins causing local tissue damage and capillary blockage from platelets-leukocytes aggregation.

Erythema, swelling, and formation of bullae becomes widespread with larger vessels becoming occluded. Necrosis then permeates to all tissue layers. There are many diagnostic pitfalls, but the presence of systemic signs should delineate every physician's suspicion towards NF.

Case Description: We present a case of a 38-year-old male with past medical history of hypertension and uncontrolled diabetes that presented to the emergency department with complaints of left leg pain, swelling, fever and nausea. His symptoms have been progressing for past 5 days prior with the onset after injuring his left great toe when clipping his nails. On physical exam, his vital signs were stable, he had left anterior tibial swelling, and erythema with tenderness to palpation. Swelling extended from his left knee down to left foot with discoloration and small skin breaks in left toe and medial anterior tibial region. Laboratory work-up revealed high white blood cell (WBC) count of 18.47x10^3/uL, low hemoglobin (Hb) of 9.0 g/dL, high C-reactive protein (CRP) of 9.63 mg/dL, low serum sodium (Na) of 129 mEq/L, creatinine (Cr) of 1.1 mg/dL, and glucose >600 mg/dL. The LRINEC Score (Laboratory Risk Indicator for Necrotizing Fasciitis) was 6 from these results. Computed tomography (CT) of lower extremities revealed diffuse anterolateral compartment fasciitis and myositis without fluid collection. Intravenous broad-spectrum antibiotics were started, and the surgical team was alerted. Prompt transfer to operating room for wound irrigation and debridement revealed gross pale and light green-gray membranous and rubbery necrotic tissue 3.7 x 1.4 cm in the left lower extremity, with microscopic confirmation of necrotic and inflammatory infiltration of fascia and surrounding tissues. Wound cultures grew methicillin-sensitive *S. Aureus*. Targeted antibiotics were initiated by infectious disease (ID) team; however, patient continued to have elevated WBC, pain out of proportion, and increasing gross necrotic fat at surgical wound, prompting re-exploration and 2nd debridement on 6th day after initial debridement. Patient was placed in the ICU afterwards due to an episode of hypotension and near syncope following physical therapy. A decision was made for emergent below knee amputation (BKA) as septic shock was suspected from still active NF. Antibiotics were escalated, with multiple pressors, and patient is currently in ICU with rising WBC count.

Discussion: This case explores the spiraling effect of Necrotizing Fasciitis in high-risk patients and to emphasize a critical degree of suspicion for diagnoses to launch aggressive treatment. The treatment algorithm, risk stratification, and types of NF will be reviewed in this report.

Title: **Utilizing Carpal Tunnel Syndrome as a Prediagnostic Indicator for Cardiac Amyloidosis: Case Series**
Authors: Joshua Sharan, OMS3; Ryan Boyle, OMS3; Gregory Kunis, OMS3; Gary Schwartz, MD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Amyloidosis is a group of disorders that occurs due to the aggregation of insoluble and misfolded proteins in the extracellular space, eventually resulting in organ dysfunction. Type II amyloidosis is caused by the deposition of transthyretin (TTR), which will be the main focus of this paper. Deposition of TTR in the myocardium results in a restrictive cardiomyopathy (RCM). TTR can also deposit in the flexor tenosynovium resulting in carpal tunnel syndrome (CTS). CTS develops five to ten years prior to cardiac amyloidosis (CA), and therefore the temporal relationship allows CTS to be a diagnostic indicator for CA.

Case Description: This report discusses a 65-year-old female and a 76-year-old male presenting with pain and paresthesia in the distribution of the median nerve in the left and right wrist. Both cases involved a positive Phalen's maneuver and Tinel's sign, which led to the diagnosis of bilateral CTS. Subsequent tenosynovial and transverse carpal ligament biopsies were performed with Congo red stain revealing amyloid deposits of TTR monomers. This prompted the investigation into possible cardiac involvement. Following cardiac evaluation, the diagnosis of CA was established for TTR deposition.

Discussion: CA has gained much attention in the medical community due to the improvements of cardiac imaging, therapeutic interventions, and diagnostic indicators such as bilateral CTS, presenting approximately five to ten years before CA emerges. Medical professionals should be urged to have a high level of clinical suspicion and refer for cardiac evaluation in patients with CTS.

Title: **Fast and Furious: A Case Report and Review of Literature of CNS Fusariosis**
Authors: Jeffrey C. Shogan, OMS3; Jason D. Vadhan, OMS4; Alyssa J. Melo, OMS4; Vishal Singh, MD; Maria Carrillo, MD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Immunocompromised solid organ transplant recipients are well known to be at an increased risk of acquiring fungal infections. Fusarium, however, is a ubiquitous environmental fungus that has rarely been reported to cause invasive infection in

patients post solid organ transplant. It is typically seen instead in more profoundly immunocompromised hematopoietic stem cell transplant recipients, or those with hematologic malignancies undergoing chemotherapy resulting in significant neutropenia. Disseminated fusariosis is the most common manifestation in the immunocompromised, and often presents with fever, neutropenia, cutaneous skin lesions, and a blood culture positive for mold. Other invasive forms include cellulitis, sinusitis, pneumonia, central nervous system (CNS) infection, endophthalmitis, and bone and joint infections. This case describes a rare incidence of invasive CNS fusariosis with endophthalmitis in a heart transplant recipient.

Case Description: We report a 57-year-old male with a recent heart transplant on immunosuppressive therapy who presented to the emergency department with right eye pain, headache, and focal neurologic deficits, and was found to have CNS fusariosis and endophthalmitis.

Discussion: This is the 21st reported case of fusariosis with CNS involvement, and only the 2nd reported case associated with solid organ transplant. Skin lesions were the most common presenting symptom, occurring in the majority of cases (57%) (Table 3). Altered mental status was the most common neurologic symptom, occurring in 5 cases (23.8%). The cerebellum was the most frequently involved brain region with involvement in 5 cases (5/21, 23.8%). Unfortunately, despite even aggressive treatment, the mortality rate is extremely high, with only two cases of survival noted in the literature. Other disseminated forms of fusariosis not involving the CNS have shown improved mortality with correction of any predisposing neutropenia. In sum, we recommend a high index of suspicion for CNS fusariosis given its heterogenous presentation, small number of reported cases, and fulminant course of the disease, and urge further research to improve treatment outcomes.

Title: **Penile Calciphylaxis: Going Beyond the Diagnosis of Sexually Transmitted Diseases**

Authors: Monica Singh, OMS3; Ashrita Hanmiah, OMS4; Mark Fersch, DO; Naz Gandikal, DO
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Penile calciphylaxis is a rare occurrence of penile necrosis that is characterized by small vessel thrombosis and medial calcification with intimal hypertrophy. It is also known as calcific uremic arteriolopathy and is observed in less than 5% of patients undergoing hemodialysis for end stage renal failure (ESRD). Some risk factors include diabetes, warfarin use, obesity, and renal failure. The pathogenesis of calciphylaxis is unclear however it has been suggested that these risks can interrupt calcium balance and promote calcium deposition in small blood vessels. In the early stages, calciphylaxis presents as painful violaceous reticulated patches or plaques resembling livedo reticularis. Pain may manifest prior to lesion development. This tissue becomes necrotic with further progression often manifesting as bullae and ulcers. Calciphylaxis has a mortality rate of 69% with a 5-year survival rate of 35%. Due to the limited data on penile calciphylaxis, diagnostic tools and treatment protocols for calciphylaxis remain controversial.

