

# ACHE Semi-Annual Research Symposium

Fall 2022

October 7, 2022



AMERICAN OSTEOPATHIC ASSOCIATION



— ARKANSAS COLLEGES OF —  
HEALTH EDUCATION

## **Agenda**

<b>12:45 – 1:00 pm</b>	Welcome and serve hors d'oeuvres
<b>1:00 – 1:50 pm</b>	Barriers to Diversity in Research with Christopher Smith, Ed.D
<b>1:50 – 2:40 pm</b>	Building Trust and Planning Trials to be more Representative with James Turner, DO, MPH
<b>2:40 – 3:00 pm</b>	Attendee Participation (discussion)
<b>3:00 – 5:00 pm</b>	Poster Review & Presentations

## **Learning Objectives**

After completing this activity, learners will be able to:

1. Demonstrate an understanding of the factors that led to the historic disparities in clinical research.
2. Identify the challenges that will prevent diversity in their own research.
3. Develop knowledge of resources for their community to build trust in medical research and professionals.
4. Plan clinical trials that will accurately represent the patient populations served.

## **Accreditation Statements**

In support of improving patient care, this activity has been planned and implemented by the American Osteopathic Association and the Arkansas Colleges of Health Education. The American Osteopathic Association is accredited by the Accreditation Council for Continuing Medical Education (ACCME), to provide continuing education for the healthcare team.

## **AMA Credit Designation Statement – Physicians**

The American Osteopathic Association designates this live activity for a maximum of 3.00 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

## **AOA Credit Designation Statement**

The Arkansas Colleges of Osteopathic Medicine is accredited by the American Osteopathic Association to provide osteopathic continuing medical education for physicians.

The Arkansas Colleges of Osteopathic Medicine designates this activity for a maximum of 3.00 AOA Category 1-A credits and will report CME and specialty credits commensurate with the extent of the physician's participation in this activity.

## **APTA Credit Designation Statement**

This course has been pre-approved by the APTA for 3.0 Contact hours for Arkansas PTs and PTAs. The approval # is APTA-AR 1079.

## **Disclosures**

The American Osteopathic Association has implemented a policy to comply with the current Accreditation Council for Continuing Medical Education (ACCME) Standards for Integrity and Independence in Accredited Continuing Education requiring resolution of all faculty conflicts of interest. Faculty declaring a relevant conflict of interest must be identified in the activity syllabus

and/or program. In accordance with disclosure policies of AOA and the ACCME, every effort has been made to ensure all CME activities are balanced, independent, objective, and scientifically rigorous. These policies include complying with ACCME's Standards for Integrity and Independence in Accredited Continuing Education and resolving all possible conflicts of interest for the Planning committees, Authors, Faculty and staff. All relevant financial relationships have been mitigated.

## **Disclaimer**

The information in this educational activity is provided for general medical education purposes only and is not meant to substitute for the independent medical judgment of a physician relative to diagnostic and treatment options of a specific patient's medical condition. The viewpoints expressed in this CME activity are those of the authors/faculty. They do not represent an endorsement by the AOA. In no event will the AOA be liable for any decision made or action taken in reliance upon the information provided through this CME activity.

# Acknowledgements

## Speakers



**James M. Turner, D.O., MPH, FACOEP, FACOEP**

Dr. Turner presently serves as the Senior Vice President to the President and CEO of Arkansas Colleges of Health Education (ACHE) where his responsibilities include oversight of Diversity, Equity, and Inclusion initiatives. He is a consultant and Board member for several national organizations and medical schools. Prior to joining ACHE, he served as Dean of the William Carey College of Osteopathic Medicine and CORE faculty of the Emergency Medicine Residency Program at Merritt Health Wesley in Hattiesburg. He has served as faculty of several osteopathic medical schools, Associate Dean, Clinical Science WCUCOM, before becoming the WCUCOM Dean. He has been active in establishing residency programs and was the Founding Program Director for the Emergency Medicine program in Charleston, West Virginia.

Dr. Turner graduated from Nova Southeastern College of Osteopathic Medicine in 1988. He completed his residency in Emergency Medicine from Mount Sinai Medical Center in Miami, Florida and completed his Bachelor of Science degree at Georgia Southwestern College in Americus, Georgia. He completed his Master of Public Health at the University of Southern Mississippi in 2014.

He received his Fellow from the American College of Osteopathic Family Physicians in 1998 and the American College of Osteopathic Emergency Medicine (ACOEP) in 2008. In 2017, Dr. Turner was recognized by the ACOEP as a Distinguished Fellow. He has worked as an Osteopathic Family Physician and Emergency Physician in Tennessee, Florida, South Carolina, West Virginia, and Mississippi. He is a past president of the Tennessee Osteopathic Medical Association, a past board member of the Board of Directors of the Mississippi Osteopathic Medical Association.

He is a commissioner for the Commission on Osteopathic College Accreditation, where he serves as the Chair of the Standards Review Committee. As the chair, Dr. Turner's committee crafted standards to guide diversity, equity and inclusion in osteopathic medical education including research elements.

Dr. Turner's work has been recognized when he received the Alton B. Cobb Outstanding Master of Public Health Award in 2013, Mississippi Healthcare Hero's award in 2016, and a Doctor of Science, honoree degree from William Carey University in 2016, the Turner Academic Honor Society recognizes his contributions to his alma mater. William Carey University honored the Doctors Turner by naming the Turner Academic Building after them in recognition of their service to the university.

He is married to Dr. Sherry Turner who is the Designated Institutional Official and Associate Dean of Graduate Medical Education at ACHE. He has one daughter, Ashely, who lives in

Pittsburg, Pennsylvania. with her husband and two significantly above average grandchildren, Walter and Peter.

Most recently the Turners have established *The Drs. Sherry and James Turner Endowed Scholarship for Under-Represented Minority Students*.



**Christopher Smith, Ph.D.**

Dr. Christopher Smith is Director of Diversity, Equity, and Inclusion at the Arkansas Colleges of Health Education and previously served as Dean of Student Services at the University of Arkansas Hope-Texarkana. Prior to his selection as Dean of Student Services, Christopher served as Program Coordinator for Special Programs and Special Assistant to the President at Philander Smith College in Little Rock, Arkansas.

His areas of expertise include recruitment and retention, organizational change, leadership, and diversity, equity, and inclusion. Dr. Smith has spent over seven years bridging gaps between student success and organizational resources.

In his roles at Philander Smith College, Dr. Smith oversaw many initiatives. With an intentional focus on addressing issues in particular academic and social inequity, he led the institution's summer bridge program for academically underserved students and developed recruitment pipelines for regional scholars which led to an institutional headcount increase of over 500 students over a four-

year period. Dr. Smith also served as a representative for the institution's president in the Greater Little Rock area. During his tenure as Dean of Student Services at the University of Arkansas Hope-Texarkana (UAHT), Dr. Smith founded the UAHT Iron Horse Pantry and implemented the UAHT RERAIL Academic Recovery Program for students placed on academic probation and suspension. He also led the UAHT Together Campaign which focused on the institution's DEI efforts and response to COVID-19.

During the COVID-19 pandemic, Dr. Smith was appointed Acting Vice-Chancellor for Academics for the 2020-2021 academic year. In this role, he worked to cultivate inclusive practices during the hiring process for faculty and staff while ensuring students' and faculty's concerns were addressed. Throughout this term, he designed and implemented extracurricular activities to educate and engage both himself and his students to embrace each other's differences while developing a sustainable sense of belonging.

As diversity lead at UAHT, Dr. Smith worked closely with the institution's leadership as an Executive Cabinet member. He created the UAHT Together Lecture Series and UAHT Together Courageous Conversations which focused on assessing the institutional climate from the perspectives of students and employees. In addition, Dr. Smith launched UAHT Iron Horse Allies, an LGBTQ + BIPOC safe space training program for faculty and staff and launched UAHT HOLA (Hispanic Outreach and Leadership Association) student organization which fosters belonging and funds a scholarship for students of Hispanic and Latino descent. He also served on the University of Arkansas System's Racial Equity Task Force and has presented at institutions and conferences including Arkansas State University-Newport, the University of North Texas, and the Higher Learning Commission.

Dr. Smith holds an A.A. (Associate of Arts) in General Education from the University of Arkansas Hope-Texarkana, B.A. in Political Science from the University of Arkansas Little Rock, M.P.A. from

Arkansas State University, and an Ed.D. in Organizational Change and Leadership from the University of Southern California.

Dr. Smith is a native of Southwest Arkansas and is a college football fanatic and true crime show binge watcher. He is excited to call Fort Smith home and create a sustainable impact at ACHE (Arkansas Colleges of Health Education) and beyond.

