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PRESIDENT'S MESSAGE

Positively Impact Our Patients and the Profession of Osteopathic Medicine

Abraham Chen, DO

President, American College of Osteopathic Family Physicians of California



Abraham Chen, DO

Dear fellow members of the American College of Osteopathic Family Physicians of California,

I am honored to serve as your President for this coming year. As we begin 2023, I want to reflect on our progress as a profession and look forward to the opportunities and challenges ahead.

I am proud to report that, despite the many challenges we faced as osteopathic family physicians in the past few years, our community remained strong and resilient. We continue to provide high-quality care to our patients and work together to advocate for our osteopathic profession.

As we move forward, we must work together to promote the value of osteopathic medicine and educate the public about the unique approach to care that we provide.

In 2023, ACOFP-CA will address the issue of physician burnout and promote well-being at our 47th Annual Convention & Scientific seminars. I invite you to experience the magic of medicine and the magic of Disneyland at our annual CME conference! Join top physicians from around the country for five days of cutting-edge education and networking opportunities while enjoying the world-famous attractions and entertainment of the "Happiest Place on Earth."

I am confident that, by working together, we can continue to positively impact the health and well-being of our patients and the profession of osteopathic medicine as a whole.

Thank you for your continued dedication and commitment to ACOFP-CA. I look forward to talking with each and every one of you in the coming year and hope to see you at the "Happiest Place on Earth" for the "Best CME in the West", August 2-6, 2023 at the Disneyland Hotel in Anaheim, CA. Register today at acofpca.org and bring the family along for the ride!

Sincerely,

Abraham Chen, DO

Abraham Chen, DO

President, American College of Osteopathic Family Physicians of California



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Letter to the Editor

Our True Professional Destination: Mentor

Steve Kamajian, DO, CMD, FACOFP

Dear Editor,

After reading, Nanette Miner's article, "Ascend to Mentorship," published in The Chief Learning Officer, through the lenses of what I have learned in my two decades of studying the Chief Learning Officer position, I wanted to share with JOFP-CA readers my vision for a reimagined osteopathic profession leadership pyramid.

This quote from the "Ascend to Mentorship" article strongly resonated in my thoughts for weeks:

"Rather than identifying the pinnacle of one's career as a title related to managing business units or other people, I propose the highest level of one's career should be when we ascend to advising and mentoring others."

Leadership in any field requires skill sets that can be intuitive but, more often, are learned.

As physicians, opportunities exist for leadership with our constituencies that include patients, clinical teams, and classmates while studying either pre or post-doctoral; with management, be it office, hospital, insurance, medical-professional organizations, academic, political, publications, or with charity work.

At some point, a physician's career journey permits growth and wisdom beyond clinical skills. Our old medical apprenticeship model involved the mantra.

See one. Do one. Teach One.

This three-part mantra mandated mentoring. Mentoring is the skill set beyond the management of people.

What if osteopathic organizations created a leadership hierarchy with a mentor at the top of the leadership pyramid and a seasoned expert to help shift through the information and offer a historical perspective in problem-solving and decision-making?

As we ascend our professional ladder, each step takes us towards an ever higher position and even greater responsibilities. Miner's premise is that our career journey allows us to capture the talent for operational stability and change simultaneously. Once minds and hearts are engaged in any organization, a mentor can coach through whatever learning is necessary for change and inspire personal growth. A mentorship that targets unlocking the development of others, both personal and professional.

Imagine a company that has decided it is time to move senior-level people from seeing patients and, instead of retiring them, move them into a mentor advisory role. In this new role, their sole responsibility would be to consult, support, and guide the physicians and medical staff who have replaced them or the up-and-coming leaders.

Senior physicians could share a wing or a floor in the building or work from home, with private offices where they can meet confidentially with their mentees or via Zoom. Anyone from the organization can visit the "mentor floor" and request the mentor of their choice based on specialty or word-of-mouth. Instead of the brain drain facing medicine today, this leadership model fills that void with mentors at the top of the leadership pyramid. Miner puts forth the premise that mentorship is not just part of the process but, in fact, the highest goal of leadership, our true professional destination. I know my career's true destination is mentorship.

Steve Kamajian, DO , CMD, FACOFP

Research Article

Application of Point of Care Ultrasound in the Removal of Non-Palpable Nexplanon in a Teaching Community Health Center

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KEYWORDS:

Contraception

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Ultrasound Guided

Ultrasound Guided Deep
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Outpatient Clinic
Nexplanon Removal

ABSTRACT

Background

Nexplanon is a reversible non-biodegradable progestin-only long-acting hormonal contraceptive subdermal implant removed after three years. Superficial palpable implants are easy to remove in the outpatient setting. However, deep non-palpable implants are traditionally referred to surgery for elective removal. In the wake of Covid-19, emergency cases were prioritized, leaving patients with non-palpable implants unattended. Herein described are five cases of reproductive-age women who presented at our community health center with non-palpable implants.

Purpose

To show that non-palpable implants can be successfully and safely removed in a teaching community health center under ultrasound localization, guidance, and the direct supervision of an experienced healthcare provider without needing specialty referral.

Method

We performed a retrospective study by reviewing the charts of all patients who presented at our clinic for Nexplanon® removal from September – October 2021. Data was gathered from our electronic medical records system of patients database. Twenty-nine women were identified; twenty-four had palpable implants and five non-palpable implants. Using a high-frequency linear ultrasound probe to localize non-palpable implants, a 3–5 mm incision was made, and implants were removed successfully under local anesthesia and the direct supervision of an experienced provider. All implants were at depths of 0.22 to 0.56 cm from the surface, and their relationship to fascia, muscle, and vascular structures was assessed before removal. The sterile technique was observed throughout the procedure, and the site of removal was secured with steri strips and wrapped with a bandage for 24 hours to secure hemostasis. No sutures were needed post-removal, and all patients tolerated the procedure well, with minimal bleeding.

Results

Twenty-four patients (82.7%) had palpable implants successfully removed by manual palpation. Five patients (17.3%) had non-palpable implants removed successfully under ultrasound localization and guidance in our clinic with no complications. Four non-palpable implants were located above the fascia, and one was localized in the fascia within the subcutaneous layer. Patients were discharged in stable conditions with no need for follow-up.

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DOI: 10.58858/010101

Conclusion

Our study has shown that non-palpable Nexplanon® implants can be successfully removed under ultrasound localization and guidance in a teaching community health center under the direct supervision of an experienced healthcare provider without the need for specialty referral. It is fast, safe, practical, and cost-effective, provides accessibility and availability of expertise without heavy cost bearing to the patient, and increases overall patient satisfaction.

INTRODUCTION

Nexplanon® is a reversible non-biodegradable progestin-only single rod long-acting hormonal (etonogestrel; 68mg) contraceptive subdermal implant, approved by the FDA for three years and about 99% effective in preventing pregnancy. Introduced into the United States market in 2010 to replace the Implanon®, which was found to have insertion errors and an increased risk of migration, its makers featured two modifications; a special applicator that made insertion faster, easier with better accuracy and less chance of migration, and the inclusion of a small amount of barium sulfate aiding radiological localization for easy removal. Palpable, superficial implants are easy to remove in the outpatient clinic setting.¹

However, patients with deep non-palpable implants are traditionally referred to specialties like interventional radiology and surgery for elective removal, as recommended by various authors.^{2,3} In the wake of the Covid-19 pandemic, priority was given to emergent cases leaving patients with non-palpable implants unattended. The growing commitment to meet the healthcare needs of this patient population led to the decision to begin the removal of non-palpable implants at our community health teaching center under ultrasound guidance.