Case Presentation: We report the case of a 49-year-old Hispanic male with a past medical history of ESRD on dialysis who presented with a painful penile lesion. He had mild itching and pain on the glans penis two weeks prior and came to the Emergency Department after noticing a change in color and purulence in the initial lesion. On further questioning, the patient also complained of burning penile shaft pain and worsening dysuria. On physical exam, a white 2x2 cm eschar with black spots was noted on the ventral glans of the penis which was tender upon palpation. No active penile drainage was noted and no penile shaft, scrotal, or inguinal skin changes were observed. Blood count results were Hb 9.0, BUN 117, Creatinine 6.92, GFR 8, PTH 107. Labs were negative for HIV, HSV, Syphilis, Chlamydia, and Gonorrhea. CT abdomen/pelvis without contrast showed extensive calcification of the vas deferens. Urology was consulted who diagnosed the patient with glans penis ulceration secondary to calciphylaxis. They recommended observation unless frank necrosis or intolerable pain occurs, in which case he would be considered for debridement and partial penectomy.

Discussion: This case demonstrates the importance of prompt recognition and treatment of calciphylaxis due to its high morbidity and mortality rate. We use this case to contribute to the scant literature available on the clinical presentation of calciphylaxis and potential treatment modalities.

Title: **Connecting the Granulomas - Nonischemic Cardiomyopathy, Multivalvular Dysfunction, and Granulomas in Chagas Disease**

Authors: Prachi Singh, OMS3; Piero Carletti, MS3; Angelo Abelli, MD, PGY1; Brinsley Ekinde, MD, PGY3; Ruben Cabrera, MD, PGY3; Yoandy Rodriguez-Fuentes, MD; Jose Gascon, MD

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Chagas disease, also known as American Trypanosomiasis, is a parasitic infection caused by *Trypanosoma cruzi*. The acute phase of the disease can be asymptomatic or have symptoms that can be mistaken for a less threatening infection. However, the chronic phase, which presents decades later, is associated with devastating cardiac and gastrointestinal consequences. It is estimated that 8 million people worldwide are infected with Chagas, and 300,000 of those are in the United States, with most people acquiring the disease in endemic areas such as Latin America. Hence, Chagas disease is still a major cause of cardiomyopathy in the United States, despite the low presence of the parasite in America.

Case Description: We present the case of a 44-year-old Hispanic male with a past medical history of alcohol abuse, uncontrolled type II diabetes mellitus, and poor medical follow-up, who presents to the emergency department with a one month history of progressive dyspnea, orthopnea, abdominal distension, and bilateral lower extremity swelling associated with weeping skin ulcerations. Physical exam was significant for anasarca, ascites, jugular venous distension, decreased breath sounds with positive rales on chest auscultation. Initial work-up revealed non-ischemic heart failure (HF) of unknown etiology with an ejection fraction of 15% (NYHA Class IV, AHA Stage D), moderate to severe multivalvular disease with possible septic vegetations, bilateral pleural effusions, spontaneous bacterial peritonitis (SBP), and a normal liver. Empiric antibiotic therapy was initiated for suspected infective endocarditis (IE) and SBP with ceftriaxone and vancomycin, blood cultures were negative, and treatment for acute HF was also started. Given the patient's significant abdominal distention, a Computed Tomography Scan of the abdomen was obtained which revealed hyperdensities in multiple internal organs consistent with granulomas. Further laboratory tests were obtained to explore a gamut of possible etiologies of these granulomas, including infectious, metabolic, and autoimmune, which eventually revealed a positive serology for *Trypanosoma cruzi*. Due to the severity of the valvular disease, the patient was evaluated by Cardiothoracic surgery and underwent aortic valve replacement with mitral valve repair. Treatment for heart failure was continued, however, targeted treatment for Chagas cardiomyopathy was not pursued due to the lack of literature showing its effectiveness in adult patients.

Discussion: Though Chagas disease is considered mainly a disease of developing countries, it is important to consider it in the differential diagnoses of certain patient populations, especially in patients with cardiomyopathy of unexplained etiology who immigrated from Central and South America. In the case of this patient, such risk factors were alcohol use disorder and uncontrolled diabetes, however the severity of his disease warranted further evaluation.

Title: **Superior Capsular Reconstruction After Failed Massive Rotator Cuff Repair**

Authors: Trevor Smith, MS, OMS2; Emily Oakley, PA-C; Christopher Baker, MD

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Superior capsular reconstruction, SCR, is a rapidly growing procedure in patients with large or irreparable rotator cuff tears. In a review of 24 shoulders, Mihata et. al. reported that forward flexion increased from 84° to 148° with American Shoulder and Elbow Score improving from 23.5 to 92.9 points. A more recent review by Pennington et al. also revealed similar data trends in a cohort of 86 patients. The rapid rise in SCR being used as a treatment for irreparable rotator cuffs has shown excellent short-term clinical results for patients. However, authors debate the clinical indications of SCR, suggesting that patients have an intact subscapularis or that reverse arthroplasty may be more suitable for elderly patients with failed rotator cuff repairs or poor bone stock.

Case Description: We present a case of a 62-year-old female who presented with left shoulder pain from a fall at work where she slipped on ice. Pain 8/10 with weakness and limited range of motion on exam. Initial radiographs indicated no fractures or dislocations or bony lesions. MRI revealed an acute rotator cuff tear involving the subscapularis, supraspinatus, infraspinatus, with dislocation of the biceps with tearing, and subacromial impingement with a type III subacromial spur. The patient was taken to the operating room for arthroscopic repair, biceps tenodesis, distal clavicle excision, and subacromial decompression. Initial follow ups were promising post repair of her massive rotator cuff tear. The patient progressed along a typical postoperative protocol for a massive rotator cuff repair. She did well with improving pain and range of motion during physical therapy. However, at the 3-month post op visit, the patient reported pain of 9/10 with markedly decreased function. A left shoulder intra-articular injection was performed. This intervention did not help the worsening pain and a new MRI was subsequently obtained at the 4-month visit. New MRI showed a tear medial to the repair at the supraspinatus and infraspinatus. The proximal humerus was migrating proximally. Her elevation was 140° with external rotation to 30°. The patient was taken back to the operating room for a revision arthroscopic rotator cuff repair with

dermal allograft augmentation of the superior capsule. Successful repair was achieved, and the patient was satisfied. The patient achieved MMI at her 9-month follow up with consistent ROM and function. At her 5-year post-op visit, the patient had full range of motion bilaterally: forward flexion to 180°, external rotation to 60°, and internal rotation to T4 with 5/5 strength on the right and 4/5 strength on the left.