## Judges

Christopher Fortson, M.D., Program Director, Mercy Fort Smith,  
Family Medicine Program

Sarah Robertson, M.D., Program Director, Conway Regional  
Medical Center, Family Medicine Residency

Melissa Kuehl, D.O., Faculty, Mercy Fort Smith, Internal  
Medicine Residency

Pat Montiel., M.D., Faculty, Mercy Fort Smith, Family Medicine  
Residency

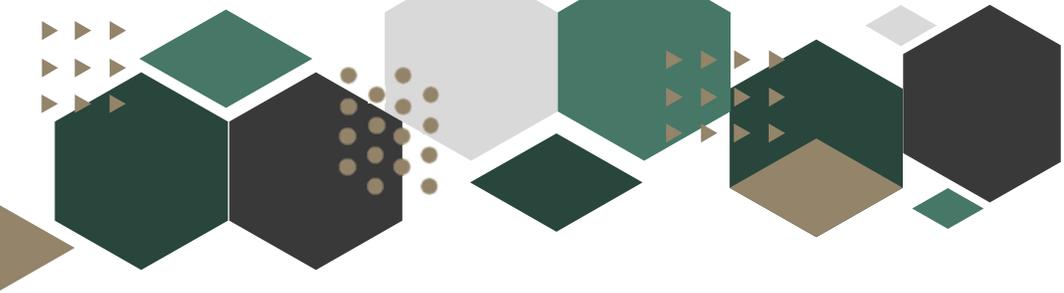
Clark Trapp, M.D., Faculty, Conway Regional Medical Center,  
Family Medicine Residency

## ACHE Mission

To educate and train a diverse group of highly competent and compassionate healthcare professionals; to create health and research support facilities; and to provide healthy living environments to improve the lives of others.

## SOAR

The Student Osteopathic Association for Research (SOAR) is an ACHE affiliated club that is dedicated to promoting research within the medical community. The mission is to provide increasing opportunities to learn and practice research and build relationships among like-minded peers in order to provide a strong foundation for students to continue their education in the future



## Case

### **Novel Germline Mutation of DICER1 gene in a Head and Neck Rhabdomyosarcoma Patient**

**Mehmet Faith, M.D., Baylor College of Medicine**

**Kevin John, OMS II, Arkansas College of Osteopathic Medicine**

#### **Introduction:**

Soft tissue cancer is responsible for approximately 7% of all childhood cancers and out of those 50% of those children are diagnosed with Rhabdomyosarcoma (RMS). Over the years we have identified somatic mutations helpful in the diagnoses of RMS however not much has been understood regarding the germline mutation.

#### **Case Description:**

This novel case of a patient, a 16-year-old male, who presented with a 3-month history of right jaw pain to his dentist which resulted in further investigation. A biopsy and CT were done which revealed a 5.5 cm mass in the posterior cavity and the biopsy revealed that there was an intermediate grade spindle sarcoma. In the coming weeks with multiple visits with the hematology department and genetics study lead them to diagnose the patient with head and neck RMS.

#### **Discussion:**

The unique finding of this case is the diagnosis of a germline DICER1 mutation (p. Y1330fs), in a patient with head and neck RMS bearing MYOD1 mutation. Patients with DICER1 germline

mutation have an increased risk for GU RMS, however it was present in our patient with head and neck RMS. Moreover, identifying this germline mutation will be very helpful in diagnosing, risk stratification, and helpful in preparing the family for the prognosis of their loved ones.

# **Polymyalgia Rheumatica Post COVID-19 Infection**

**Rachael Agbator, M.D., PGY2, Baptist-UAMS North Little Rock, Internal Medicine Residency**

**Aaroop Haridas, M.D., Faculty- Rheumatology, Baptist-UAMS North Little Rock, Internal Medicine Residency**

## **Case Description:**

This is a case report of a 50-year-old Caucasian male who presented to the rheumatology department with an eight-week history of widespread joint and muscle pain, particularly in the patient's bilateral shoulders, hips, proximal arms and thighs, along with morning stiffness which started 4 weeks after a laboratory confirmed COVID-19 infection. The patient initially was thought to have developed statin-induced myositis, however with persistence of symptoms despite withholding his statins he was suspected to have COVID-19 induced myositis. Considering the symmetric bilateral involvement of hips and shoulders, elevated ESR, and CRP, PMR was suspected and a bilateral shoulder MRI was obtained which showed subacromial bursitis, confirming the diagnosis of PMR. Although various infections and vaccinations have been postulated as possible causes of PMR. With an extensive literature search, this is the first case report noting Post Covid PMR.

## **Discussion:**

In conclusion, clinicians should include inflammatory markers in the work up of patients with persistent musculoskeletal symptoms post COVID-19 infection and have high suspicion for the possibility of PMR or other rheumatologic conditions.

# **Tianeptine (Gas Station Heroine) and the Rising Concern of Withdrawal and Abuse Potential**

**Catey Ashlyn Abbott, D.O. PGY2, University of Arkansas for Medical Sciences, Internal Medicine Program**

**Sarah Assem, M.D., Program Director, University of Arkansas for Medical Sciences, Internal Medicine Program**

## **Introduction:**

This case of a 55-year-old male presenting with acute metabolic encephalopathy with normal brain imaging and negative urine drug screen raises concerns about an increasingly popular over the counter supplement called tianeptine, its high rate of abuse and the findings mimicking opioid withdrawal. Tianeptine is available in Arkansas and surrounding states in gas stations, flea markets and by mail.

## **Case Description:**

A 55-year-old male with a medical history of opioid dependence, alcoholism and hypertension presented to the emergency department with memory loss, word-finding difficulties, hallucinations, and anger outbursts. A code stroke was initiated. His physical exam showed a well-developed, well-nourished male diaphoretic, experiencing auditory and visual hallucinations. He was hypertensive with a blood pressure reading of 262/169. A CT head and MRI brain were negative for acute pathology. His UDS was positive for cannabis but negative for all other metabolites. His CBC was grossly unremarkable, CMP showed a CO2 of 18 and a glucose of 228. UA, ethanol level, and acetaminophen level were negative. EKG showed NSR without acute abnormality. His delirium proceeded to worsen on hospitalization. He admitted to the provider that he had taken, for analgesic effect, an over-the-counter supplement called “Tiana” for analgesic effect. He admitted to taking enormous amounts of the supplement (up to 2 bottles a day.) Online, Tiana is praised as a euphoric mood enhancer. Poison control was contacted and suggested we treat this patient as an opioid overdose, as the drug mimics opioid agonists at high doses.

## Discussion:

This case presents a man with no known cause of delirium even with extensive workup. It was only discovered upon his mentioning that he takes a supplement called tianeptine that he could be experiencing opioid withdrawal from this substance at supratherapeutic doses. Two states in the United States have banned this over the counter “supplement” for its highly addictive qualities and substantial risk of abuse and withdrawal. It is an available and easy to obtain source of abuse. In this case, thousands of dollars of resources and tests were conducted because there was no identifiable source of the patients' symptoms and the effects of this widely abused substance need to be considered by care providers. This case addresses the need to identify a new toxidrome. Managing this issue will include addressing national policies around availability and regulation of herbal supplements which should include healthcare participation.

# **Hypertriglyceridemia-Induced Pancreatitis**

**Cynthia Chow, M.D., PGY2, Resident, Conway Regional Family Medicine Residency**

**Authur Slaton, M.D., Faculty, Conway Regional Family Medicine Residency**

## **Introduction:**

Hypertriglyceridemia-induced pancreatitis (HTGP) causes 1 to 35 percent of all cases of acute pancreatitis and up to 56 percent of pancreatitis cases during pregnancy.

## **Case Description:**

This case presentation discusses a 30-year-old female with no significant past medical history who presented to the hospital for acute epigastric abdominal pain radiating to the back associated with nausea. Laboratory workup and physical examination were consistent with HTGP—triglycerides elevated to incalculable levels, lipase greater than 3000, and CT of abdomen and pelvis demonstrated changes such as perinephric fat stranding. Initial treatment began with intravenous insulin, fluids, pain control and liquid diet which was continued until patient showed improvement in triglyceride levels, alleviation of pain and was able to tolerate an advanced diet. Although her hospitalization course was temporarily complicated by excessive peripancreatic fluid collection, pleural effusions, worsening leukocytosis and intermittent fevers, she was clinically improving. Upon discharge, the patient's triglycerides plateaued to around 300 and her lipase decreased to mid-100s. This case highlights complications of moderate to severe pancreatitis including an abnormally long course to recovery.

## **Discussion:**

Hypertriglyceridemia is one of the most common causes of acute pancreatitis. Contributing factors can be primary (genetic) and secondary disorders of lipoprotein metabolism. Diagnosis can be made through clinical presentation such as abdominal pain, nausea and vomiting, laboratory work and imaging. Management of acute

pancreatitis includes intravenous fluids, pain control, dietary fat restriction and reduction of hypertriglyceridemia. Intravenous insulin can also be used as treatment for rapid reduction of triglycerides by promoting synthesis of lipoprotein lipase. Timely treatment and close monitoring are imperative for the first 24 hours to prevent fatal events. Following stabilization, HTGP patients require long-term therapy to prevent recurrent pancreatitis. Education on lifestyle modifications such as weight loss and dietary restrictions are crucial to prevent complications that include pseudocysts and necrosis. Acute pancreatitis can lead to several complications, including some less common morbidities like pleural effusions as in this case, and up to multiorgan failure and death.