The main aim of this study was to show that non-palpable Nexplanon® implants can be successfully and safely removed under ultrasound localization and guidance and the direct supervision of an experienced healthcare provider, in a teaching community health center, without the need for specialty referral. Herein described are the cases of five reproductive-age women who presented to our community health clinic for deep non-palpable Nexplanon® removal.

METHODS

A retrospective review of patients' records was performed from September 2021 to October 2021. The literature search was conducted on PubMed, ResearchGate, and Google Scholar. The following search terms were applied: Ultrasound-guided deep Nexplanon® removal, contraception, ultrasound-

guided, outpatient clinic Nexplanon® removal, non-palpable Nexplanon® removal, non-palpable Nexplanon® removal in a community clinic. Data was gathered from our electronic medical records of the patient's database. We identified twenty-nine patients who presented at the clinic for Nexplanon® removal, twenty-four of whom had palpable superficial implants and five non-palpable deep implants.

A high-frequency linear ultrasound probe was utilized to localize the radiopaque rod in transverse and sagittal views on the patient's non-dominant upper arm. The implants' relationship to fascia, muscle, and vascular structures was assessed before removal. The depths were identified to be between 0.22 to 0.56 cm. The identified distal tip was marked before removal. A small horizontal incision of approximately 3–5 mm was made around the identified distal tip of the implant using a blade 11 scalpel after injecting local anesthesia. Under ultrasound guidance, dissection was performed using either a curved or straight clamp and distal tip clamped. Using the blunt edge of the scalpel, tissue adhesions were gently removed from the distal tip of the implant until the whole implant was removed. Informed consent was obtained from each patient before the procedure was carried out.

LIMITATIONS

The study had a small sample size, and non-palpable Nexplanon® implants around delicate structures were not included.

RESULTS

Twenty-nine female patients presented at the East Niles Community Health Center between September and October of 2021 for Nexplanon® removal, twenty-four (82.7%) were identified with palpable implants successfully removed by manual palpation, and five (17.3%) had non-palpable implants. All five non-palpable implants were localized using a Point of Care ultrasound (POCUS) and successfully removed under ultrasound guidance.

The sterile technique was observed throughout the procedure, and the site of removal was secured with steri strips and wrapped with a bandage for 24 hours to secure hemostasis. No sutures were required post-removal and all patients tolerated the procedure well, with minimal bleeding. They were discharged home in stable conditions on the same day with no complications. Four non-palpable implants were located above the fascia (Figures 1-4), and one was localized in the fascia within the subcutaneous layer (Figure 5).

DISCUSSION

Nexplanon® is a subdermal implant that is effective in preventing pregnancy and has been approved by the FDA for three years with a greater than 99% success rate.⁴ It is inserted in the medial aspect of the non-dominant upper arm proximal to the medial epicondyle. If done correctly, the rod should be easily palpable by both the clinician and the patient.⁵ Despite training for healthcare providers and the introduction of the applicator device to the implant, deep insertions continue to occur.^{2,6,7,8} A meta-analysis of 11 studies with over 1616 Nexplanon® removals showed that the applicator had not eliminated the issue of wrong and improper device placement.⁵

One study revealed a mean implant position depth of 6.7 +/- 4.9 mm, which was well above the average thickness of the epidermis and dermis, estimated to be between 1.57 and 2.16 mm.⁶ When the device is wrongly placed, it may result in difficult removal due to a higher risk of complications.

The accuracy of ultrasound localization of subdermal implants and surrounding nerves, blood vessels, and other delicate structures has been documented in multiple studies. One study says it is a highly accurate tool for measuring skin-to-depth ratio⁹ and another study reports a 95.7% specificity and 95.7% PPV of ultrasound localization of subdermal implants.¹⁰

Ultrasound-guided deep implant removal is practical, and its high success rates have been reported. Jackson *et al.*, in fact, state in their study that it is the primary method of removal of deep non-palpable implants.⁴ A study published in the European Radiology journal says it is safe, practical, highly successful, and associated with minimal complications.¹¹ While this study, like many others, recommends removal by specialties like interventional radiologists using fluoroscopy, in the O.R., or in specialty referral centers,² our study was able to demonstrate that deep implants can be successfully and safely removed in an outpatient community health teaching center under ultrasound guidance. Melissa *et al.* also agree with us in their study on non-palpable implant removal using preprocedural ultrasound.⁷ According to their study, non-palpable contraceptive implants can be safely removed in the office using a modified vasectomy clamp and high-frequency ultrasound localization.⁷

With the introduction of the family medicine-focused point of ultrasound curriculum into family medicine residency training, family medicine residents/doctors possess a wealth of expertise that can be employed in removing non-palpable subdermal implants in the outpatient setting,

FIGURE 1:

Short axis view of the distal tip of the Nexplanon®, seen as bright echogenic focus with posterior acoustic shadowing with its measured depth of 0.22 cm from the skin.



FIGURE 2:

Short axis view of the distal tip of the Nexplanon®, seen as bright echogenic focus with posterior acoustic shadowing with its measured depth of 0.56 cm vertically from the skin.



FIGURE 3:

Short axis view of the distal tip of the Nexplanon® seen as bright echogenic focus with posterior acoustic shadowing with its depth measured 0.29 cm vertically from the skin.

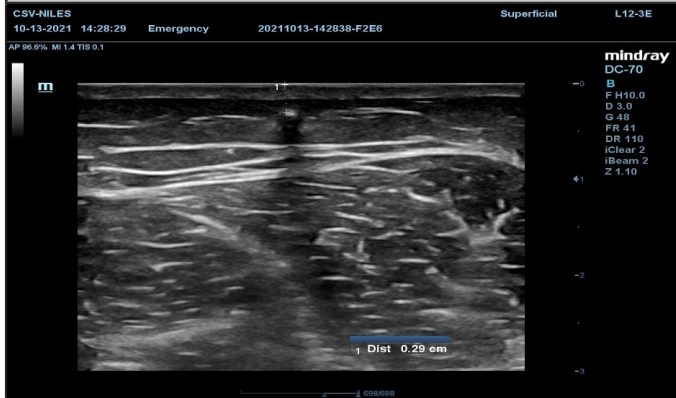


FIGURE 4:

Short axis view of the distal tip of the Nexplanon® seen as bright echogenic focus with posterior acoustic shadowing with its depth measured 0.11 cm vertically from the skin.

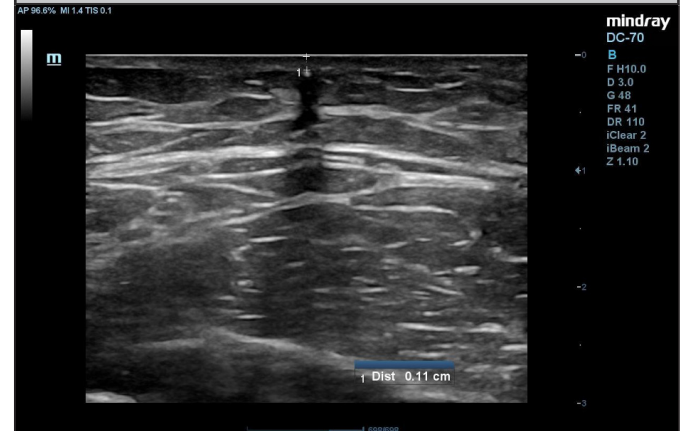


FIGURE 5:

Short axis view of the distal tip of the Nexplanon® seen as bright echogenic focus with posterior acoustic shadowing located in the fascia with its depth measured vertically from the skin.



thereby eliminating the need for specialty referral. Our study demonstrated this as all five patients who presented with non-palpable implants had their implants successfully and safely removed under high-frequency ultrasound guidance and the supervision of an experienced provider, with no complications. Eliminating the need for a referral means accessibility and availability of expert care to patients without heavy cost bearing and better patient satisfaction. Patients can avoid long wait hours, and stress with scheduling is avoided. We used high-frequency ultrasound transducers (8 MHz) because, as Melissa *et al.* stated in their paper, they demonstrate posterior shadowing of the implant as actual implant visualization may be limited.⁷

Factors that may determine the successful and safe removal of implants in an outpatient setting may include but are not limited to; implant depth, ultrasound skills and accurate device localization, medical expertise, and proper positioning of patients.^{3,9,12} clinicians must have the appropriate training and expertise before attempting such removals. We recommend that implants near delicate structures, nerves, and blood vessels be referred to surgery or interventional radiology for removal to minimize the risk of nerve damage and other complications that may arise from such implants' attempted removal. Our study focused on deep non-palpable implants that were not near delicate structures.