Discussion: This case illustrates a new and emerging repair in rotator cuff surgery in a patient with a failed massive rotator cuff repair with a 5-year follow-up. SCR is a promising minimally invasive arthroscopic technique in patients with irreparable rotator cuff tears. The technique also allows for revision to reverse total shoulder arthroplasty if clinical outcome goals are not achieved.

Title: **Lemierre Syndrome Demonstrating an Atypical Case of Streptococcus Constellatus Causing a Deep Vein Thrombosis in the Left Internal Jugular Vein**

Authors: Christian Hailey Summa, MBS, OMS3; Marcos Clavijo Fernandez, OMS3; Jordan Simpson, MBS, OMS2; Andrew D. Beckler, MD; Michelle Demory Beckler, PhD

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Lemierre Syndrome (LS) is a rare, potentially life-threatening infection that typically develops from invasion of bacteria through pharyngeal mucosal tissue, followed by septic thrombophlebitis, most often involving the internal jugular vein. The primary complication of concern is formation of septic emboli to the lungs or other organs. The most common causative bacteria are *Fusobacterium necrophorum.* Typically, patients present with high fevers, sore throat, neck pain, and pulmonary symptoms, though the diagnosis is often overlooked as the initial manifestation may be subtle, and non-specific. Prompt diagnosis and treatment with antibiotics are imperative to prevent disease progression and promote quick recovery.

Case Description: Patient is a 40-year-old female current smoker with a past medical history of anxiety presented with odynophagia, bilateral neck swelling, erythema and induration. She also presented with dysphonia and mild tenderness to palpation, to the affected area due to the contributing injury patient reported swallowing a hot meatball several days prior. The patient has presented with no acute or respiratory distress but a muffled voice. Based on history and physical, a Computer Tomography (CT) of the neck was performed which showed a large fluid and gas enhancing gas collection emanating from left hypopharynx. There was focal narrowing of the left jugular vein as it approaches the process at the level of the hyoid which could include thrombus or direct communication. An Ultrasound (US) study of the neck was performed which confirmed a DVT within the left internal jugular vein as identified on the previous neck CT. A CT of the chest was also performed which showed an inferior margin of the large anterior neck collection extending just below the sternoclavicular junction level the mediastinum is unremarkable. Based on the radiology reports, history and physical the patient underwent a direct laryngoscopy with repair of left pharyngeal injury and incision and drainage of neck and upper chest abscess.

Discussion: The pathogenesis of Lemierre Syndrome is complex and not well defined. What is known is that Fusobacteria necrophorum is the most common cause of Lemierre syndrome. Complications of this disease can be caused by dissemination of septic emboli which travel to major organs and cause damage. Accordingly, prompt diagnosis and treatment of Lemierre syndrome is critical to ensure improved patient outcomes. Despite only one other reported case of Streptococcus constellatus as the cause of Lemierre syndrome, it is important to identify this organism as a possible cause due to the severity of the disease without proper treatment.

Title: **Pneumonitis: A Rare Presentation of Hairy Cell Leukemia**

Authors: Elena V. Tellez, DO, PGY2; Nabir Babbar, DO, PGY5; Alex Morizio, MD

Program: Palmetto General Hospital, Internal Medicine Residency Program

Introduction: Hairy cell leukemia is a rare malignancy of hematopoietic stem cells differentiated as mature B-lymphocytes. Hairy cell leukemia accounts for 1-2% of all cases of adult leukemia. Infiltration of lymphoid B-cells is typically predominant in bone marrow, blood stream, and spleen. Hairy cell leukemia is typically diagnosed when patients present with constitutional symptoms or complications resulting from pancytopenia. In this case report, we will discuss respiratory complications of hairy cell leukemia in a newly diagnosed patient.

Case Description: A 36-year-old male, with no known medical history, presented with a four-day history of malaise, subjective fever, and chills. Lab findings were remarkable for pancytopenia. Peripheral blood smear was notable for atypical lymphocytes. Several hours

following admission, the patient developed severe respiratory distress and hypoxemic respiratory failure requiring invasive ventilation. Computed tomography angiography of the chest was obtained, that ruled out pulmonary embolism; however, displayed diffuse bilateral ground glass opacities suggestive of consolidative pneumonitis and prominent mediastinal and mesenteric lymph nodes. Incidental finding of hepatosplenomegaly was also noted. Bronchoscopy revealed no purulent secretions and cultures did not grow any pathogens. A worsening clinical status and persistent pancytopenia prompted suspicion for hematopoietic malignancy. A bone marrow biopsy revealed extensive involvement of low-grade B lymphocytes staining positive for CD 25, DBA44, TRAP, BCL1, which was consistent with a diagnosis of hairy cell leukemia. Patient underwent splenectomy and was started on low dose Pentostatin to achieve remission.

Discussion: This case highlights an uncommon and life-threatening complication of hairy cell leukemia. Despite correction of neutropenia and treatment with multiple antimicrobials, diffuse opacities were persistent and attempts to wean off mechanical ventilation were not successful. The patient's clinical course was complicated by persistent pulmonary insults that did not respond to traditional therapies. Bronchial washings sent for flow cytometry revealed polytypic B-cell population, but no phenotypic abnormalities. Although rare, there are reported cases of pulmonary infiltration by hairy cell leukemia in literature. A pneumonitis as described in this case, raises suspicion for lymphoma infiltration due to presence of persistent lung infiltrates that were not responsive to traditional pneumonitis therapies and the presence of mediastinal lymph nodes. Unfortunately, a lung biopsy was unable to be performed due to the patient's worsening clinical course. Conclusively, pulmonary infiltration secondary to hairy cell leukemia should be considered as a differential diagnosis in patients with acute respiratory failure at the time of diagnosis and should be considered a potential complication that warrants emergent care.

Title: **Clotting Together; Multiple Venous Thrombosis Reveal Pancreatic Adenocarcinoma**

Authors: Renuka Tolani, DO, PGY1; Alejandro Dominguez, DO, PGY2; Carlos Barbur, DO, PGY3; Lisset Sirven, MD, PGY1

Program: Palmetto General Hospital, Internal Medicine Residency Program

Introduction: Deep venous thrombosis (DVT) and Pulmonary embolism (PE) can often be the presenting signs for a patient with advanced malignancies, such as pancreatic cancer. Venous stasis can present in the form of May Thurner's syndrome, when the left common iliac vein is compressed between the right common iliac artery and the underlying vertebral body. Stasis, along with collagen deposition, intimal fibrosis, and elastin can promote coagulation. We present a case that highlights how subtle undiscovered provoking factors can promote the harbinger of more sinister disease.