# Hypercalcemia of Malignancy

**Reagan Garber, D.O., PGY2, Resident, Conway Regional Family Medicine Residency**

**Darren Freeman, M.D., Associate Program Director, Conway Regional Family Medicine Residency**

## Introduction:

Hypercalcemia occurs in approximately 20-30 percent of patients with cancer, and malignancy is the most common cause of hypercalcemia within the inpatient setting. Common symptoms include polyuria/polydipsia, nephrolithiasis, anorexia, nausea/vomiting, constipation, muscle weakness, bone pain, confusion, and shortening of the QT interval.

## Case Description:

This topic is explored through a case of a 69-year-old female with stage III uterine and cervical cancer. The patient was admitted with weakness, anorexia, altered mental status, and worsening abdominal distention for four days secondary to hypercalcemia of malignancy (initial calcium=18.6). CT of abdomen/pelvis showed worsening of primary and metastatic malignancy with masses increased in size from previous imaging and evidence of intraperitoneal carcinomatosis and lymphadenopathy. She was treated with IV fluid hydration, one dose of zoledronic acid, six doses of calcitonin (three doses of 200U and three doses of 400U), and one dose of IV lasix. Throughout hospitalization, patient's calcium improved to 13; however, mentation continued to deteriorate with new onset hypoxia. Ultimately, the patient was transitioned to inpatient hospice care.

There are three major mechanisms by which hypercalcemia of malignancy occurs: tumor secretion of parathyroid hormone-related protein (PTHrP), osteolytic metastases with local release of cytokines, and tumor production of 1,25-dihydroxyvitamin D. PTHrP shares an almost identical initial 13 amino acid sequence to parathyroid hormone; therefore, it binds the same receptor which

stimulates bone resorption, distal tubular calcium reabsorption, and inhibition of proximal tubular phosphate transport. With osteolytic metastases, bone destruction is stimulated by osteoclast production resulting in increased skeletal resorption and hypercalcemia. Increased 1,25-dihydroxyvitamin D (calcitriol) production occurs via PTH-independent extrarenal production of calcitriol which increases calcium absorption.

Treatment is determined by the degree of hypercalcemia. Patient with asymptomatic or mildly symptomatic (less than 12 mg/dL) hypercalcemia do not require immediate treatment, but they should be encouraged to adequately hydrate with six to eight glasses of water per day with avoidance of things that can potentially increase calcium levels such as thiazide diuretics, lithium, dehydration, prolonged inactivity, and vitamin D supplements over 800 units per day. Moderate hypercalcemia (12-14 mg/dL) may not require immediate therapy and can be treated as mild; however, if there are changes in mentation the patient should be treated as someone with severe range calcium. Severe hypercalcemia (greater than 14 mg/dL) is treated with volume expansion, calcitonin, bisphosphonates, loop diuretics, and dialysis as a last resort. Calcitonin is administered intramuscularly or subcutaneous with initial dose of 4 units/kg. Doses are repeated every 12 hours for 24-48 hours and a dose can be increased to 8 units/kg if response is not satisfactory.

#### Discussion:

Hypercalcemia of malignancy is the most common cause of hypercalcemia in the inpatient setting and is ultimately a poor prognostic indicator for the patient indicating advanced disease.

# **Carpal Tunnel Syndrome**

**Lily Fran Guastella, M.D., PGY2, Resident, Conway Regional Family Medicine Residency**

**Clark Trapp, M.D., Faculty, Conway Regional Family Medicine Residency**

## **Introduction:**

Carpal Tunnel Syndrome (CTS) is defined as median nerve compression within the tight confines of the carpal tunnel resulting in numbness and pain in the median nerve distribution. CTS occurs most commonly in women who do repetitive hand work (typing, sewing, etc.), and it is the most common upper extremity compressive neuropathy, affecting up to 10 percent of the population. This case reviews a common clinical presentation of Carpal Tunnel Syndrome including unique findings of chronic, severe CTS.

## **Case Description:**

A 55-year-old white female with a past medical history of type 2 diabetes and hypertension presents to the Conway Orthopedic and Sports Medicine Clinic with complaints of pain, numbness, and tingling in her right thumb, index, and long finger for approximately 6 months. She states the numbness and tingling are worse at night, and she awakens to “shake her hand out” most nights. She reports the pain is aggravated while typing at work and reproduced when driving long distances. She states she has tried ibuprofen and wrist splints with minimal relief. Vital signs are within the normal reference range. Physical exam is remarkable for right thenar atrophy and a positive Tinel’s and Phalen’s test on the right wrist. An x-ray of the right wrist and an EMG/nerve conduction study were obtained. Right wrist x-ray revealed mild CMC arthritis, and the EMG/nerve conduction study confirmed moderate to severe Carpal Tunnel Syndrome on the right. Since this patient failed a trial of NSAIDs in combination with wrist splinting, the patient was taken to the OR the following Monday for endoscopic carpal tunnel release. A soft dressing was placed postoperatively and left in place for three days, after which it was removed and replaced with a small

adhesive dressing overlying the wound. Active motion of all the digits and the wrist was encouraged. At the 6-week post-operative appointment, patient had made a complete recovery and no longer experienced the pain, tingling, and numbness in her right thumb, index, and long finger that she had previously.

#### Discussion:

This case was selected because Carpal Tunnel Syndrome (CTS) is commonly encountered in the clinical setting, affecting up to 10 percent of the population. CTS affects the overall quality of a patient's life and can affect function and strength when untreated. Therefore, it is important to recognize this syndrome in practice and provide adequate treatment for patients.

# Rare case report: Diffuse Skin Discoloration due to Pure Gallium Exposure

Thai Le, D.O., PGY2, Mercy Fort Smith, Internal Medicine Residency  
Melissa Kuehl, D.O., Core Faculty, Mercy Fort Smith, Internal Medicine Residency, Adjunct Faculty ARCOM

## Introduction:

Gallium is a chemical element with the symbol Ga<sup>31-</sup>. It is a soft, silvery-white metal that is similar to aluminum in standard temperature and pressure. It is predominantly used in electronics due to its ability to make alloys, such as semiconductors. Although it is known that metallic gallium is not toxic, alloys such as gallium halide have been shown to have toxic reactions. In another case report by Ivanoff, et al, it discusses acute toxicity exposure to gallium halide can result to symptoms such as dermatitis, tachycardia, tremors, dyspnea, vertigo, and unexpected blackouts which later lead to the patient developing irreversible cardiomyopathy. However, there have been no case reports reporting side effects or complications with exposures to pure Gallium.

## Case Description:

This is a case of a 44-year-old male who recently bought pure gallium from Amazon and presents to the local hospital with chief complaint of confusion, skin turning “blue,” and dizziness.

The patient stated that he has had 2 days history prior to presentation to the hospital of skin discoloration after playing with gallium that he had purchased on Amazon after watching it on a show of how the metal would change from solid to liquid by holding it. He played with the metal for hours while his friends only did briefly. Afterwards, he was found to have diffuse skin discoloration that would not wash off while his friend did not have any side effects. He started having metallic taste in his mouth and minimal urine output. The hand he was playing with the metal was also the hand that he had recent Orthopedic surgery for 5<sup>th</sup> finger fracture with an aluminum-titanium alloy pin fixed in. The color as ashy gray that

was seen diffusely around his upper and lower extremities, face, ear, neck, lower posterior torso, and mildly diffuse around the chest. Deposits were seen when rubbing off the skin, however, made no change to the patient's skin. There has been no documentation or report of this type of exposure. Heavy metal labs were ordered which came back negative. Patient's serial labs were all unremarkable. He did have an elevated alcohol level, however, that was due to him drinking from the anxiety of his skin discoloration. Overnight, the patient's anuria resolved, his morning labs were normal, and the patient was discharged from the hospital. The patient was contacted a 3 days after the discharge and the patient stated that after 2 more days from his discharge, his skin discoloration resolved. Patient stated that he did not notice any complications since then. There was no office visit or hospitalization that was documented to see if he had any complications.

#### Discussion:

Due to its easy availability online for the public to purchase, there should be more studies on pure gallium effects on people with long term exposure, and studies to show if there are any potential long term side effects. This has never been documented before in different literatures and specialists such as dermatologists have had no answers as to why these findings came to be. Literature review was performed and there have been different articles about gallium alloy toxicity, but none on pure gallium side effects.