CONCLUSION

This study shows that non-palpable Nexplanon® implants can be successfully and safely removed under ultrasound localization and guidance and the direct supervision of an experienced healthcare provider, in a teaching community health center, without needing a specialty referral.

The study also shows that it is efficient, safe, and practical, provides accessibility and availability of expert care to patients without heavy cost bearing, and results in better patient satisfaction as the anxiety that may come with long wait hours and stress with scheduling is avoided.

Factors that may result in deep non-palpable implants include; poor insertion technique, migration from the site of insertion, small size, implantation too deep, dense fibrous sheath/scar tissue formation around the implant, lack of adequate clinical skill, and patients with a lot of subcutaneous fat.

The authors recommend the complete integration and implementation of the Family Medicine Centered Point of Care Ultrasound curriculum in all family medicine programs across the United States.

AUTHOR DISCLOSURES:

The author(s) declare no relevant financial affiliations or conflicts of interest.

IRB APPROVAL

Approval was exempt from the Institutional Review Board of Clinica Sierra Vista, and there are no financial conflicts of interest to disclose.

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Review Article

The Coffee Revolution: From Politics to Optimized Health

Steven H. Barag, DO, FACOFP¹; Amy Robichaux, PA-S2²; Taryn Kawashima, OMS³; Avis Ko, OMS³;
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KEYWORDS:

Caffeine
Cardiovascular
Chlorogenic Acid
Coffee Drinking
Metabolic
Neurologic
Political Discourse

ABSTRACT:

This article gives a brief account of the origins and evolution of coffee and its important role in human society for the last 1200 years. Fast forward to today, and 66% of Americans consume coffee daily. In the last few decades, a multitude of studies has researched the claims that coffee drinking offers cardiovascular, neurologic, metabolic, carcinogenic, and reproductive protections. This review evaluates and summarizes these findings, including the latest discoveries on the impact of caffeine on human health and the protection of human body systems.

INTRODUCTION

The history of coffee began before the 15th century on the Arabian Peninsula, where coffee provided a stimulant effect that enabled them to increase their ability to continue prayers. During their annual pilgrimages to the holy city of Mecca, word spread far beyond Arabia about the existence of coffee. Despite Arabia's best efforts to ban the export of coffee beans, Dutch traders circumvented these export restrictions in the 1600s, and the world's love affair with coffee took off.¹ In 1615, when coffee came to Venice, the Pope's Councilmen asked Pope Clemente VIII to declare coffee as the "bitter invention of Satan." The Pope decided to taste the beverage before deciding and found it so satisfying that it was given papal approval.²

Despite this initial controversy, coffee houses quickly became centers of social activity and communication in England's major cities, Austria, France, Germany, and Holland. During

the Enlightenment, Voltaire, Rousseau, and Isaac Newton could all be found talking philosophy over coffee. By the mid-17th century, there were over 300 coffee houses in London, many of which attracted like-minded patrons, including merchants, shippers, brokers, and artists.³ The cafés of Paris sheltered revolutionaries who were plotting the storming of the Bastille. They later served as the place authors like Simone de Beauvoir and Jean-Paul Sartre planned their latest books.

Fast forward to today, where 66% of Americans now drink coffee daily, more than any other beverage, including water.⁴ Along with its rising popularity, research studies continue to show that regular coffee intake is linked to a lower risk of dying from various severe diseases and consistently linked to a lower risk of early death.^{5,6} This article aims to disseminate information on new research studies and their claims that coffee drinking offers cardiovascular, neurologic, metabolic, carcinogenic, and reproductive protections.

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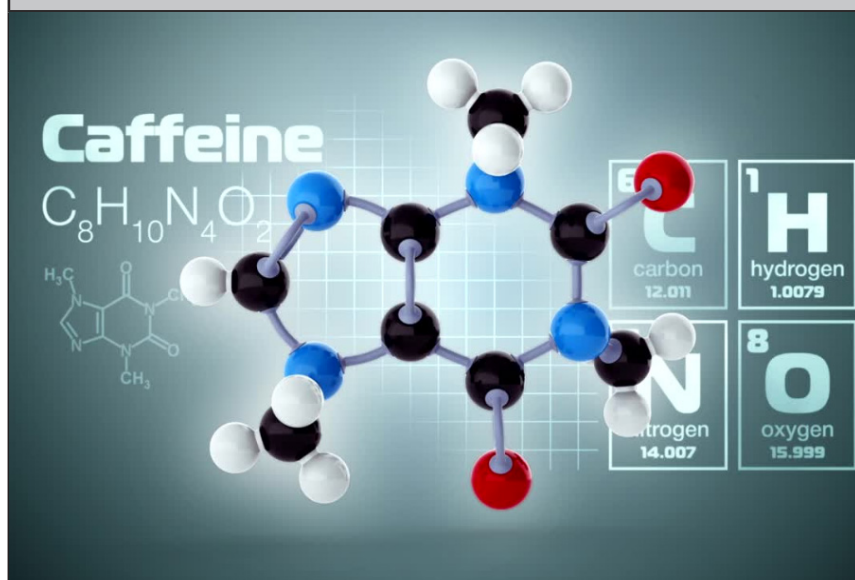
CARDIOVASCULAR PROTECTIONS

Coffee contains antioxidant polyphenols that have been shown to inhibit NADPH oxidase leading to decreased reactive oxygen species and increased endothelial nitric oxide (NO).⁷ The increase in NO results in decreased vascular smooth muscle proliferation, inhibition of platelet aggregation, and decreased vascular hypertension, reducing the risk of cardiometabolic diseases.⁸ The caffeine in coffee also diminishes oxidative stress by scavenging superoxide radicals, and limiting LDL peroxidation, a critical step in modifying LDL apoprotein. Schulze *et al.* also found that coffee consumption is associated with lower concentrations of dihydroceramide C22:2, which is associated with a higher risk of insulin sensitivity, metabolic syndrome, and hepatic inflammation.^{9,10} These properties of coffee support the hypothesis that coffee reduces the risk of cardiometabolic diseases.