Case Description: This is a 59-year-old male with a past medical history of alcohol and tobacco abuse who presents to the emergency department complaining of bilateral lower extremity pain and edema that began one month ago. The pain does not have aggravating or alleviating factors and is described as an intermittent cramping. He endorses an associated unintentional ten-pound weight loss and night sweats occurring for the last month. He denies any recent extended travel, surgery, trauma, or decreased ambulation. Clinically, the patient was hemodynamically stable upon examination. Cardiac exam revealed regular rate and rhythm with no rubs, murmurs, or gallops appreciated. Lung fields were clear to auscultation bilaterally. The patient had preserved pulses in the bilateral lower extremities. Calf tenderness was reproducible with palpation. Bilateral lower extremity edema was non-pitting. Doppler ultrasound of the bilateral lower extremities revealed extensive acute DVT of the left and right posterior tibial veins. CTA of the chest showed pulmonary emboli with no right heart strain. The patient was taken emergently for mechanical thrombectomy of the left DVT. Upon recovery and initiation of full-dose anticoagulation, the patient was worked up for occult malignancy, ultimately revealing a pancreatic mass with liver metastasis. As disease and clot burden progressed, the patient's hospital course was complicated by massive pulmonary embolism, resulting in mechanical thrombectomy. During this time, the patient was found to have May Thurner syndrome, for which stenting of the iliac veins was conducted. On completion of pulmonary artery embolectomy, the patient required intubation with pressor support and transfusion of blood products due to reperfusion injury. Eventually the patient succumbed to hospice.

Discussion: This presentation showcases the severity of seemingly unprovoked emboli and the diagnostic workup it entails.

Title: **Atypical Presentation of Plant-Induced Allergic Contact Dermatitis in a Pediatric Patient**

Authors: Oleg Tsvyetayev, OMS3; Mandi Abdelahad, OMS3; Carmen E. Sainz, OMS3; Rogerio S. Faillace, MD

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Plants of the Anacardiaceae family are responsible for more allergic contact dermatitis cases than all other plant families combined. The most important members of this family are those in the genus *Toxicondendron*, which include poison ivy,

poison oak, and poison sumac. Poison ivy dermatitis typically presents as intense pruritus and erythema, followed by papules, vesicles, or bullae, which are usually arranged in a characteristic linear or streak-like pattern. Described is a unique case of a three-year-old female with allergic contact dermatitis presenting in a circular pattern without any pain or pruritis. Poison ivy grows in shady or sunny locations throughout Florida. Poison ivy dermatitis should be suspected in infants and children presenting with unexplained pruritic and linear streaks of erythematous papules and vesicles but should not be excluded from the differential in atypical presentations such as this one.

Case Description: A three-year-old girl with prior history of asthma, atopic dermatitis, and perioral dermatitis presented with a two-day history of an eruption on the left dorsal hand, wrist, and arm. One day later, the eruption did not improve but remained localized. After further questioning, mother reported that the patient was playing at a city park and touched a number of leaves ten days prior to initial symptoms, which was suggestive of an allergic contact dermatitis. However, there was no pain, pruritus, or any other associated symptoms resulting in consideration of viral etiologies. Patient attends daycare but her mother was confident that no close sick contacts have been encountered and she did not develop a fever. The initial presentation included red papules and vesicles in a circular pattern on the thenar eminence of the left hand, distal left arm, and proximal forearm. An erythematous patch with sharp borders appeared beyond those papules and vesicles. The dermatitis was treated with over-the-counter hydrocortisone 1% cream. Two days of this treatment showed improvement and progression to papules and shallow ulcers. Seven days after symptom onset, the dermatitis remained localized with tiny papules, ulcers, and sharply demarcated patch.

Discussion: Intense pruritus, erythema, and a vesicular rash in a streak pattern have been reported as the most common pediatric presentation of allergic contact dermatitis (ACD). The original sensitization to an allergen has been reported to take up to 21 days in an unexposed patient. In a pediatric population, the initial ACD reaction can be mild. However, to our knowledge, all the prior reports of ACD have been associated with pruritus and/or pain. Our case illustrates a pediatric patient with dermatitis in a localized, clustered distribution of vesicles along the left arm. Remote contact with plants warrants further consideration of ACD despite the lack or pruritus, pain, or typical streak pattern. Improvement with hydrocortisone, as well as the timing of symptom onset after allegen exposure suggests immune-mediated etiology. Based on this case, mild symptom presentation and lack of pruritus cannot definitively rule out the diagnosis of ACD in a pediatric patient and the frequency of such presentation is unknown. The diagnosis of ACD can be difficult and needs to consider the entire clinical picture, thorough history of exposure, and treatment response. Better clinical knowledge of ACD associations will allow for improved recognition of this underreported condition. Consideration of differential diagnoses is also crucial in the choice of therapy and eventual clinical outcome.

Title: **An Osteopathic Approach to Thoracic Outlet Syndrome Masked by Ehlers-Danlos Syndrome: A Case Study**
Authors: David Tuyn, OMS2; Joshua Berko, OMS3; Gregory Kunis, OMS3; Mark Sandhouse, DO
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Ehlers-Danlos Syndrome (EDS) is a connective tissue disorder that frequently results in joint instability, subluxations, and dislocations. EDS can also cause other problems outside of the typical musculoskeletal presentation. Since EDS affects all connective tissue, it can present as stomach pain, dysphagia, and also vascular events. A seemingly unrelated medical condition, thoracic outlet syndrome (TOS), is a syndrome in which the neurovasculature structures of the neck are compressed by surrounding structures causing decreased blood flow and innervation to the affected extremities. Compression can be caused by the scalenes, first ribs, pectoralis minor muscles, and by cervical ribs, which are extra ribs that occur in 1/500 people. There are multiple types of TOS with the most common being the neurogenic form resulting from compression of the brachial plexus. This roadblock to innervation results in decreased sensation in the affected arm, numbness, tingling, weakened grip, and muscular atrophy.

Case Description: A 35-year-old female presented with numbness and tingling in her upper extremities bilaterally, which she had experienced for the majority of her life. The patient has also reported left shoulder pain, instability, and frequent dislocations due to her past medical history of EDS and a failed shoulder reconstruction in 2002. Upon visual examination, her left humeral head was anteriorly displaced, and her entire left shoulder was displaced inferiorly compared to the right. Neurologic testing revealed decreased sensation to light touch C5-T1 bilaterally but more so on the left side as well as 3+ reflexes bilaterally in the upper extremity. Adson's and Reverse Adson's maneuvers were positive bilaterally. Osteopathic structural examination revealed severe hypertonicity in the anterior and middle scalenes, and radiographs revealed bilateral cervical ribs at C6 and C7. The patient was diagnosed with TOS, symptoms of which were previously masked with the diagnosis of EDS. The patient elected for osteopathic manipulative treatment (OMT) in combination with a prolotherapy regimen. OMT techniques used include facilitated positional release, muscle energy, direct myofascial release, and counterstrain directed at the scalenes and cervical tissues. Prolotherapy was used in this capacity with the osteopathic principle of utilizing the body's natural healing mechanism to restore function by reducing shoulder instability. Over 8 weeks of treatment, the patient reported a remarkable reduction in dislocation events and extremity numbness bilaterally. Visual inspection revealed reduction of the humeral head. The patient also stated that her "hands have color for the first time in

forever", regarding increased blood circulation.