## **Achalasia in a 17-year-old Female**

**Nkolika Nwankwo, M.D., PGY2, Mercy Fort Smith, Internal Medicine Residency**

**Zhexiang He, D.O., PGY1, Conway Regional Internal Medicine Residency**

**Eduardo Demondesert, M.D., Faculty, Gastroenterology, Mercy Fort Smith, Internal Medicine Residency**

### **Introduction:**

Achalasia is a rare neurogenic disorder that is characterized by insufficient relaxation of the lower esophageal sphincter and loss of peristalsis on esophageal manometry. Achalasia can be primary or secondary. Primary Achalasia is mostly caused by neuron degeneration in the esophageal wall. Secondary achalasia results from Chagas disease. Chagas disease, which occurs as a result of infection by the parasites *Trypanosoma cruzi* endemic to Southern America. The clinical findings in Chagas disease are similar to that seen in idiopathic achalasia. Radiographically, there is aperistalsis, esophageal dilation and minimal LES opening which leads to the bird-beak appearance and poor emptying of barium. Endoscopically, there is esophageal dilation with retained saliva, liquid and undigested food particles without mucosal structuring or tumor. The dysmotility of the lower esophageal sphincter leads to stasis of food and symptoms of dysphagia. Patients also experiences regurgitation, chest heaviness, sometimes chest pain. Regurgitation typically happens when patient is in supine position. Patient will reports waking up, coughing and food regurgitation. Food regurgitation may sometimes be mistaken with gastroesophageal reflux disease. Chest heaviness mostly happens during or after meal and is sometime severe enough to prevent patients from eating. The sensation of heaviness may be misinterpreted with angina. As achalasia progresses, weight loss may occur.

Patients characteristically describe dysphagia which initially occurs to solid food and then progresses to liquids. In some cases, chest pain, regurgitation, and weight loss occur.

Achalasia can be managed pharmacologically, the pharmacologic goal is improvement of esophageal emptying, symptomatic relief, and prevention of future esophageal dilation. Most commonly used medications are calcium channel blockers and nitric oxide potentiating agents. However, those medications are used as bridges to more definitive treatments due to limitations in effect, side effects, and drug tolerance.

Non-pharmacological management options include peroral esophageal myotomy (PEOM), Pneumatic dilation and Heller myotomy. Esophageal myotomy was first described by Heller in 1913 and has been used widely since then. In the 1990s, the procedure was performed laparoscopically, and has become the gold standard therapy for achalasia.

#### Case Description:

In this report, we describe a 17-year-old female who presented to the gastroenterology clinic with complaint of acid reflux, chronic nausea, vomiting and dysphagia. Patient had esophagoduodenoscopy (EGD) which suggested Achalasia. Subsequently an esophageal manometry was done which showed elevated IRP and meniscus confirming Type 2 Achalasia Cardia.

#### Discussion:

Achalasia although a very rare disease can occur in pediatric populations. Symptoms of presentation may not be typical as seen in the adult population. There is need for a high degree of suspicion to make an accurate diagnosis in a timely manner. This is important because surgical intervention can significantly improve morbidity and ultimately quality of life.

# **Cadaveric Analysis of Bilateral Short Rectus Femoris Muscle**

**Michael Adams, OMS II, Arkansas College of Osteopathic Medicine**

**Madison D. Long, OMS II, Arkansas College of Osteopathic Medicine**

**Reshly Mary Rajan, OMS II, Arkansas College of Osteopathic Medicine**

**Bader Semakieh, OMS II, Arkansas College of Osteopathic Medicine**

**Amberdeep Singh, OMS II, Arkansas College of Osteopathic Medicine**

**Joanne Peterson, PhD., Anatomy, Arkansas College of Osteopathic Medicine**

**Raja Rachakatla, PhD., Anatomy, Arkansas College of Osteopathic Medicine**

## **Introduction:**

Rectus femoris is the only bi-articular muscle of the quadriceps group present in the anterior compartment of the thigh. It is involved in both hip flexion and knee extension.

## **Case Description:**

In this case study, we present bilateral short rectus femoris muscle belly, an unusual variation of rectus femoris muscle that was observed in the cadaver of a 69-year-old female during routine dissection at the Arkansas College of Osteopathic Medicine (ARCOM). Symmetrical muscle wasting of rectus femoris, without involvement of any other anterior compartment muscles, raised suspicion of hereditary myopathies of lower limb.

## **Discussion:**

Extensive review of the literature on lower limb myopathies showed that an “outside in” progression of muscle wasting is generally seen in congenital myopathy and collagen VI related myopathies. However, this was not observed in the cadaver presented in this study. On further investigation, a study that focused specifically on rectus femoris showed that selective wasting of rectus femoris is related to COL12A1 related myopathy. Knowledge of the aforementioned variation of rectus femoris and its clinical significance may be helpful to clinicians when making decisions to screen patients and their families for inherited myopathies.

# **Small Cell Lung Cancer in a Non-Smoker - A rare presentation**

**Jill Taylor, OMS-IV, Arkansas College of Osteopathic Medicine**

**Natalie Turner, OMS-IV, Arkansas College of Osteopathic Medicine**

**Saif Fiaz, OMS-IV, Arkansas College of Osteopathic Medicine**

**Alena Yarema, D.O., PGY2, St Bernards, Jonesboro, Internal Medicine Residency**

**Vanessa Garber, D.O., PGY1, St Bernards, Jonesboro, Internal Medicine Residency**

**Siji Thomas, M.D., PGY3, St Bernards, Jonesboro, Internal Medicine Residency**

**Joshua Morrison, M.D., Faculty, Pulmonology, St Bernards, Jonesboro, Internal Medicine Residency**

## **Introduction:**

The terms “never-smokers” and “nonsmokers” are frequently used to describe the population with a lifetime smoking history of fewer than 100 cigarettes <sup>1</sup>. It is well described that the most common lung cancer in never-smokers (LCINS) is non-small cell lung cancer (NSCLC), particularly adenocarcinoma. However, there is an even smaller subsection of this population of never-smokers that develop small cell lung cancer (SCLC)<sup>3</sup>. SCLC is generally believed to be the predominant cancer in smokers. This population of small cell LCINS is poorly described in epidemiology, pathogenesis, and risk factors. Even in existing literature describing LCINS, the SCLC subgroup is often overlooked or not mentioned due to limited data.

## **Case Description:**

Our case report describes a 55-year-old African American woman with a past exposure to limited secondhand smoke (SHS). She was found to have a .7cm nodule on CT in 2017 and was lost to follow up. Returned to hospital in 2022 with moderate pleural effusion and extensive thoracic involvement. She was confirmed to be SCLC via cytology in an ICU setting and is currently undergoing chemotherapy. With only 2% of SCLC cases arise in never-smokers <sup>1</sup> and LCINS is described to have variable age with a predominance in women<sup>3,4</sup>, This case will provide insight into this unique population.

### Conclusion:

SCLC in a never-smoker is seldom seen in the general population. With limited literature about SCLC in never-smokers, this emphasizes the importance of primary prevention, and poses challenges for public health interventions. It is important to follow up with incidentally discovered pulmonary nodules. Future studies could explore if there is a correlation in treatment efficacy for SCLC in smokers and non-smokers. There might be new venues for immunotherapy. In conclusion, this case report describing SCLC in never smokers can add to the broader understanding of this extraordinarily rare condition.

# **Hypercalcemia Workup in Sarcoidosis with Chronic Remission**

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**Jason G. Daily, MD, FACP, Faculty, Mercy Hospital Fort Smith, Internal Medicine Residency**

## **Introduction:**

Sarcoidosis is a systemic disorder of unknown etiology characterized by non-caseating granulomas in multiple organs including lungs, eyes, skin and lymph nodes. Evidence based practice demands physicians to promptly evaluate other etiologies of hypercalcemia including lymphoma, metastatic malignancy, hyperparathyroidism, chronic kidney disease, multiple myeloma in addition to sarcoidosis.

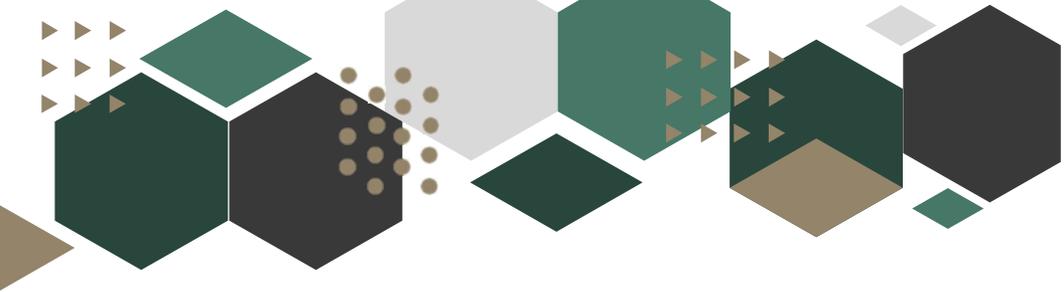
## **Case description:**

This is a case of 67-year-old male presented to the endocrinology clinic for a follow-up visit for Diabetes mellitus type 2. The patient complained of excessive fatigue, shortness of breath and weakness for a couple of weeks. The patient's past medical history was significant for sarcoidosis with chronic remission for the past 20 years, Type-2 Diabetes mellitus and prostatic carcinoma. Beginning in June 2021 the patient has had intermittently elevated calcium, then in March 2022, he was noted to have elevated calcium of 11.7 mg/dl with suppressed iPTH at 3ng/dl consistent with non-PTH mediated hypercalcemia. Further evaluation revealed elevated 1,25 Dihydroxy Vitamin D at 82pg/ml and elevated ACE level at 88U/L with a normal PTH related peptide and serum protein electrophoresis. A skeletal bone survey showed no focal bony lytic or osteoblastic lesion. CT scan revealed extensive, progressive hilar, mediastinal, axillary, celiac and groin lymphadenopathy. Ultrasound guided biopsy of right groin lymph node was consistent with non-caseating granulomatous disease. The patient

was then started on Prednisolone 40 mg once a day and after a month of therapy significant improvement was noted in his symptoms with normalization of his Calcium and PTH levels.