CORONARY ARTERY DISEASE

According to the Centers for Disease Control and Prevention, coronary artery disease (CAD) is the most common form of heart disease in the U.S., leading to more than 382,000 deaths in 2020.¹¹ CAD is caused by atherosclerotic plaque formation. Plaque forms in arteries when there is damage to the endothelial cells leading to an inflammatory response. This is a natural response to repair damage within the body. Still, the damage becomes extensive and continuous when the damage is caused by oxysterols and free fatty acids derived from our diet. T cells, namely monocytes and lymphocytes, adhere to the damaged vessel wall and differentiate into macrophages which engulf and oxidize LDL, forming foam cells, the building block of arterial plaques.¹² Oxidized LDL releases a component known as lysophosphatidylcholines (LPCs). As oxidized LDL is a significant component of atherosclerotic lesions, LPC production is a useful biomarker of atherosclerotic risk. LPC plays a role in macrophage recruitment and blocks the vasodilatory effect of NO on the endothelial wall, thus inducing endothelial dysfunction.¹³ One serving of coffee contains 27-121mg of phenolic acids, most notably hydroxycinnamic chlorogenic acids, that exert protective mechanisms against atherogenesis.¹⁴ A 2017 study by Miranda *et al.* concluded that the phenolic acids released from coffee had a protective

FIGURE 1:
Molecular Formula of Caffeine



effect in decreasing the susceptibility of LDL to oxidation.¹⁵ By reducing LDL oxidation, LPC is subsequently reduced and endothelial function protected.

The current literature suggests that the bioactive components of coffee, specifically chlorogenic acid and hydroxycinnamic acids, are incorporated into LDL molecules and exert protective effects against atherosclerotic plaque formation and subsequent cardiovascular disease risk.¹⁵ A review of literature conducted in 2018 by Yamagata further analyzed chlorogenic acid in which they identified inhibition of the gene expression of adhesion molecule-1 that promotes adhesion to the endothelial wall and consequent damage.¹⁶ Additionally, they found that chlorogenic acid increases nitric oxide synthase, which regulates nitric oxide production, a vasodilatory molecule involved in maintaining proper endothelial function.¹⁶

These protective effects of chlorogenic acid and other bioactive components of coffee were reproduced in a study conducted by Lara-Guzman *et al.* in which a group of healthy habitual coffee drinkers without chronic conditions or medications were subject to either eight weeks of daily brewed coffee or eight weeks of coffee cessation with a pre and post serological analysis of their lipid profile.¹⁷ At the close of the eight weeks, oxysterols and free fatty acids increased in the control group, whereas the intervention group significantly decreased ($p < 0.0001$).

Many of the oxysterols that increased in the intervention group are known biomarkers of CVD risk and were highly correlated with free arachidonic acid (AA). Oxysterols activate macrophages and damage endothelial cells. Adipose tissue, prevalent in individuals with coronary artery disease, is known to release free radicals that oxidize AAs leading to oxylipin production. Both oxysterols and oxylipins are pro-inflammatory biomarkers of CVD.^{17,18} Habitual coffee consumption, therefore, has a protective effect in reducing known biomarkers for CVD.^{17,18}

Obesity is a known risk factor for cardiometabolic diseases due to the oxidative and inflammatory effects adipose tissue has on the surrounding cells.¹⁸ In 2020, Van Dam *et al.*¹⁹ conducted a randomized control study that measured different biological risk factors for insulin sensitivity and most notably found that over 24 weeks, the coffee-drinking group had a significant decrease in fat mass loss when compared to the placebo group (-3.7% with a 95% CI -6.3 to -1.1%, with $p=0.006$) while controlled for diet and exercise factors.¹⁹ As obesity is a relevant risk factor, these findings have implications that coffee may reduce the risk of many cardiometabolic diseases.

COFFEE AND HEART FAILURE

There has been mixed data reported as to if coffee increases or decreases the risk of heart failure. A meta-analysis by Mostofsky *et al.* found that the association between heart failure risk and coffee consumption was non-linear ($P=0.02$).²⁰ In this study, four cups of coffee/day most significantly decreased the risk of heart failure. The relative risk of heart failure drinking four cups of coffee/day was 0.89 (95% CI, 0.81 to 0.99), and the risk of heart failure began to increase at nine cups/day. Coffee's effect on heart failure was therefore found to be dose-dependent.²⁰

Longitudinal studies were initially performed to identify risk factors for cardiac diseases, however, when Stevens *et al.* used machine learning on the same data sets in 2021, they found that coffee consumption is a modifiable risk factor for heart failure.²¹ Patients drinking 3 cups/day had a hazard ratio of 0.71 with a 95% confidence interval 0.58-0.89, $p<0.001$). However, they categorized coffee intake as 0 cups, 1 cup, 2 cups, or 3 cups/day, so it is unclear if coffee in higher amounts increases the risk of heart failure.²¹ The data from multiple studies have shown coffee's protective effects on heart failure, which aligns with the biochemical assays showing how coffee can reduce the risk of cardiometabolic diseases.

COFFEE AND BLOOD PRESSURE

The question of coffee's effect on blood pressure has long been discussed. For many years coffee was thought to increase one's blood pressure; however, as research continues, there is increasing evidence supporting a beneficial effect in reducing blood pressure.^{22,23,24} Blood pressure is controlled by the kidneys in response to fluid and electrolyte balance. The angiotensin-I converting enzyme triggers the renal system to retain water and sodium, thus increasing total blood volume and blood pressure.²³ ACE inhibitors have become one of the drugs of choice in treating hypertension.

An in-vitro study conducted by Rufian-Henares and Morales demonstrated coffee's inhibitory effect on ACE.²³ Their results showed a 62.1% to 79.9% inhibitory impact on ACE depending on the type of roast, with light roast exerting the strongest inhibition.²³ They attributed this effect to chlorogenic acid (inherent to coffee) and melanoidins produced during the roasting process of coffee.²³ Additionally, this may have strong implications on the impact coffee exerts on blood pressure, namely a reduction in arterial blood pressure. A 2017 meta-analysis concluded that drinking seven cups of coffee daily leads to a 9% decrease in the risk of developing hypertension.²⁴ This supports the notion that chlorogenic acid's vasodilatory effects in producing NO and the inhibitory impact on angiotensin-I converting enzymes may reduce hypertension in habitual coffee drinkers.

METABOLIC PROTECTIONS

The studies on whether coffee could induce weight loss are currently equivocal. Coffee could induce weight loss by increased thermogenesis, physical activity, lipolysis, satiety, and decreased appetite. A 2006 literature review found that weight loss was modest in the short term, but coffee could reduce the overall risk of developing diabetes.²⁵ A 2017 study that followed 45 overweight Americans found a ~4% decrease in fat mass after 24 weeks and about a 2cm decrease in waist circumference after 16 weeks, a mild effect supporting coffee-mediated fat loss.²⁶ The impact of coffee, weight loss, and other metabolic products is limited by the short duration of randomized controlled studies. Toumlehto conducted a literature review in 2004 of studies involving longitudinal questionnaires and cohort studies of American, Swedish, and French women and found an inverse association between drinking coffee and the risk of diabetes.²⁷ Women that drank about 5-6 cups appeared to have a lower risk of developing diabetes, with a stronger association with decaffeinated coffee.²⁷ The review by

Greenberg in 2006 also suggested that the adverse effects of coffee were due to caffeine and that drinking decaffeinated coffee could reduce the risk of diabetes without increasing the risk of cardiovascular disease through its pressor-like effect.²⁸ It is proposed by Ding that the increase in lipolysis is due to an increased loss in hepatic fat by the induction of lipophagy coupled with mitochondrial beta-oxidation.²⁹

The mechanism is not well understood, but coffee could increase fatty acid beta-oxidation and reduce liver stress by activating Nrf2 (nuclear factor erythroid 2-related transcription factor's antioxidant) transcription factor antioxidant effects or UDP glucuronosyltransferase in hepatic cells to increase antioxidant activity.²⁹ This could contribute to the habitual coffee drinker's prevention of NAFLD and a decrease in weight. An epidemiological study by Ding indicated that drinking coffee could be protective by decreasing hepatic enzymes, GGT, AST, and ALT, in a patient with a high risk of liver injury due to alcohol, diabetes, or viral hepatitis.²⁹

The activation of Nrf2 activity has also been protective in pancreatic beta cells to prevent loss of cell mass and function by Chen in 2022. He explains that increased Nrf2 activity in beta cells by phytochemicals could counteract the negative effects of glucolipotoxicity and a high-fat diet on beta cells.³⁰ The antioxidant effects also lower the level of reactive oxidative species for beta cells.²⁹ While it is not fully understood how coffee creates these net beneficial effects for diabetes and other health benefits, there continue to be strong associations in favor of drinking coffee.