Discussion: This case illustrates how multiple syndromes can complicate a patient's presentation and a high index of clinical suspicion is necessary to assemble all of the pieces. This case also demonstrates how OMT and osteopathic approach to prolotherapy can improve the symptoms of EDS and TOS.

Title: **Finding the B in Bone Loss**
Authors: Sachin Vasikaran, MD, PGY1; Sridhi Patel, MD, PGY2
Program: Broward Health Medical Center, Pediatric Residency Program

Introduction: Bone and joint pain are common preceding symptoms in chronic illnesses including acute leukemia. Osteoporosis, however, is rare in the pediatric population and not typically a reported symptom prior to diagnosis of acute lymphoblastic leukemia. Increased risk factors for osteoporosis in children include nutritional deficiencies, hormonal imbalance, and prolonged inactivity. Typically, symptoms of this sort can be seen after treatment with chemotherapy and not prior as seen in our case.

Case Description: This is an 11-year-old girl who presented with a chief complaint of worsening back pain and stiffness for the past 2 months that causes her difficulty with ambulation. The patient has used over the counter pain medication to alleviate her pain, but with minimal success. She had a spine x-ray performed around when the pain started which did not show any structural abnormalities. Upon arrival to the emergency room, her vital signs were within normal limits. The patient had an X-Ray of her Cervical spine, Thoracic spine, lumbar spine, hip with pelvis and sacrum/coccyx which showed pan osteoporosis with intermittent possible endplate compression deformities, as well as potential gross disturbance of normal hematopoiesis, or underlying error of vitamin-D metabolism. Her presenting physical exam was only positive for diffuse back pain but worst at the lumbar and thoracic regions. This pain also affected her gait and caused her to hunch over and move gingerly. The patient's initial abnormal labs showed severe neutropenia and low total Vitamin D. Given her abnormal presentation, she underwent a comprehensive endocrine, rheumatologic, and autoimmune workup, all which were negative. In the days following, the patient received an MRI of her brain, cervical spine, thoracic spine, lumbar spine, pelvis with and without contrast as well as a Bone density scan. Of note, the MRI Thoracic spine showed acute to subacute mild uncomplicated less than 50% type A compression fracture at T8 as well as mild uncomplicated chronic compression fractures at T6 and T7, MRI Lumbar spine showed mild, likely chronic wedge deformity atL1. MRI Pelvis showed severe osteoporosis from gross disturbance of normal hematopoiesis. Bone densitometry scan showed markedly low bone mineral density results, at least 3 standard deviations below the mean for age matched controls. After this, it was decided to perform a bone marrow biopsy and flow cytometry which confirmed a diagnosis of B-Acute Lymphoblastic Leukemia with approximately 71% of the total events showing B-lymphoblasts.

Discussion: Acute lymphoblastic leukemia cases have been discussed in the past; however, the primary presenting complaint has rarely been acute onset osteoporosis resulting in diffuse back pain. We hope to inform the scientific community of a new and serious differential diagnosis of such a presentation. Further investigation into the correlation of osteoporosis and ALL could be performed in the future.

Title: **Pseudocholinesterase Deficiency: A Case Study**
Authors: Adithi Vemuri, OMS3; Alyssa Goldenhart, OMS3; Ashley Long, OMS3; Stephen Igel, MD
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: The enzyme pseudocholinesterase metabolizes many drugs commonly used during anesthesia. Most individuals can quickly metabolize these drugs leading to a short duration of action. Individuals with an acquired or inherited deficiency are slow to metabolize anesthetics and may take up to 8 hours to recover from anesthetic administration. About 1 in 3,200 to 1 in 5,000 patients inherit this autosomal recessive trait. It is important to quickly recognize this rare condition as patient care post-surgery will need to include mechanical ventilation until the medication has been fully metabolized.

Case Description: Our patient was a 26-year-old female who presented to the emergency department after having a right ovarian cystectomy at a surgery center. After the surgery was completed, the anesthesiologist was unable to extubate the patient safely as the patient was having difficulty recovering from general anesthesia facilitated by succinylcholine. She was under observation for 4 hours without any improvement in her respiratory status. Upon arrival in the emergency department, the patient was able to nod yes and no to certain questions but was unable to lift her legs or head safely. The patient was intubated and ventilated, alert, and awake. Vitals on

admission were as follows: BP 123/76 mmHg, pulse 100 bpm. The patient was found to have acute hypoxic respiratory failure secondary to respiratory muscle paralysis requiring mechanical ventilation. This was considered to be secondary to a pseudocholinesterase deficiency. This required the patient to be on mechanical ventilation. After four hours of observation without recovery from anesthesia at the surgery center, the patient was transferred to a nearby ICU. She was monitored overnight while intubated and sedated. The next morning, she underwent a successful spontaneous breathing trial and was extubated. Prior to extubation, the patient had an O2 saturation of 100% and FiO2 of 30%. A chest CT was performed and showed no evidence of cardiopulmonary disease. The patient was then deemed stable and medically cleared for discharge home with instructions to follow up with primary care in 3-5 days.

Discussion: Prompt and accurate diagnosis of pseudocholinesterase deficiency can lead to optimal patient outcomes. Management typically consists of conservative treatment. Increasing recognition of this rare condition will help patients receive appropriate and timely care.

Title: **Overcoming Misconceptions and Other Barriers to the Use of Osteopathic Manipulative Treatment**
Authors: Felix Vergilis, OMS3; Joshua Berko, OMS3; Gregory Kunis, OMS3
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Osteopathic manipulative treatment (OMT) has many proven benefits in patient care, however, it is not practiced by all osteopathic trained physicians due to several proposed barriers, one of them being misconceptions about osteopathic medicine. Amid a psychiatric rotation, OMT was used to augment treatment for a 55-year-old female with an acute complaint of a tension headache. A non-medically trained hospital administrator passed the room where the medical student was performing treatment and proceeded to notify the human resources department due to perceived inappropriate patient contact. We look to analyze this case and illustrate one of the many barriers facing osteopathic medical students and physicians in using OMT. We also look to propose solutions to overcome these barriers to maximize the use of OMT as well as patient outcomes.