#### Conclusion:

Patients with sarcoidosis in chronic remission which are off immunosuppressive medication for decades can suddenly present with hypercalcemia and disseminated lymphadenopathy and any patient presenting with non-PTH mediated hypercalcemia should have a prompt evaluation for other etiologies including lymphoma, hypercalcemia of malignancy, hyperparathyroidism, chronic kidney disease, multiple myeloma and metastatic malignancy.



## Research

### **Physician- Nurse Communications as it Relates to Patient Care**

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**Vanessa Soussa, Department of Health System Science, University of Illinois at Chicago**

**Karen Dunn-Lopez, Department of Health System Science, University of Illinois at Chicago**

**Abhinaya Balasubramanian, Department of Computer Science, University of Illinois at Chicago**

**Gail Keenan, Department of Health Care Environments and Systems, University of Florida, Gainesville**

**Michel Burton, Department of Medicine, University of Illinois at Chicago**

**Neil Bahroos, Office of the Vice Chancellor of Research, University of Illinois at Chicago**

**Barbara DiEugenio, Department of Computer Science, University of Illinois at Chicago**

**Andrew Boyd, Department of Biomedical and Health Information Sciences, University of Illinois at Chicago**

#### **Background:**

Physician and nurses have worked together for generations; however, their language and training are vastly different; comparing their work and their joint impact on patient outcomes is difficult considering this difference. At the same time, the EHR only includes the physician perspective via the physician-authored discharge summary, but not nurse documentation. Prior research in this area has focused on collaboration and the usage of similar terminology.

### Purpose:

The objective of the study is to gain insight into interprofessional care by developing a computational metric to identify similarities, related concepts and differences in physician and nurse work.

### Methods:

58 physician discharge summaries and the corresponding nurse plans of care were transformed into Unified Medical Language System (UMLS) Concept Unique Identifiers (CUIs). MedLEE, a Natural Language Processing (NLP) program, extracted “physician terms” from free-text physician summaries. The nursing plans of care were constructed using the HANDS© nursing documentation software. HANDS© utilizes structured terminologies: nursing diagnosis (NANDA-I), outcomes (NOC), and interventions (NIC) to create “nursing terms”. The physician’s and nurse’s terms were compared using the UMLS network for relatedness, overlaying the physician and nurse terms for comparison. Our overarching goal is to provide insight into the care, by innovatively applying graph algorithms to the UMLS network. We reveal the relationships between the care provided by each professional that is specific to the patient level.

### Results:

We found that only 26% of patients had synonyms (identical UMLS CUIs) between the two professions’ documentation. On average, physicians’ discharge summaries contain 27 terms and nurses’ documentation, 18. Traversing the UMLS network, we found an average of 4 terms related (distance less than 2) between the professions, leaving most concepts as unrelated between nurse and physician care.

### Conclusion:

Our hypothesis that physician’s and nurse’s practice domains are markedly different is supported by the preliminary, quantitative evidence we found. Leveraging the UMLS network and graph traversal algorithms, allows us to compare and contrast nursing and physician care on a single patient, enabling a more complete picture

of patient care. We can differentiate professional contributions to patient outcomes and related and divergent concepts by each profession.

## **Rank availability controls thymic M-cell development**

**Santana Maria Bachaalany, OMSII, Arkansas College of Osteopathic  
Medicine**

**Xian Liu,**

**Jared Balolong,**

**Corey Miller,**

**Mark Anderson, University of California San Francisco**

**Objective / Hypothesis:**

Failure of self-tolerance by the adaptive immune system results in organ specific autoimmunity. Central T-cell tolerance occurs in the thymus where T-cells undergo negative selection, resulting in the deletion of potentially self-reactive lymphocytes or their conversion to T-regulatory cells. This process is dependent on Aire-expressing medullary thymic epithelial cells (mTECs). Recently, we identified a novel subset of post-Aire expressing mTECs with striking similarity to peripheral microfold (M) cells found within Peyer's patches. Here, we investigate the function and developmental requirements of this novel medullary epithelial cell type. By analogy to the periphery, we hypothesize thymic M cells will organize the medullary B- cell niche and will be developmentally dependent on RankL availability.

**Methods:**

We harvested thymic lobes from WT (C57BL/6J) or osteoprotegerin knockout (OPG  $-/-$ ) mice and prepared the tissue for vibratome sectioning. Thick, 500um sections were cut, stained with fluorescently labelled antibodies, and imaged by laser scanning confocal microscopy. Large volume images were analyzed using the Leica LAS X and Imaris software suites.

**Results:**

We found the majority of Gp2<sup>+</sup> thymic M cells colocalized with Ccl20 staining. We also found that Gp2<sup>+</sup> thymic M cells are present within the medulla at >2-fold higher density in OPG  $-/-$  mice as compared to WT controls. Similarly, medullary B220<sup>+</sup> B cells are present within the medulla at 2.13-fold increased density.

### Summary/ Conclusions:

Taken together, this data shows that thymic M cells are an important source of the chemokine Ccl20, are closely associated with thymic B cells at the corticomedullary junction, and are highly sensitive to Rank signaling for their development.

# **Postoperative Therapeutic Protocol for Thumb Carpometacarpal (CMC) Joint Arthritis: Systematic Literature Review**

Nancy Damrah, OTD., Assistant Professor, Arkansas Colleges of Health Education

## **Purpose:**

To design an appropriate therapeutic protocol based on the current standards of care to address carpometacarpal (CMC) joint dysfunction for patients after having surgical intervention for thumb CMC joint with arthritis, including orthosis, safe exercise progression and occupation-based hand therapy and identify appropriate rehabilitation goals and interventions for thumb CMC joint with arthritis.

## **Methods:**

Studies were included in the systematic literature review after applying Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) standards and guidelines for systematic literature review. The purpose of this systematic literature review was to determine the effectiveness of an early mobilization therapeutic protocol for the thumb CMC joint, compared to the immobilization therapeutic protocol after the surgical intervention with using thumb spica splint and refining a therapeutic protocol in regaining thumb function during the acute postoperative phase. The assessment of bias tool that was used is developed by the Agency for Health Research and Quality (AHRQ), through its Evidence-Based Practice Center (EPCs). The inclusion criteria: All studies were in English, studies were published between 2011-2021, and all studies included 18 years of age participants, who had thumb CMC joint surgical intervention for thumb CMC osteoarthritis (OA).

## **Results:**

A summary of 18 articles were included the postoperative therapeutic regimens for CMC joint for different surgical

interventions. Early mobilization therapeutic protocol (Including short immobilization period of time, early initiation of active ROM and strengthening exercises) provides positive outcomes for limitation in activities of daily living (ADL), pain level, grip and pinch strength of the CMC joint the same as the immobilization therapeutic protocol without complications. Furthermore, the preferred orthosis to use for the CMC joint is thumb spica splint (Thumb CMC joint in palmar abduction and extension). Recommendations: Comparative studies for different postoperative therapeutic protocols for the same surgical procedure is recommended to examine the efficacy of the early mobilization rehabilitation program.

# **Teacher Perceptions of Facilitators and Barriers to a Child's Ability to Regulate Behavior for Learning**

**Whitney Garrison, MS, OTR/L Arkansas Colleges of Health Education,  
School of Occupational Therapy  
Karen Majeski, OTD, OTR/L, Department of Occupational Therapy,  
Quinnipiac University**

## **Introduction:**

Strong regulation skills are critical for academic success. In the spring of 2020, classroom learning environments dramatically changed in response to the COVID-19 pandemic. The pivot from in-person to virtual learning environments created challenges for students, teachers, and caregivers. Teachers have always had the responsibility teach students skills for academic and life success; however, they have not always had sufficient support in the classroom to meet the unique needs of each individual student. Teachers need support more than ever as students return to in-person learning from virtual learning environments.

## **Methods:**

This qualitative study explores what teachers perceive as the facilitators and barriers to a child's ability to regulate their behavior in the classroom.

## **Results:**

This study illustrates that sense of community, environment, social interaction skills, and process skills impact learning. Results from this study could inform future programming to support students and teachers with the tools to develop executive function skills to improve learning behavior.