NEUROLOGIC PROTECTIONS

Researchers have conjectured a connection between coffee and the risk of neurological diseases for decades. Various studies have identified trends between the two, promising that coffee consumption is associated with a reduced risk of disorders. Multiple studies concluded that coffee consumption could reduce the risk of Parkinson's^{31, 32, 33, 34, 35, 36} while another found that drinking coffee reduces the risk of stroke.^{37, 38, 39} The impact of coffee on some other neurodegenerative disorders is less conclusive, with mixed findings on multiple sclerosis and no evidence that coffee impacts ALS.⁴⁰ Neurodegenerative diseases at their core are caused by an accumulation of abnormal proteins that damage neurons through inflammation and reactive oxygen species. Some abnormal proteins include alpha-synuclein (Parkinson's), tau protein (Alzheimer's disease), and alpha Beta polymer (Alzheimer's). Neurotoxic effects such as neuroinflammation, apoptosis, and synapse degeneration lead to neuronal dysfunction and neurodegeneration.⁴¹

Understanding the pathophysiology of neurodegenerative diseases, we can see how compounds in coffee can interrupt the processes that damage neurons. There are many bioactive compounds in coffee, but the most well-known one is caffeine. Caffeine is known as an antagonist of the adenosine A2A receptor, resulting in increased wakefulness and alertness.

Caffeine is also an agonist of the Nrf-2 receptor. Both through the adenosine receptor and Nrf-2, Ikram *et al.* proposed in 2022 that caffeine modulates cytokines to prevent damage to neurons.⁴² They have also noted that caffeine may be able to modulate other neurotransmitters (dopamine, glutamine, and GABA) that have also played an important role in the pathophysiology of neurodegenerative disorders.⁴³ Furthermore, it is understood that caffeine lessens the accumulation of misfolded proteins and may have an antioxidant effect though the mechanism by which these effects work is still under investigation.^{44, 45} These findings on the neuroprotective effects of caffeine have been demonstrated through experiments on animal models; therefore, further research on human subjects is needed to elucidate clearly how or if caffeine is neuroprotective in humans.⁴⁶

Caffeine is the most widely studied and widely known compound in coffee, but it is not the only one under investigation for its neuroprotective effects. Cholinergic acid can also potentially reduce oxidative stress, as does caffeic acid. Caffeic acid is also thought to have anti-ischemic effects (implications for stroke) and reduce glutamate-induced toxicity.⁴⁷ One study found that Eicosanoyl-5-hydroxytryptamide (EHT) protects against alpha-synuclein-related toxicity.⁴⁸ Though the compounds each have their potential effects, some believe that coffee's potential as a neuroprotective agent comes from various bioactive compounds working together synergistically rather than as separate entities.^{49,}

⁵⁰ As such, trying to tease apart what exactly makes coffee neuroprotective is a difficult task.

Several meta-analyses have concluded a relationship between higher coffee consumption and lower risk of Parkinson's incidence.^{51, 52, 53} Interestingly, one study found that serum caffeine and metabolites are reliable biomarkers of early Parkinson's disease, solidifying the connection between the two.⁵⁴ While some studies tackle how coffee might affect the progression of Parkinson's, others seek to understand if it can provide symptomatic relief. A 2020 meta-analysis found that studies overall showed Parkinson's patients who consumed coffee had a lower rate of disease progression than those who did not.⁵⁵ One study found that drinking coffee is associated with a later onset.⁵⁶ Many studies have been done to understand if coffee affects motor and non-motor symptoms of Parkinson's, specifically tremors.^{57, 58, 59}

There is some evidence that caffeine may decrease the tremors in Parkinson's patients.⁶⁰ Interestingly, more research is being conducted on the potential connection between the gut microbiota, coffee, and neurodegeneration, believing that the microbiome may be a critical connection between how coffee can be neuroprotective.^{61, 62}

The research on coffee and neurological disease is a promising, expanding field. Medical providers must stay current on recent literature regarding the risk-benefit analysis of habitual coffee consumption and educate their patients accordingly. Though there is evidence that coffee is neuroprotective, may lower the incidence of neuro diseases like Parkinson's, may slow disease progression, and alleviate symptoms, not enough research has been done to have a conclusive answer about how this can be therapeutically applied. Coffee at low or moderate levels of consumption has not been shown to exert a negative effect on neurodegenerative disorders and may even be a promising part of neurological disease treatment in the near future.⁶³

CARCINOGENIC AND REPRODUCTIVE PROTECTIONS OF COFFEE

In addition to the cardiovascular, neurologic, and metabolic effects of coffee, there seems to be an effect on hormone profiles in both men and women. Therefore, it is important to look at these effects to determine if drinking coffee has any reproductive or carcinogenic repercussions or benefits. In premenopausal women, coffee intake was associated with lower luteal total and free estradiol levels but not luteal progesterone.⁶⁴ There was a positive association between coffee intake and SHBG levels in postmenopausal women but no increase in other detected hormones.⁶⁴ However, in another study, higher coffee consumption resulted in higher early follicular phase estradiol levels.⁶⁴

In a randomized control trial from 2012, men who consumed caffeinated coffee had significantly increased total testosterone and decreased total and free estradiol after four weeks of continuous coffee consumption.⁶⁵ This finding of increased testosterone was also seen in several other studies as well.^{65, 66, 67} In a 2022 study, they found a positive association between caffeine and testosterone at low doses of caffeine exposure. Still, there was an inverse association between caffeine and testosterone with higher levels of caffeine.⁶⁸ However, since this 2022 study did not indicate that high levels of caffeine intake were associated with increased testosterone, there may be a compound in coffee other than caffeine related to this increased testosterone.

Additionally, as previously mentioned, coffee intake is suggested to positively impact chronic diseases. However, the role of coffee in urological diseases such as erectile dysfunction (ED) remains unclear. A large 2018 observational study investigated the association of coffee intake with ED prospectively. In this study, they observed no significant associations between intakes of total and regular coffee and ED. However, decaffeinated-coffee intake seemed to be associated with ED.⁶⁹

A 2013 study showed that consuming five cups of regular caffeinated coffee daily was associated with significantly reduced breast cancer risk.⁷⁰ This study has indicated that coffee consumption correlates with reduced levels of estrogen, which may be due to the estrogenic compounds in coffee. These reduced levels of estrogen likely correlate with breast cancer risk reduction. In this previous study, coffee consumption modified the risk of estrogen-receptor-negative breast cancer. High levels of coffee consumption were protective against ER-negative and post-menopausal breast cancers but not ER-positive and premenopausal breast cancers.^{71, 72} Additionally, a study from 2011 also found that coffee consumption was associated with a strong reduction in breast cancer risk for ER-negative breast cancer.⁷³ There was no apparent correlation between lower coffee, tea, soft drink, or chocolate candy bar consumption and breast cancer.⁷³ Since the study did not indicate that caffeine intake was associated with breast cancer risk reduction, there may be a compound in coffee other than caffeine related to this reduction.