Case Description: A 55-year-old female was evaluated for a bilateral frontal headache lasting two days that radiated to the orbital regions bilaterally as well as the upper back. She stated a 7/10 pain scale with no exacerbations and a history of migraines yet stated this did not feel like one. She admitted to one episode of light-headedness several days earlier, but denied any recent falls, head trauma, photophobia, nausea, vomiting, or blurred vision. A cervicogenic headache diagnosis was made and the osteopathic psychiatric residents approved the osteopathic medical student to perform OMT. The patient was educated about OMT and verbally consented to the treatment. Another third-year medical student was present as a chaperone and the door to the room was open. Osteopathic exam showed bilaterally hypertonic suboccipital triangle musculature, C2-C4 NR_LS_L, T1-T3 NR_LS_R, and hypertonicity bilaterally in the trapezius musculature. The plan consisted of sub-occipital decompression, Still's Technique for C2-C4 NR_LS_L, balanced ligamentous tension for T1-T3 NR_LS_R myofascial release and muscle energy of the cervical spine. After treatment, the patient reported decreased pain from a 7/10 to a 4/10 and stated increased range of motion in the cervical and upper thoracic regions. During the treatment, a non-medically trained hospital administrator walked past the open room and perceived that the male osteopathic medical student was "performing a massage" on the female patient. The incident was escalated to the human resources department and ultimately the national hospital headquarters. The national headquarters notified the psychiatric director who proceeded to educate them on the intentions and methods of OMT. No further administrative action was taken.

Discussion: This case illustrates one of the many barriers that osteopathic students and physicians face when implementing OMT. One study found that a lack of a supportive philosophic environment contributed to 23% of physicians surveyed diminished use of OMT in their practice. It was also found that 85% of surveyed physicians agreed that the confusion of OMT as chiropractic medicine was a barrier to using OMT. As the merger between allopathic and osteopathic residencies continues and number osteopathic hospitals decrease due to buyouts or mergers, education on OMT is imperative. The American Osteopathic Association must work with hospitals, physicians, and students to push for additional OMT education in graduate medical education as well as the public domain.

Title: **Opsoclonus-Myoclonus-Ataxia Syndrome Secondary to Advanced HIV Infection: An Extremely Rare and Atypical Case with Management Considerations**

Authors: Ashley Ryan Vidad, OMS3; Ahjay Bhatia, OMS3; Himadri Shah, OMS3; Shrinand Shah, OMS1; Divy Mehra, OMS3; Olu Ogunjemilusi, MD, PGY1

Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: Opsoclonus-myoclonus-ataxia syndrome (OMAS) is a rare neurological disorder that presents with multidirectional saccades (opsoclonus) and rapid onset, involuntary muscular contractions (myoclonus) which may or may not present with ataxia. It has an incidence of 0.18 for every 1,000,000 in total population. OMAS is mostly idiopathic in origin or in association with cancers such as neuroblastoma in children and breast and small cell lung cancer in adults. However, other reports also link OMAS to infections such as HIV. OMAS commonly presents with both myoclonic and opsoclonic components, with optional ataxia. However, this case reports a previously healthy patient who presents with weakness, balance dysfunction, gait instability, and multidirectional opsoclonus, without any spastic muscle contractions.

Case Description: Patient is a 43-year-old female with no past medical history, presented to the emergency department with complaints of weakness and dizziness for four days. She admitted to falling frequently and a sensation that her eyes are moving. Physical examination showed no abnormalities except for mild tachycardia, balance dysfunction, and nystagmus. She was awake, alert, oriented to person, place, and time. She had no motor deficits and her gross sensation and CN II-XII were intact. Brain CT showed a small, age indeterminate, right frontal lobe infarction and aspirin was continued. Throughout the course of the hospital stay, the patient developed focal weakness, blurry vision, and diplopia, but was still alert, oriented to person, time, and place. Due to the downbeating nystagmus on ocular motility test, the neurologist considered cervicomedullary junction pathology, but MRI results were negative. Due to her persistent nystagmus and ataxia, a history of heavy smoking, and weight loss, a paraneoplastic work-up was done. However, paraneoplastic markers and antibodies such as RF, ANA, Anti-Hu, Anti-Yo, and dsDNA were not detected. Given her repeated low levels of WBC, an HIV workup was ordered and showed that the Antigen/Antibody HIV screen test was positive, but HIV Antibody test was non-reactive, which was initially deemed as a false positive. The HIV-1 viral load was then checked and reported >400k copies/mL bDNA. At this point, a clinical picture of OMAS secondary to advanced HIV infection was elicited which prompted the start of Raltegravir, Emtricitabine, and Tenofovir for treatment of HIV and pulse high dose steroids for nystagmus. Patient reported mild alleviation of the nystagmus but persisted until discharge.

Discussion: OMAS typically presents with both opsoclonus and myoclonus, with optional ataxia. However, in patients who do not complain of spastic muscle contractions, OMAS should not be retracted from the differential diagnoses, especially in a patient with balance dysregulation. Moreover, OMAS can present in seemingly healthy patients, so a thorough history should be taken. Early detection and treatment is empirical in this disorder so a quick extensive workup should be started to decrease the chances of developing permanent neurological deficits such as dysregulated behaviors and affect and cognitive impairment.

Title: **An Uncommon Medical Emergency**

Authors: Alberto Villarreal, DO, PGY2; Freddie Prieto, OMS3; Lori Le, DO, PGY3; Lisette Perez-Lazo, DO

Program: Palmetto General Hospital, Family Medicine Residency Program

Introduction: Acute epiglottitis is a medical emergency that is of increasing prevalence in the adult population. This is a case of an adult patient who presented with acute epiglottitis and how prompt management can prevent intubation, morbidity and or mortality.

Case Description: A 35-year-old male previously healthy with a 10-pack year smoking history presented to Palmetto General Hospital with 2 days of sore throat. One day prior to presentation the patient had difficulty swallowing. On presentation to the ED the patient was unable to speak nor eat and was beginning to drool. In the emergency department the patient was found to have mild extension of the neck, stable vital signs, with no stridor and no tachypnea. Patient in ED was given 10mg of dexamethasone and 30mg of Toradol. He had improvement of breathing and began to tolerate secretions. Laryngoscopy was performed revealing a "beefy red" epiglottis. Patient condition stabilized with IV clindamycin, no other steroids were given, and patient was discharged from the hospital after 2 days.

Discussion: The impact of this case shows the importance of medical intervention in the ED that prevented intubation and advanced airway management in epiglottitis. Prompt recognition with physical examination and treatment with steroids or antibiotics is critical in preventing mortality in this medical emergency.

Title: **Promising Future for Treatment of Neuroinvasive West Nile Virus with High-Dose Corticosteroids**
Authors: Don Woody, OMS3; Mandi Abdelahad, OMS3; Brooke Alexander, OMS3; Taylor Mazzei, OMS3; Rebecca Cherner, DO
Program: Nova Southeastern University Dr. Kiran C Patel College of Osteopathic Medicine, Doctor of Osteopathic Medicine Program

Introduction: West Nile Virus (WNV), although rare, is the leading cause of mosquito-borne disease in the United States. This is an unusual case of a 63-year-old healthy male with fever and altered mental status diagnosed with WNV meningoencephalitis. The patient's neurologic function worsened during his hospital stay but was subsequently treated with an alternative treatment regime. He was given hydrocortisone five milligrams (mg), which drastically improved his neurocognitive function after two days. This case is unique in that the majority of WNV infections are either asymptomatic or self-limited. Less than 1% of patients, however, develop a severe neuroinvasive form consisting of meningitis, encephalitis, or flaccid paralysis. The mortality rate of patients with neuroinvasive disease is approximately 10%, especially in cases involving meningoencephalitis. Physicians should remain vigilant in including WNV in their differential diagnoses, especially in areas such as Florida, as warmer climate changes and humidity start to shift concerns for vector transmission.