# **Assessing the Effects of Adaptive CrossFit on Cardiovascular Endurance and Balance for People with Parkinson's**

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**Trystin Anderson, OMSI, Arkansas College of Osteopathic Medicine**

**Carter Deuel, OMSI, Arkansas College of Osteopathic Medicine**

**Jeanita Littrell, OMSI, Arkansas College of Osteopathic Medicine**

**Austin Phan, OMSI, Arkansas College of Osteopathic Medicine**

**Mecca Djhedian, OMSI, Arkansas College of Osteopathic Medicine**

**Reed Handlery, DPT, PhD, Arkansas College of Health Education, School of Physical Therapy**

**Kaci Handlery, PT, DPT, Arkansas College of Health Education, School of Physical Therapy**

## **Introduction/Background:**

Studies have shown that high-intensity exercise could be used as a treatment option to slow the disease progression of Parkinson's Disease (PD).

## **Objectives:**

The purpose of this study is to determine the health effects of a 13-week adaptive CrossFit class on cardiovascular endurance and balance for people with PD.

## **Methods:**

With IRB approval, a single group, pre and post-test design was used. Participants were offered 13-weeks (25 exercise classes) of adaptive CrossFit classes at a CrossFit Gym in Fort Smith, twice per week for 60-75 minutes and led by two physical therapists (one of which was a CrossFit coach). Classes focused on aerobic endurance, muscular strength and balance, using exercises and equipment common to CrossFit (e.g. medicine balls, rowing machines, kettlebells).

## **Data:**

10 adults (2 females) with PD, mean age of 73 (4) years, Hoehn Yahr stages 1 (n=2), 2 (n=4), 3 (n=3) and 5 (n=1). The intervention utilized was a 13-week adaptive CrossFit class. Walking endurance

and speed were assessed pre- and post-intervention with the 6 Minute Walk Test (endurance) and the 10 Meter Walk Test (fast-walking speed). Balance was assessed pre- and post-intervention with Mini BESTest and Activities-specific Balance Confidence Scale (balance confidence). The Wilcoxon signed-rank test was used to compare pre- and post-intervention outcomes with alpha set at .05.

### Results:

At post-assessment, there were significant improvements in 6 Minute Walk Test distance (median increase of 64 meters,  $p < .05$ ), fast-walking speed (median increase of .15 meters per second,  $p < .01$ ), and balance (median increase of 2.5 points,  $p < .05$ ). There were no significant changes in balance confidence (median increase of 5%,  $p > .05$ ). People with PD showed improvement in walking endurance, fast-walking speed, and balance. However, improvements in balance were not accompanied by increased balance confidence. Further studies could address this disparity by the addition of therapeutic counseling to see if balance confidence could be improved to reflect the results of balance improvement. Different exercise modalities that focus on improving balance (e.g., yoga) could also be assessed to determine if that would increase balance confidence compared to CrossFit. To better analyze the effects on cardiovascular health for people with PD, future studies could evaluate specific effects of CrossFit on cardiac measures (heart rate, blood pressure, cardiac output, etc).

### Conclusions:

PD is associated with increased risks of falls and higher incidence of cardiovascular disease; both could have serious, and even fatal, consequences. CrossFit could improve balance and improve cardiovascular endurance for people with PD. This study supports physician prescribed high-intensity exercise, such as CrossFit, for PD patients.

# **Does the Type of Knee Replacement Impact Early Postoperative Pain? A Retrospective Analysis of Three Prosthetic Knee Systems**

**Jared T. Hammond, MSB., Arkansas College of Osteopathic Medicine**  
**Russell T. Nevins, MD. Desert Orthopedic Center in Las Vegas, Nevada**

## **Introduction:**

Studies have shown that in certain populations, outpatient total knee arthroplasties (TKAs) can be as effective as inpatient TKAs. With many different TKA systems in use, there will inevitably be different outcomes using each system. This study is a retrospective chart review comparing pain reduction and opioid use postoperatively between three different knee replacement systems to identify which one allows for an earlier postoperative reduction in pain. Thus, increasing patients' confidence and mobility with their knee replacement earlier in the postoperative recovery.

## **Methods:**

After receiving an Institutional Review Board exemption certificate, a retrospective analysis was used to examine patient records. 299 TKAs performed by a single surgeon at two hospitals from June 2020 to March 2022 were studied. There were no major variations between surgical procedures. 94 patients received posterior-stabilized knees, 104 medial-pivot knees, and 101 received a rotating platform with a cruciate retaining femur (RPCRF). Pain levels using the Numerical Rating System were obtained from their preoperative and postoperative visits at two weeks, six weeks, and three months. The differences between pain levels were calculated from preoperative to each postoperative visit to assess the amount of pain decreased within each knee system. Using a prescription monitoring program, the type and dose of opioid prescribed at each postoperative interval was examined. Only patients who were opioid naïve, those not prescribed or using opioids 30 days prior to surgery, were included. The amount of opioid naïve individuals for each group were 77 for patients who received posterior-stabilized knees, 89 for medial-pivot, and 75 for RPCRF. The daily milligram

morphine equivalents (MME) were calculated and compared between the three systems. The Kruskal Wallis and Dunn tests were used for all calculations to obtain p-values. The Kruskal Wallis test was used to calculate significance between the three groups. The Dunn test was used as a post-hoc test to determine significance between pairs of groups.

#### Results:

The average preoperative pain level on a scale of 0 to 10 for each system were: posterior-stabilized 6.66, medial-pivot 6.17, and RPCRF 5.55. From preoperative to two weeks postoperative, posterior-stabilized knees reduced pain by 1.52 points, medial-pivot by 0.52, and RPCRF by 0.40 ( $p = 0.011$ ). From preoperative to six weeks postoperative, posterior-stabilized knees reduced pain by 3.20, medial-pivot by 1.73, and RPCRF by 1.60 ( $p = 0.002$ ). At two weeks postoperative, opioid naïve patients who received posterior-stabilized knees had an average daily MME of 29.59, medial-pivot 45.45, and RPCRF 45.24 ( $p < 0.001$ ). At six weeks postoperative, posterior-stabilized patients had an average daily MME of 21.03, medial-pivot 30.90, and RPCRF 30.20 ( $p = 0.039$ ).

#### Conclusion:

Posterior-stabilized knees had a significant reduction in pain levels compared to medial-pivot and RPCRF systems immediately after surgery. The daily MMEs prescribed were also significantly reduced postoperatively using the posterior-stabilized knee compared to the other two systems. This study showed using a posterior-stabilized system will allow for greater reduction in pain levels and lessen opioid use. With less pain immediately postoperatively, patient confidence and mobility can be increased, allowing an earlier recovery and more outpatient TKAs.

# **Educating Future Practitioners to Influence Health Literacy Practice**

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**Jennifer Moore, PhD, OTR/L, FAOTA, CLA, Arkansas Colleges of Health Education School of Occupational Therapy**

## **Introduction and Purpose:**

The occupational therapy profession promotes client-centered delivery of services and acknowledges the importance of addressing health literacy. Health literacy is rather new to educational standards and there has been little research on how to effectively teach students the principles of health literacy. The objective of this study was to evaluate the impact of health literacy assignments on occupational therapy students' knowledge, abilities, and confidence.

## **Methods:**

Researchers used a qualitative descriptive approach examining a group of 47 occupational therapy students completed who completed four learning activities a) orientation to health literacy, b) a plain language challenge, c) a redesign of existing written health-related materials to a 5th grade level, and d) reflection of the learning experiences.

## **Results:**

Themes were derived from student responses to the reflection prompts: plain language challenge, writing redesign, and reflection of learning:

- plain language challenge - it is difficult to transition between professional jargon back to plain language,
- writing redesign - rewriting material to a 5th grade level was more difficult than expected,
- reflection of learning - increased awareness of importance of health literacy.

## Conclusion:

Students learned to use plain language so they did not inadvertently exclude the client from their own care. This study supports the need for educators to include more opportunities for students to learn about and engage in health literacy practice.

# **Implications of High-Intensity Exercise on Cardiovascular Health for People with Spinal Cord Injury**

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Baylor Johnson, OMSII, Arkansas College of Osteopathic Medicine

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## **Introduction/Background:**

There is anecdotal evidence of the effectiveness of high-intensity exercise, performed as a group, in improving health markers in people with spinal cord injury (SCI). Objectives: The purpose of this study was to examine the effect of a 13-week adaptive, group based CrossFit class on cardiovascular health, peak power, and social support in individuals with SCI.

## **Methods:**

Single group pre- and post-test design. Participants completed 25 adaptive CrossFit classes across 13 weeks led by two physical therapists, one of whom was a Certified CrossFit Coach. Classes were twice per week for 60-75 minutes, and emphasized aerobic endurance, muscular strength, and power development through varied high intensity functional movements.

A longitudinal study observing the effects of adaptive CrossFit on health markers for people with SCI. This study was performed with the approval of the IRB.

The intervention was implemented at an ADA compliant (accessible entrances, restrooms, and equipment) CrossFit gym, in Fort Smith, Arkansas.

13 adults (2 females) with SCI, mean age of 53, level of injury ranging from C3-L3, with 5 participants using manual wheelchairs, 4 using power wheelchairs, and 4 with ambulation as their primary means of mobility.