In a 2022 study, coffee was reported to be a source of biochemical compounds that can protect against prostate cancer.^{74, 75, 76} Consumption of coffee has anticancer effects due to its bioactive, antioxidant, and anti-inflammatory properties. The high antioxidant capacity and anti-inflammatory effects of coffee have been hypothesized in the article, *Molecular Mechanisms of Coffee on Prostate Cancer*, to protect against oxidative stress and decrease chronic inflammation, which protects against DNA damage.⁷⁷ Ultimately, these properties contribute to coffee's ability to reduce the risk of developing prostate cancer.⁷⁴ Additionally, caffeinated coffee consumption is associated with higher concentrations of total testosterone and increased levels of sex hormone-binding globulin (SHBG) in men.⁷⁷ Prostate cancer has been associated with decreased sex hormone-binding globulin (SHBG), therefore suggesting that this may be another mechanism by which coffee reduces the risk of prostate cancer.

CONCLUSION

Caffeine is a stimulant that is commonly consumed in coffee, tea, and energy drinks. It can have several health benefits, including increased alertness and concentration, improved physical performance, and a lower risk of certain diseases. Studies have shown that moderate caffeine intake can improve cognitive function, including memory, mood, and reaction time. Additionally, caffeine may have beneficial effects on heart health, including reducing the risk of stroke and some types of cancer. Coffee is also connected to plant-based foods and is a bold example of how important anti-inflammatory, plant-based foods should be a significant part of an optimized diet. It is important to note that excessive caffeine intake can lead to negative effects such as insomnia, anxiety, and increased heart rate. In addition to its health benefits, coffee has also played a significant role in politics throughout history. Coffee houses were important centers of political and social discourse in the 17th and 18th centuries in Europe and America. These “penny universities” were places where people from all social classes could gather and discuss news, politics, and ideas.

AUTHOR DISCLOSURES:

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Review Article

Chelating Foods in Chronic Disease Treatment and Prevention

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Chelating Foods
Chelation Therapy
Chlorella
Chronic Disease
Cilantro
Garlic
Heavy Metals

ABSTRACT

As increasing numbers of patients present with chronic illnesses each year, healthcare has remained unable to resolve many of these issues' root causes, resorting to symptom management instead. For example, it is becoming increasingly clear that heavy metal toxicity is highly correlated with these conditions. Still, clinical care has focused more on pharmaceutical and surgical interventions than on trying to understand these underlying connections better. Because heavy metals are ubiquitous in modern life, exposure risk is high for nearly everyone. While chelation therapy has a long history and remains an effective method of removing heavy metals from the body, various foods have also been shown to possess powerful chelating properties. In light of these realities, not only is it incumbent upon physicians to make a heavy metal testing standard protocol for certain conditions, but incorporating a diet emphasizing chelating foods can provide powerful support to existing treatment and act as a preventative measure against bioaccumulation and its associated diseases.

INTRODUCTION

Seven of the ten leading causes of death in the U.S. are non-communicable chronic diseases.¹ As cases continue to rise, patients are being diagnosed at younger ages, leaving them to spend more years fighting illness rather than enjoying their lives.² In fact, increasing chronic multi-morbidity among women in their 30s has led some researchers to call for strategic chronic disease interventions in childhood to ensure long-term health and protect future generations.³ This troubling trend has made it clear that chronic disease cannot be entirely or even explained mainly by genetics and has forced researchers to broaden their perspective. Some now suggest that while genetics can predispose a person to chronic disease, one such factor is exposure to toxic metals. 70 to 90% of disease risks are due to environmental factors.⁴

HEAVY METALS AND CHRONIC DISEASE

There are 21 toxic metals in total; of these, arsenic, cadmium, lead, nickel, and mercury comprise the most exposure.⁵ In the body, they interfere with enzyme function by binding with sulfhydryl groups in proteins. Most often, they accumulate in the brain, bone, liver, and kidneys, resulting in neurological damage and organ dysfunction.⁶

Heavy metals have long been implicated in chronic diseases, including cardiovascular disease and stroke⁷, neurodegenerative diseases⁸, kidney disease⁹, and cancer.¹⁰ They have also been found to play a causative role in liver disease¹¹, autoimmune disease¹², endocrine disruption¹³, dysbiosis¹⁴, and even mental illness¹⁵. This has much to do with heavy metals' ability to create inflammation¹⁶, DNA damage¹⁷, oxidative stress, and suppress antioxidant production.¹⁸

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EXPOSURE RISKS

Heavy metals are ubiquitous, and avoiding exposure is impossible. It's not just industrial workers exposed to heavy metals, but the general population through the air pollution and water runoff their facilities create.¹⁹ Pesticides, herbicides, and caustic fertilizers also contain heavy metals²⁰, which vegetables can take up through their root systems from contaminated soil.²¹ Likewise, heavy metals have been found in many products, including cosmetics,^{22,23} chocolate bars,²⁴ seafood,²⁵ baby food,²⁶ protein supplements,²⁷ rice,²⁸ ceramic cookware,²⁹ and many others.

CHELATION THROUGH DIET

While intravenous chelation therapy is an effective treatment for removing heavy metals and cardiovascular, neurodegenerative, and kidney diseases,³⁰ plants have long been known to produce chelating agents.³¹ Their effectiveness has convinced public health experts to recommend a diet rich in such foods and nutrients to support continuous heavy metal removal for disease prevention and body rebuilding.³² Some of these include:

- Cilantro (*Coriandrum sativum*) significantly reduces lead deposits in the kidneys and bones,³³ as well as the liver³⁴ and brain,³⁵ while reversing functional and structural damage.
- Chlorella green algae have an outstanding ability to bind to cadmium and arsenic³⁶ while also producing significant reductions in cumulative mercury in the brain and kidneys through excretion via urine and feces.³⁷
- Foods high in sulfur, such as Alliums (garlic, onions, shallots, leeks), are powerful chelates. Garlic (*Allium sativum*) has shown a remarkable ability to bind to cadmium, methylmercury, and phenylmercury in reducing accumulation in the liver, kidneys, bone, and testes. Its protective effect was said to be superior to several medical chelating agents and similar to others, such as 2,3-dimercaptosuccinic acid (DMSA).³⁸ At the same time, garlic has been shown to preserve immune function by protecting leukocytes against mercury-induced damage³⁹ while producing considerable reductions in the lead.⁴⁰

FIGURE 1:

Heavy metal testing: a standard protocol for certain conditions



- Selenium-rich diets have been shown to prevent mercury toxicity and reverse some of its effects, particularly in the brain and neuroendocrine tissues. Selenium is a powerful chelating agent because mercury's binding affinity for selenium is nearly one million times higher than sulfur.⁴¹
- Curcumin, a compound of the spice turmeric, has scavenging and chelating properties that protect the liver from damage induced by cadmium, chromium, copper, lead, and mercury while protecting glutathione from depletion and preventing mitochondrial dysfunction.⁴²
- Quercetin, a flavonoid, significantly reduced cadmium levels and related kidney damage. Its chelating power was further enhanced when accompanied by vitamins C and E.⁴³
- Alpha-lipoic acid has been shown to greatly reduce lead levels and oxidative damage,⁴⁴ while folate has the same effect as arsenic.⁴⁵

CONCLUSION

Because heavy metal exposure is unavoidable in modern life, evidence strongly supports periodic testing and a diet high in chelating foods as part of a disease prevention or treatment protocol.

AUTHOR DISCLOSURES:

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Review Article

X-Linked Hypophosphatemia

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ABSTRACT

X-Linked Hypophosphatemia (XLH) is a genetic disorder that affects the bones and teeth, primarily characterized by low levels of phosphate in the blood. XLH is a rare disorder but is considered the most common inherited form of rickets. The clinical presentation of XLH varies widely with the most common symptoms of XLH being short stature, bowing of the legs, and dental defects. Diagnosis of XLH is typically made through clinical evaluation and genetic testing. Treatment options include monoclonal antibody therapy, oral phosphates, and bisphosphonates. This article will discuss the general clinical presentation of XLH, including the common symptoms and signs, the age of onset, diagnosis and treatment options, and the importance of primary care physician screening.