Case Description: This is a 63-year-old previously healthy male who presented for worsening altered mental status, fever, and neck pain for three days. Meningitis panel by polymerase chain reaction (PCR) was negative for all pathogens. The patient repeatedly tested negative for coronavirus disease 2019 (COVID-19) throughout the duration of his stay in the hospital, ruling out COVID-19 amidst the pandemic. West Nile IgM antibodies were identified in cerebrospinal fluid and a diagnosis of West Nile Virus meningoencephalitis was made. Initially, supportive measures included blood pressure control, high-flow oxygen, nasogastric tube, ventilation, Seroquel for agitation, and antibiotics for likely aspiration pneumonia. The patient failed extubation while in the intensive care unit and underwent a tracheostomy tube placement. The patient was then treated with a trial of continuous hydrocortisone five mg every eight hours with remarkable improvement in mental status and became stable for discharge after just two days of this uncommon treatment regimen.

Discussion: This case shows a promising future for the treatment of neuroinvasive WNV with high-dose corticosteroids. Currently, there are no vaccines or treatment for infected individuals. Literature review shows identifies one other similar case, in which a 71-year-old female with WNV neuroinvasive disease received intravenous methylprednisolone with remarkable improvement. Limited research suggests WNV can trigger an exaggerated immune response that amplifies neuroinflammation. This leads to the notion that the use of high-dose corticosteroids can suppress WNV neuroinvasive disease and thus, may be used as alternative treatment. It is crucial for physicians to maintain a high index of suspicion in patients presenting with unexplained symptoms that can mimic many other diseases. Additional research is also needed to determine if high-dose corticosteroids can improve recovery in infected individuals with WNV neuroinvasive disease.

Title: **Pheochromocytoma: Often an Incidental Finding**
Authors: Rebecca Yaras, DO, PGY1; Elena Tellez, DO, PGY2; Taleb El-Masri, DO, PGY3; Yaswanraj Yuvaraj, DO, PGY1
Program: Palmetto General Hospital, Family Medicine Residency Program

Introduction: Pheochromocytomas, present in less than 0.2% of hypertensive patients, are catecholamine-secreting tumors arising from the chromaffin cells of the adrenal medulla. The classic triad consists of sustained or paroxysmal hypertension, headache, and generalized sweating. However, only about 50% of patients present with all three symptoms making their diagnosis challenging. Nearly half of pheochromocytomas are found on autopsy or incidentally on imaging due to their lack of distinct and universal symptoms. Here, we discuss the case of a 58-year-old Hispanic male who presented with a Pheochromocytoma.

Case Description: A 58-year-old male with a past medical history of hypertension and non-insulin-dependent diabetes presented to the emergency department (ED) complaining of constant, diffuse abdominal pain associated with nausea and vomiting. The patient was afebrile, however noted to have a sinus tachycardia with a heart rate of 102 bpm and a blood pressure of 201/130 with myocardial injury and acute renal failure. Electrolytes were all within normal limits. Computed tomography (CT) of the abdomen performed in the ED did not reveal any acute intra-abdominal processes, however, incidentally revealed a 4.2 x 4.0 x 4.9 cm right adrenal mass with unenhanced contents measuring 35 Hounsfield Units (HU). Decision was made to work-up the adrenal mass to determine whether it was a functioning adenoma or not. Workup was negative for primary hyperaldosteronism. A random cortisol was found to be elevated. However, a dexamethasone suppression test was not performed as the patient was already discharged. The patient did have elevated plasma metanephrine levels of 6109.4 and plasma normetanephrine levels of 4505.6. Unfortunately, the 24-hour urine sample was contaminated so additional confirmation was not obtained. Furthermore, upon prompting, the patient did admit to experiencing episodes of headaches and palpitations with sporadic elevations in blood pressure, which were transient.

Discussion: The clinical suspicion for pheochromocytoma for this case is high due to the patient's symptoms of intermittent tachycardia, headaches, hypertensive emergency, an adrenal mass greater than 4 cm in size and greater than 10 HU units, as well as the elevated plasma metanephrines and normetanephrines. The gold standard for diagnosis is typically urine fractionated metanephrine with a sensitivity of 90% and specificity of 98%, however, plasma fractionated metanephrines do have a respectable sensitivity of 97% and specificity of 85%. Although advances in medicine have provided us with numerous diagnostic tests, the most reliable tool to identify an illness lies within the history and physical exam. In this case, the urine samples were contaminated and inconclusive, but the diagnosis was made based on clinical presentation and supportive serum metanephrine levels. This highlights the importance of considering pheochromocytoma as a cause of recurrent hypertensive emergency especially when presenting with tachycardia, headache, palpitations, and/or diaphoresis. As clinicians, attentiveness to these symptoms can lead to earlier diagnosis and ultimately expedite treatment of the underlying cause.

Title: **Mycoplasma Pneumoniae Induced Myocarditis and Rhabdomyolysis**
Authors: Yaswanraj Yuvaraj, DO, PGY1; Tram Nguyen, DO, PGY3; Taleb El-Masri, DO, PGY3
Program: Palmetto General Hospital, Internal Medicine Residency Program

Introduction: Mycoplasma pneumoniae (MP) is a common cause of community acquired pneumonia with an incidence of 1-3 per 1000 cases annually. However, extrapulmonary manifestations of MP in the adult population are rare. This can be attributed to the subclinical infections that go undiagnosed. Only a handful of MP cases causing pericarditis, myocarditis, or rhabdomyolysis have been reported. The mechanism behind injury is predicted to be caused by bacterial inflammation and vascular occlusion combined with an autoinflammatory response. We present a case of a 21-year-old Hispanic male with peri-myocarditis and rhabdomyolysis caused by MP.

Case Description: A 21-year-old Hispanic male with a past medical history of Kawasaki disease, tobacco abuse, and alcohol abuse presented complaining of constant chest pain for two days. He endorsed subjective fever, dark urine, and myalgias. He had previously visited an urgent care and was prescribed ibuprofen and cyclobenzaprine to no avail. During the physical exam, the patient was afebrile and tachypneic. Cardiac exam revealed tachycardia with no rubs, murmurs, or gallops. Lung fields were clear to auscultation bilaterally. Chest pain was not reproducible upon palpation. The abdomen was soft, nondistended, and without organomegaly. Initial labs revealed leukocytosis, transaminitis, elevated d-dimer, elevated troponins, elevated C-reactive protein, and elevated creatinine kinase. Admission chest x-ray was without infiltrates, cardiomegaly, or pneumothorax. Initial electrocardiogram demonstrated ST elevations in inferolateral leads. Emergent cardiac catheterization demonstrated normal coronary anatomy. CTA of the chest was negative for pulmonary embolism and aortic dissection but revealed bilateral pleural infiltrates and effusions. Original echocardiogram demonstrated normal ejection fraction. Respiratory pathogen panel was positive for MP IgM. Treatment for MP-induced rhabdomyolysis and myo-pericarditis with intravenous fluids and azithromycin was initiated. The intravenous fluids plus the stunned myocardium induced systolic heart failure. The rapid clearance of bacteria with proper antibiotics allowed the stunned myocardium to recuperate within 72 hours. At which point the patient experienced rapid clinical improvement and was discharged home in stable condition.