Exercise classes consisted of a 10-minute warm up, followed by 30-60 minutes of aerobic, resistance and/or balance training with a target intensity of at least 5/10 (“hard”) on the Rating of Perceived Exertion Scale. Participants finished each class with a 10-minute cooldown consisting of exercise performed at a low intensity.

Assessments were measured pre- and post-intervention and included aerobic endurance (6 Minute Arm Test (6MAT)), peak power (One Minute SkiErg), and social support for exercise (Social Support and Exercise Survey). The Wilcoxon signed-rank test was used to compare pre- and post-intervention outcomes with alpha set at .05.

#### Results/Discussion:

Participants attended an average of 79% (233/295) of available classes and 94% of participants completed the post-intervention assessment. At post-assessment, there were significant improvements in aerobic endurance (median RPE decrease of 1.5 during 6MAT,  $p < .05$ ), peak power (mean increase of 21 watts,  $p = .01$ ) and social support (median increase of 18.5 points,  $p < .01$ ). After 13 weeks of participation in adaptive CrossFit, there were statistically significant improvements in aerobic endurance, peak power, and social support for people with SCI. An expanded study, including additional markers of cardiovascular health (resting heart rate, heart rate recovery, and VO<sub>2</sub> max), should be further explored in future adaptive CrossFit studies for individuals with SCI.

#### Conclusions:

The adherence demonstrated in group exercise contrasts the adherence seen in standard therapies for the treatment of cardiovascular disease, highlighting the importance of social support among individuals with SCI. People with SCI are at a higher risk of developing diabetes and cardiovascular disease, with exercise capable of reducing those risks. For physicians hoping to improve the long-term health of patients with SCI developing a

long-term health program that includes a group exercise design, such as adaptive CrossFit, should be considered over standard therapies alone.

# **Craniofacial Bone Mineral Density at Muscle Attachment Sites in Mice with Osteogenesis Imperfecta**

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Courtney A. Miller, Center for Anatomical Sciences, University of North  
Texas Health Science Center**

**Alexandra H. McBride, Texas A&M College of Dentistry**

**Jason M. Organ, Department of Cell Biology, Anatomy & Physiology,  
Indiana University School of Medicine**

**Rachel A. Menegaz, Center for Anatomical Sciences, University of North  
Texas Health Science Center**

## **Introduction:**

Osteogenesis imperfecta (OI) is a genetic disease commonly caused by mutations in the COL1A1 or COL1A2 gene affecting the production of type I collagen, a major component of bone that determines the toughness of bone, or its resistance to fracture. Thus, patients with OI present with brittle bones and higher rates of skeletal fractures. Additionally, defects in the collagen framework of developing bones impair their biomineralization, further compromising bone mechanical properties. Previous work investigated bone mineral density (BMD) at cranial locations which experience compressive forces during feeding (e.g. joints). Muscles also contribute to cranial growth through tensile forces exerted on bone during contraction, but the relationship between muscle function and bone quality in OI is unclear.

## **Purpose:**

The aim of this study is to quantify the BMD in a mouse model of OI, with a focus on skeletal sites associated with cranial musculature. This study hypothesizes that the mice with OI will have lower BMD in skeletal areas associated with muscle attachment compared to their unaffected littermates.

The hypothesis was tested using homozygous recessive OI murine (OIM) mouse (B6C3Fe a/a-Coll1a2oim/J), a model for the severe type III OI seen in humans.

## Method:

Adult (16 weeks old) OIM mice (n=11) and wildtype (WT, n=13) littermates were CT scanned, and BMD was measured using the Bruker CTAnalyzer software in 7 regions of interest encompassing muscle attachment sites on the mandible, zygomatic arch, and parietal bone. For each region, BMD values were compared between genotypes by a Kruskal-Wallis test.

OI mice had significantly lower BMD at the coronoid process ( $p=0.007$ ), parietal bone ( $p=0.031$ ), and posterior mylohyoid line ( $p=0.007$ ) compared to WT mice. No significant differences were found in BMD at the gonial angle or zygomatic arch. This suggests a disproportionate weakness of the temporalis and mylohyoid muscles in mice with OI, but not in the masseter muscle. While type I collagen defects impact the structural organization of skeletal muscle, it is possible that masseter muscle function is preserved in OIM mice because of its key roles in rodent feeding and postural control of the jaw. The imbalance between temporalis and masseter muscles may contribute to the prevalence of dental malocclusions in human patients with type III OI.

## Conclusions:

The findings of this study support further exploration of specific muscle groups (e.g., jaw adductors/temporalis, hyoid muscles/mylohyoid) and efforts to improve their functions during feeding, as a way of recovering facial growth and preventing dental malocclusions in OI. A better appreciation of muscle-bone interactions in the skull and their effect on bone quality can potentially be used to inform oro-motor therapies to improve feeding function, muscle strength, and facial bone quality for patients with OI.

Funding was provided by the AAA Innovation Program, an Indiana University Collaborative Research Grant, and the Ralph W. and Grace Showalter Trust.

# **Zonular tension in hyper-mature Morgagnian cataract extraction.**

**Trishan Patel, OMS II, Arkansas College Osteopathic Medicine  
Alireza Ghaffarieh, M.D., University of Arkansas Medical School Zia  
Siddiqui, M.D., University of Arkansas Medical School**

## **Introduction:**

One of the biggest surgical complications that arises with hyper-mature morgagnian cataract extraction is the Argentinian flag sign. This occurs when the initial incision of the anterior capsule extends to the periphery spontaneously. In this event, surgeons must adapt and find an alternative route into stabilizing a pseudophakic lens. This is attributed to the increased intracapsular pressure associated with hyper-mature cataracts. This phenomenon has not been studied without the affects of zonular tension on the capsule.

## **Purpose:**

To explore the mechanics of zonular tension as well as the frequency of capsular tears in 50 hyper-mature Morgagnian cataracts during capsulotomy in cataract surgery.

## **Methods:**

50 Morgagnian donor cataracts and lenses were obtained from the UAMS Eye bank in Little Rock, Arkansas. These lenses had no history of ocular eye disease or ocular operations. Upon obtaining the lenses, the anterior portion of the capsule was demarcated via a dot. These lenses were placed in a hypotonic solution for 2-3 days depending on the age of the capsule. Over this time, the capsules were emulsified in the solution, causing the capsule and the contents inside to swell due to the hydrostatic and osmotic forces. With this, we were able to increase the pressure within the capsule without jeopardizing the integrity of the capsular membrane. This swelling was observed over an OCT of the donor tissues. The lenses were stained with Trypan blue for proper capsule visibility. Then, the initial incision was made in the center of the capsule. The

observations following the initial incisions were recorded and the same process was used for all 50 lenses.

50 Morgagnian cataracts were obtained from UAMS Eye-Bank and capsulotomy was performed on the tissue in UAMS Jones Eye Institute operating rooms.

Patients (or other participants):

This study was performed on donor tissues collected from the UAMS Eye bank. This research was conducted on donor tissue.

Recording the occurrences of peripheral tears in the anterior capsule of the lens following a capsulotomy.

Results:

Out of the 50 lenses tested, zero of the initial incisions extended to the periphery spontaneously. In majority of the lenses, the capsular incision led to a slight depression of the capsule followed by a leaking of the contents. Without the centrifugal forces of the zonular fibers, the incision did not result in a tear into the periphery. Since Argentinian flags also occur due to peripheral incisions, after the initial cut, a peripheral second incision was made to see if there was further expansion, but none were observed.

Conclusion:

During our research we found that the Argentinian flag sign was not observed during the capsulotomy in the absence of zonular fibers. These finding showed that zonular fibers play a vital role in spontaneous Argentinian flag signs. It also gives an alternative surgical method in combating hyper-mature cataracts by focusing on zonular tension rather than using femtosecond lasers pre-operatively. Future research can be conducted to manipulate the ciliary muscles through cholinomimetic agents in pre-operative care to relax the zonules and lower the tension on the capsule.

# **Investigating the Effects of HSD17B13 on Somatostatin Expression Changes in High Fat Diet**

**Pranitha Pothuri, OMSII, Arkansas College Osteopathic Medicine  
Joann Peterson, PhD., Anatomy, Arkansas College Osteopathic Medicine  
Dr. Alison Wing PhD, Post doc, National Institute of Health, NIDDK  
branch (National Institute of Diabetes and Digestive and Kidney Diseases  
Dr. Yaron Rotman PhD PI, National Institute of Health, NIDDK branch,  
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## **Introduction:**

NAFLD (Nonalcoholic fatty liver disease) is the most common cause of chronic liver disease and affects a significant number of Americans, it is a progressive disease and associated with many health conditions such as hypertension, an increased risk of heart attack, and type two diabetes. Type two diabetes results from reduced insulin sensitivity and in turn hyper-insulin secretion and higher overall blood glucose levels. HSD17B13 is a lipid droplet protein that is thought to play an important role in hepatic lipid homeostasis. Past studies have shown that HSD17B13 knockout mice have differences in insulin response based on timepoint, diet, and treatment condition. However, the overall glycemic setpoint between the two groups is the same. Somatostatin is a hormone secreted by delta cells of the pancreas that is thought to play a role in glucose level regulation. It inhibits multiple hormones, but in the pancreas specifically, it inhibits glucagon and insulin. Our hypothesis is that communication from the liver affects somatostatin in the pancreas.