INTRODUCTION

X-linked hypophosphatemia (XLH) is a rare x-linked dominant disorder that affects about one out of every 20,000 individuals worldwide.¹ It consists of a loss of function mutation in the PHEX gene located on the X chromosome.² This mutation causes an increase in the protein fibroblast growth factor 23 (FGF23).² The protein causes an overall reduction in the amount of phosphate in the body via increased renal excretion by inhibiting NaPi-2a channels in the kidney tubules and reduced phosphate production from Vitamin D by inhibiting one alpha-hydroxylase and increasing the activity of 24 hydroxylases.³ Low Vitamin D levels then reduce the amount of phosphate absorbed in the intestines.³

When overall phosphate levels are excessively reduced, this causes an assortment of clinical symptoms in children,

which, left untreated or undiagnosed, lead to pathologies in the adult patient. The main findings in children include bowing of the lower extremities and rickets. In adults, these unresolved complications cause reduced height, frequent fractures, bowing of the legs with pain, hearing loss, and dental abscesses.⁴⁻⁹ With the disease being dominant, you find an entire family with the same issue by finding one patient with the disease.⁴

The treatment goal is to improve the quality of life as the patient ages and prevent the need for costly treatments further down the line.¹⁰ Primary care physicians (PCPs) can quickly screen with routine labs when there is clinical suspicion. Early screening allows for early intervention since the disease is progressive.^{1,11}

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CLINICAL PRESENTATION

General Clinical Presentation: Common Symptoms and Signs

In general, XLH causes various changes on biochemical laboratory tests, which will show deficits caused by excessive FGF23 and compensatory mechanisms by the body. These cause physical changes in the patient, which then alters as it is carried over to adulthood if untreated.¹ The two main laboratory tests are decreased phosphate levels and decreased tubular reabsorption of phosphate corrected for glomerular filtration rate (TmP/GFR), which can be linked back to the effects of FGF23.

Pediatric Presentation

The compensatory rise in 1,25 Vitamin D typically happens in low phosphate environments; however, this is not seen in XLH.¹ Another compensatory change is a rise in Alkaline phosphatase (ALP). ALP plays a role in bone mineralization which becomes hindered by the lack of phosphate.¹² In children, all symptoms are related to impaired bone formation. The main symptoms during the first two years of life include lower-extremity bowing, impaired growth, short stature, and rickets.¹ Lower extremity bowing became evident with weight bearing and was found by Skrinar and Carpenter to be the most frequently reported issue among patients with XLH.^{10,13} Mao *et al.* showed that children with XLH decreased height gain by one year. By two years, the median height of XLH children was around the bottom percentile of all children despite phosphate and Vitamin D supplementation.¹⁴ Bone mineralization happens in more areas than just the extremities. Thus other effects include craniosynostosis and tooth abscesses.^{1,10}

Infants with XLH may have a delay in the attainment of developmental milestones such as sitting and standing. As the child grows, they may have a waddling gait and difficulty climbing stairs or rising from a sitting position due to muscle weakness.^{1,15} Children with XLH may also have an increased risk of fractures and other bone injuries.¹⁶ Dental abnormalities such as enamel hypoplasia and delayed teeth eruption are common in children with XLH.

FIGURE 1:
Clinical Presentation and Disease Progression
in Pediatrics Patients^{1,4,9,15}

- XLH typically presents during the first 2 years of life, with lower-extremity bowing, impaired growth, and rickets
- Clinical manifestations vary in severity, ranging from isolated hypophosphatemia to severe lower-extremity bowing
- Pain, gait disturbances, and impaired gross motor function may also be observed

SKELETAL

- Short stature/loss of growth potential
- Progressive skeletal deformity
- Lower-extremity deformity
- Osteomalacia
- Bone pain
- Joint pain and stiffness
- Muscle pain
- Muscle weakness
- Rickets
- Delayed growth

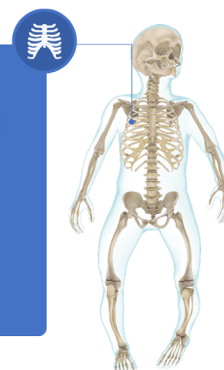
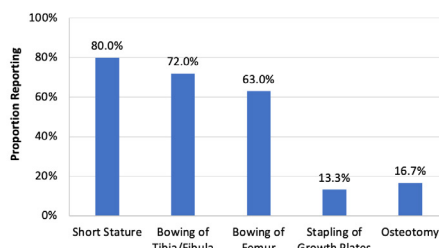


FIGURE 2:
Frequency of Skeletal Manifestations in
Pediatric Patients with XLH^{4,10}

Skeletal manifestations reported in an international online survey of parents/caregivers of children with XLH (N=90)



Rickets and osteomalacia can lead to lower-extremity deformities



Patient is a 2-year-old girl recently diagnosed with XLH. X-rays show bone deformity leading to genu varum

The diagnosis of XLH in children is based on clinical symptoms, radiographic findings, and laboratory results. It is important to recognize and diagnose XLH early in childhood, as early intervention can prevent severe complications and improve the child's quality of life.

Adult Presentation

In adults, the presentation includes reduced height, gait abnormalities, lower extremity deformities, and osteoarthritis as a consequence of these misaligned joints.¹ Dysfunctional anatomy leads to pain, stiffness, weakness, and fractures.^{10,15} The heavy medical burdens on these patients lead to a decreased quality of life.¹⁰

FIGURE 3:
Clinical Presentation and Disease Progression
in Adult Patients^{4,9,10,15,17}

Clinical manifestations in adults with XLH arise from:

- Unresolved complications of XLH from childhood
- New and continuing symptoms as a result of ongoing, active disease

SKELETAL

- Short stature
- Lower-extremity deformity
- Osteomalacia
- Bone pain
- Joint pain and stiffness
- Muscle pain and weakness
- Fractures (pseudofractures and Looser zones)
- Osteoarthritis
- Extraosseous calcifications including
 - Enthesopathy
 - Spinal stenosis

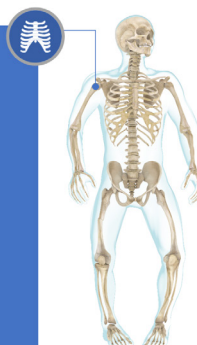


FIGURE 4:
Frequency of Skeletal Conditions in Adults Resulting
from Unresolved Childhood XLH Disease¹⁰

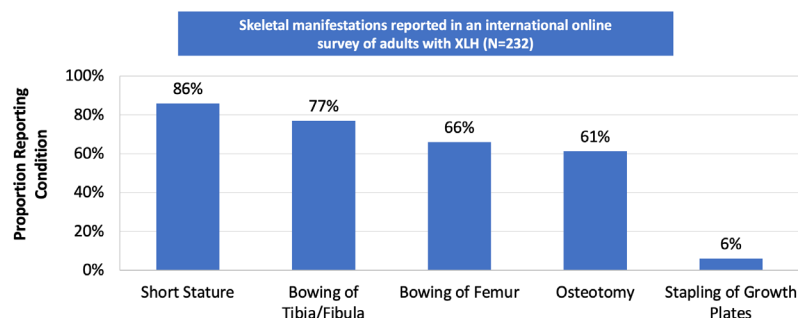
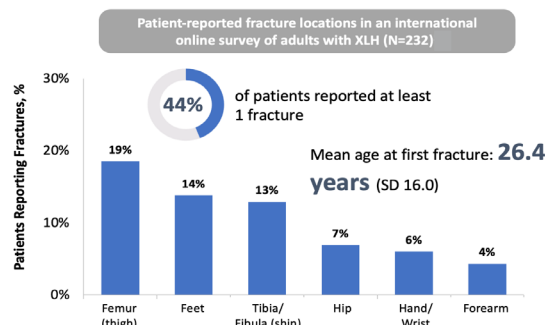


FIGURE 5:
Frequency of Fractures in Adult Patients with XLH^{4,10,18,19,20}

- Several types of fractures, including insufficiency fractures and Looser zones, can develop as a consequence of long-term weight bearing on weakened bones
- Fractures most often occur in the weight-bearing bones of the lower extremities, especially the shaft of the femur or tibia



XLH TREATMENTS

Several treatments are available for XLH, which aim to increase phosphate levels in the blood and prevent complications.