Discussion: The diagnosis of MP is difficult due to its cellular structure, its ability to be missed on routine blood cultures, and its ability to cause extrapulmonary manifestation via autoimmune dysfunction. The case presented here demonstrates normal chest x-ray, but the CTA of the chest demonstrated pneumonic changes in lung architecture, and positive MP IgM. Thus, we were able to diagnose another rare manifestation of a common community acquired pneumonia infection that was complicated by cardiac and skeletal muscle injury leading to peri-myocarditis and rhabdomyolysis. MP should be considered in young patients due to its increased incidence in the younger population and unique presentations.

Title: **Abnormal Presentation of Endocarditis; Not Just Another Pain in The Neck**
Authors: Geidel N. Zambra, DO, PGY2; Micheal Girard, MD, PGY3; Alejandro Dominguez, DO, PGY2; Pedro Valdes, DO
Program: Palmetto General Hospital, Internal Medicine Residency Program

Introduction: The classic constellation of symptoms for infective endocarditis (IE) include splinter hemorrhages, retinal emboli, Osler nodes and Janeway lesions along with non-specific symptoms such as malaise and low-grade fever. However, despite the advances in prevention, detection, and treatment methods for IE, it continues to hold a 30% one-year mortality rate. This may be due to its notorious heterogeneity related to its etiology, course, and clinical manifestation.

Case Description: A 58-year-old male with a past medical history of chronic cervicalgia presented to the emergency department with a chief complaint of sudden onset of fever and progressively worsening meningeal signs for the past week. On physical examination, he was noted to be febrile at 101F with positive meningeal signs (Kernig/Brudzinski). Lumbar puncture revealed prominent leukocytosis consistent with viral etiology. He was empirically treated with antimicrobials including IV Rocephin, ampicillin, vancomycin and acyclovir. On admission blood cultures were obtained which grew 2/2 Streptococcus Gallolyticus (formerly known as Streptococcus Bovis biotype 1) and antibiotics were deescalated. Workup included a TEE which revealed a 1.2 x 0.5cm vegetation attached to the aortic valve and a 1 x 1 cm attached to the mitral valve. Ampicillin was initiated for broad-spectrum endocarditis coverage, with gentamicin for synergistic effect. Finally, a colonoscopy was completed revealing three sessile polyps consistent with tubular adenoma. Pathologic evidence linked both the valvular and colonic sources. The patient ultimately underwent surgical intervention for concurrent aortic and mitral valve replacement.

Discussion: S. Gallolyticus is a known causative organism for IE and is usually associated with gastrointestinal pathologies. Two-thirds of bacteremic cases involving S. Gallolyticus originate from either colonic or hepatobiliary growths. Diagnostic modalities, including TEE, help to confirm IE in the presence of fever when bacteremia co-exists. While histopathological evidence from colonoscopic procedures help locate the primary source. In the case of our patient, pathologic evidence after mitral and aortic valvular replacement revealed evidence of inflammatory changes. These included neutrophilic invasion followed by fibrotic changes that ultimately resulted in drastic vegetative growths. Pathologic evidence via colonoscopy revealed multiple tubular adenomas that confirmed the primary nidus of the bacteremia. It is always important to consider infective endocarditis even if it may be an uncommon presentation. Prompt labs, diagnostic tests/imaging, and an always helpful ID consultation are paramount in decreasing mortality from IE. Diagnostic modalities including colonoscopy and TEE are necessary for investigation of S. Gallolyticus. Once the source location is identified, antibiotic regimen and source control via valve replacement and polypectomy become critical with regards to morbidity and mortality benefits.

Title: **Small Bowel Obstruction Precipitated by Intussusception of a Meckel's Diverticulum**

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Introduction: Small bowel obstruction (SBO) secondary to a Meckel's diverticulum (MD) is a rare cause of acute abdominal pain that may warrant urgent surgical intervention. Volvulus or intussusception of the small bowel with presence of a MD as the lead point is the most commonly reported etiology of Meckel's-related obstruction, although additional known mechanisms include torsion, incarceration, inflammation, or inversion of the MD. Here, we report the first case of an SBO caused by the intussusception of a MD within its own lumen.

Case Description: A 30-year-old male with no reported past medical history and a surgical history of left inguinal hernia repair at eight years old presented to the emergency room with severe, persistent abdominal pain for 12-15 hours. The patient reported at least 10 episodes of nausea and non-bloody, non-bilious vomiting since he was woken by the pain 12 hours prior with associated obstipation. Last flatus or bowel movement was reported to be one day prior. His physical exam was notable for diffuse abdominal tenderness and mild distention. Vitals and laboratory tests were unremarkable. Abdominal CT imaging showed a distal high-grade SBO with multiple dilated loops of small bowel throughout the abdomen measuring up to 3.5 cm in diameter. The terminal ileum had collapsed, and mild ascites was seen in the right lower quadrant and within the pelvis. There was also a lucency within the distended loop of the small bowel in the medial right pelvis that was unable to be fully characterized. Patient was scheduled for urgent surgical intervention after initial management in the emergency room with intravenous fluid resuscitation and nasogastric tube placement demonstrated minimal improvement. Diagnostic laparoscopy revealed mucoid ascites throughout the abdomen and what appeared to be an area of intussusception in the right lower quadrant. Efforts to mobilize or reduce the intussusception were unsuccessful and the decision was made to convert to an exploratory laparotomy. A midline laparotomy incision was made and upon entering the abdomen dilated loops of small bowel were noted and carefully traced to the apparent intussusception in the terminal ileum. On reduction of the intussuscepted bowel, there was a very large diverticulum with a necrotic terminal end. An intussuscepted, focally necrotic Meckel's diverticulum in the distal ileum was identified to be the cause of the acute SBO. A segmental small bowel resection with primary anastomosis was performed. The patient tolerated the procedure well. On gross pathology, the segment of small bowel containing Meckel's diverticulum was remarkable for pancreatic acinar tissue. Transmural vascular congestion and hemorrhage were also noted with epidural injury including mucosal necrosis, consistent with ischemic-type injury. Postoperatively, the patient progressed well and was discharged to home on post op day four in hemodynamically stable condition. At follow-up in the office two weeks later, the patient reported doing well with return to baseline activity status.

Discussion: This case emphasizes the importance of history and physical findings in coordination with radiologic imaging in helping

to make appropriate decisions in a timely manner for operative vs conservative management of a potentially fatal SBO.

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