## **Purpose:**

The research examined if somatostatin is the reason behind this observed phenomenon by comparing pancreatic gene expression of somatostatin in knock-out and wild-type groups under high-fat diet conditions.

### Method:

To accomplish this, qPCR analysis for somatostatin and its related genes was performed. In addition, ELISA on pancreatic plasma was also performed to determine systemic levels of somatostatin.

### Results:

Overall, there was not any significant observable difference between relative levels of gene expression for somatostatin and its related genes or systemic levels of somatostatin protein.

### Conclusions:

While this could mean somatostatin is in fact not involved with this process, it could also mean that it is not involved on the local level but the systemic level and opens new areas of potential research to explore.



## Quality/Education

### **Improving Influenza Vaccination Rates in Resident Continuity Clinic**

**Dylan Cruz, D.O., PGY3, Conway Regional Family Medicine Residency**

**Clark Trapp, M.D., Faculty, Conway Regional Family Medicine Residency**

#### Introduction:

Influenza, commonly known as the flu, is a respiratory viral illness. The influenza virus is responsible for thousands of hospitalizations and deaths each year. Unlike many viral infections, there is a vaccine available that has been shown to reduce infections and complications of the flu. Although this vaccination's effectiveness has been proven, a large portion of patients decline the vaccine.

#### Purpose:

The goal of this quality improvement project was to increase the vaccination rates at Conway Medical Group, the resident clinic at Conway Regional Health System. After initial review, no official screening process was found that addressed the flu vaccine. The hypothesis was that with a team-based approach, changing the processes during the patient encounter and giving educational information, vaccination rate of the resident patient panel could be improved. The goal of the intervention was to increase vaccination rates by 25% in the resident patient panel.

### Method:

To evaluate the intervention, EMR billing records from the years 2020-2021 and 2021-2022 were used. After gathering the data, a 52% improvement in vaccination rates was seen in the intervention period compared to the same period the previous year.

### Results:

Through additional points of addressing vaccination status and educating patients, the overall vaccination rates increased in the resident continuity clinic.

### Conclusions:

To continue improvement, the recommendation is to adopt the screening process for flu vaccination as a standard procedure for the clinic. Increasing the vaccination rates will improve the quality of care and patient health outcomes within the resident clinic and community.

# **Promoting Increased Access to Preventive Care in Unassigned Emergency Room Patients**

**Olufadejimi “Jimmy” Kareem, M.D., PGY3, Chief Resident, Conway Regional Family Medicine Residency**

**Clark Trapp, MD, Faculty, Conway Regional Family Medicine Residency**

## **Introduction:**

Patients who lack a primary care provider utilize the emergency room care at higher rates when compared with patients who have primary care providers. These patients have a greater risk of presenting sicker and suffering avoidable health consequences, resulting from lack of access to health promotion and disease prevention resources provided by primary care providers.

## **Purpose:**

To improve individual and community health especially in areas of prevention and health promotion, efforts should be made to ensure that patients who present to the emergency room without a primary care provider (PCP) are discharged home to follow up with a PCP. Our project focused on providing unassigned patients a PCP who was taking new patients and accepted their insurance. The intervention included both education and process change where every unassigned patient was assigned before the discharge order could be placed. We theorized that education of the providers and the process change in the EMR would lead to fewer unassigned patients being discharged from the ER without PCP information. Our first step was to meet with an interdisciplinary team including nursing, QI staff, ER staff, ER physicians, EMR/IT staff.

## **Method:**

Over the course of 30 days, we educated the ER staff and providers and made changes to the EMR discharge processes for the emergency room.

### Results:

We collected data on our unassigned ER patients discharges pre and post intervention which showed a decrease from 13% unassigned discharges to less than 1% unassigned discharges.

### Conclusions:

We concluded that inter-collaborative efforts would result in improved referral and potentially, increased follow up by unassigned ER visit to better improve patients' overall health.

# **Naloxone Prescription for Our Patients on Opioids**

**Ross Lenzen, D.O., PGY2, Conway Regional Family Medicine Residency**  
**Clark Trapp, M.D., Faculty, Conway Regional Family Medicine Residency**

## **Introduction:**

Opioids are a diverse class of analgesics with different levels of potency. Their availability has made them popular as medical treatments; however, the adverse effects range from constipation to addiction all the way to respiratory depression and death. Every day in Arkansas, first responders rescue 11 people from dying of opioid overdose. Act 651 entitled “An Act to Mandate the Coprescription of an Opioid Antagonist Under Certain Conditions” was officially approved on 4/12/21. Key points of this piece of legislation are that healthcare professionals are now required by law to co-prescribe an opioid antagonist to any patient with excess of 50 MME’s on medication list, or who are taking benzodiazepine in addition to an opioid.

## **Purpose:**

I hypothesized that by educating the providers at Conway Medical Group and providing the providers with a list of patients with an opioid prescription, the number of patients with access to naloxone who may need it would increase. I obtained a list of all patients with an active opioid prescription in our clinic and divided these up by which provider was their PCP. The providers were educated on the legislation, the importance of opioid antagonists, and under what circumstances the opioid antagonist was recommended. I instructed providers to send in opioid antagonist if applicable. I then compared the number of patients from the first list who had an opioid antagonist prescription before and after the intervention.

## **Results:**

Before intervention, there were 37/40 patients in our clinic who had an active opioid prescription without an opioid antagonist on file. After our intervention, 0/40 patients in our clinic with an active

opioid prescription are without an opioid antagonist on file. That is a relative reduction of 92.5% and an absolute reduction of 37 patients.

#### Conclusions:

We hope that this quick access to naloxone for our patients will lead to declining numbers of opioid related deaths in the state of Arkansas. It is now clinic policy to continue providing naloxone prescriptions to all patients at Conway Medical Group if clinically indicated. However, more time is needed to determine if this law and increased naloxone prescribing will lead to increased lives saved.

# **Automated Office Blood Pressure Measurement versus Manual Blood Pressure Measurement in a Primary Care Outpatient Clinic**

**Clayton Preston, D.O., PGY-3, Conway Regional Family Medicine Residency**

**Clark Trapp, M.D., Faculty, Conway Regional Family Medicine Residency**

## **Introduction:**

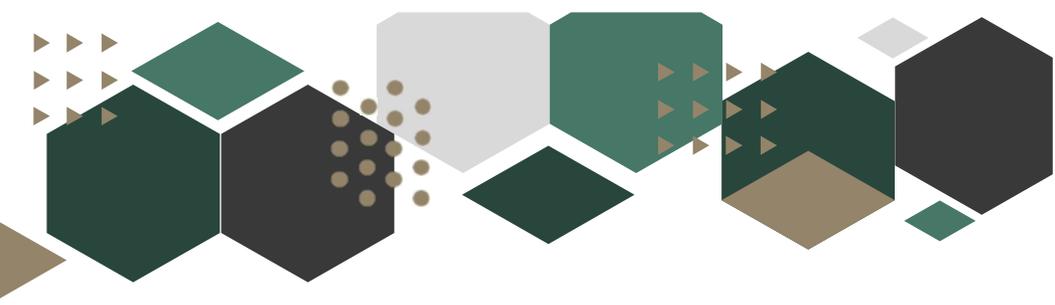
Hypertension is a major risk factor for cardiovascular disease, stroke, chronic kidney disease, and all-cause mortality and is a major contributor to rising healthcare costs. Historically, manual office-based blood pressure measurements have been the mainstay of hypertension diagnosis and decision to treat. However, there is increasing evidence that manual measurements taken in the office can be imprecise and exhibit significant variability due to the white coat response, stethoscope type, surrounding environment, and a certain level of skill required to perform an accurate manual blood pressure measurement. The American Heart Association and American College of Cardiology most recent guidelines recommend automated office blood pressure measurement devices (AOBM) over manual measurement.

## **Purpose:**

The purpose of this study was to evaluate blood pressure trends and variation before and after the implementation of automated blood pressure cuffs in the outpatient clinic as all previous blood pressure measurements were taken using the traditional manual method. In addition, education was provided to clinic providers and medical personnel on proper blood pressure measurement technique. A cohort of patients was selected based on a diagnosis of hypertension and in office blood pressure data was obtained 6 months prior to implementation of AOBM devices and 6 months after. Patients with any blood pressure medication changes during the study period were excluded.

## Conclusions:

This data is still in process of being extracted from the electronic medical record and verified for accuracy. However, it is hypothesized that implementation of AOBM devices will result in less statistical deviation, lower mean systolic and diastolic pressure readings, and overall, more accurate measurements due to standardization of obtaining the blood pressure and reduction of the white coat effect.



“Research is to see what everybody else has  
seen, and to think what nobody else has  
thought.”

~ Albert Szent-Gyorgyi  
1937 Nobel Prize for Medicine



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