Burosumab:

Burosumab is a human anti-FGF23 monoclonal antibody that the FDA approved in 2018 for use in children aged six months and older.^{21,22} It is administered subcutaneously every two weeks for pediatric patients and every four weeks for adolescents above 18-years-old. Treatment is monitored in the initial months of therapy through fasting serum phosphate levels.²³ Its limited side effect profile and evidence-proven efficacy against rickets in pediatric patients (as young as one) make it the preferred treatment for untreated pediatric XLH cases and those previously treated with phosphate and calcitriol.²³ Based on current data, burosumab treatment is strongly indicated in early pediatric cases since it may improve development, growth, and skeletal integrity.^{23,24} In adults, however, fewer obvious benefits to initiating burosumab have been proposed since growth is mainly established and rickets is a pediatric disease. One trial observed improved healing of asymptomatic fractures and arthralgias in adults, but there is currently no widely accepted consensus regarding the use of burosumab in adults.²⁵ It is offered to adults who experience arthralgias, fatigue, slow-healing fractures, and low stamina. The most common adverse effects associated with burosumab use include rashes, dental abscesses, GI upset, injection site reactions, cough, fever, and vitamin D deficiency.²²

Oral phosphate supplements:

Oral phosphate supplements are the mainstay of treatment for XLH. They aim to increase the levels of phosphate in the blood by providing an exogenous source of phosphate. The dosage of oral phosphate supplements is based on the patient's age, weight, and disorder severity. Before the discovery of burosumab, oral calcitriol and phosphate were considered standard treatments for decades.²⁶ However, they are now only used when burosumab is unavailable, contraindicated (such as allergies), or when burosumab does not provide much benefit over calcitriol-phosphate.

FIGURE 6:
Management of XLH^{2,4,10}**Management of XLH**

- Phosphate supplements and vitamin D analogs may improve rickets and growth in pediatric patients, although outcomes of therapy are still not optimal. They are often considered in adults, however no consensus exists on their risk–benefit profile

FIGURE 7:
Muscle Weakness in XLH^{29,30}**Muscle weakness is a clinical feature of XLH****Children and adults with XLH have lower peak muscle force and power, partially due to limb deformities**

- Patients with XLH without lower limb deformities had better muscle function than those with severe deformities
- However, muscle function was also reduced in patients with XLH with straight legs

**Muscle function might be low in XLH because of changes in muscle composition**

- Individuals with XLH had lower muscle density compared with age- and sex-matched controls, indicating increased fat content of muscle
 - Intra- and intermuscular fat infiltration is considered a marker of poor muscle quality and has been associated with decreased muscle force

Pediatric treatment aims to minimize rickets and osteomalacia, monitored through routine imaging, growth curves, and clinical presentation (bowing of the legs).²⁶ In children, calcitriol is usually taken twice daily, while phosphate is given in 4–5 doses daily. For adults, therapy goals are ameliorating musculoskeletal pain, fractures, and limited mobility.²⁷ In adults, calcitriol is taken twice daily while phosphate is taken 3–4 times daily. Side effects of calcitriol-phosphate therapy include secondary hyperparathyroidism and nephrocalcinosis, which is why burosumab has been accepted as the standard treatment.⁷

Vitamin D:

Vitamin D plays a crucial role in the absorption of phosphate in the gut. Therefore, vitamin D supplements are often used in conjunction with oral phosphate supplements to improve phosphate absorption.

Bisphosphonates:

Bisphosphonates are drugs used to treat bone disorders such as osteoporosis. They can also treat XLH to prevent bone mineral density loss and reduce the risk of fractures.

Orthopedic surgery:

In some cases, orthopedic surgery may be required to correct the bowing of the legs caused by XLH. Surgery can also correct other complications, such as spinal deformities.

It's important to note that the treatment plan is tailored to each patient and depends on the severity of the disorder, age of onset, and other factors. It's also important to have a multidisciplinary approach that includes a pediatrician, orthopedic surgeon, dentist, geneticist, and other specialists as needed.

POTENTIAL SEQUELAE OF UNTREATED XLH

Due to this disease's rarity and variable presentation, XLH can go untreated into adulthood. Other factors, such as less parental input, and noneffective therapeutic results in medication noncompliance, play a role in adult sequelae of the disease.⁴ Chronic low phosphate has significant effects on the body. Dysfunctional mineralization leads to bowing of the legs from the strain of weight bearing.⁴ In an online survey of 232 respondents, 77% reported issues with the tibia and fibula bowing.¹⁰ It also leads to osteoarthritis⁴ and enthesopathy.²⁸ In a survey of patients with an average age of 39, a majority had enthesopathy in joints such as the knee, ankle, and pelvis.²⁸ These can lead to pain and stiffness (92% of survey respondents reported this condition)¹³ and fractures⁴⁷ and muscle weakness.²⁹ Fractures most often occur in weight-bearing bones such as the femur, with 44% of patients reporting a fracture with a mean age of 26.4.¹⁸ Overall, patients' quality of life is hindered. In the studies by Skrinar, most patients tested lower in quality of life measurements compared to the US general population, with pain and decreased physical function being the main drivers of these lower measurements.¹⁰

Children with XLH who go untreated become adults with symptoms of short stature, bowing of tibia/tibia, bowing of femur, osteotomy, and stapling of growth plates.

XLH SCREENING IN PRIMARY CARE

XLH is seen in 1 in 20,000 to 1 in 25,000 live births.¹ Because of its rarity, its diagnosis and treatment are frequently delayed, leading to impaired skeletal development.^{2,4} Family practitioners are trained to treat patients of all ages: newborns, children, and adults. Since a diagnosis of XLH can be made at any point in a person's life, it is well within the scope of family medicine to screen and refer to treatment when clinical suspicion is indicated.

FIGURE 8:
Effects of XLH on Quality of Life (QoL)¹⁰



Adults with XLH have significantly impaired QOL

- 232 adults with XLH reported lower QOL than normative population in a self report of functional health and well-being
- In this study, pain, stiffness, and decreased physical function were the most common contributors to impaired QOL in adults with symptomatic XLH

A physician may diagnose XLH by evaluating a patient's symptoms and physical examination findings, such as short stature, bowing of the legs, and dental defects. The physician may also order laboratory tests, including a measurement of serum phosphate levels, which is typically low in patients with XLH. Genetic testing can also confirm the diagnosis by identifying a mutation in the PHEX gene.

If the serum phosphate level is low, a physician's next step is to rule out other causes of hypophosphatemia, such as vitamin D deficiency or renal phosphate wasting. Finally, if XLH is suspected, the physician may order genetic testing to confirm the diagnosis.

After a diagnosis of XLH is confirmed, the physician will likely recommend a treatment plan to manage the patient's symptoms and prevent further bone and dental complications. Treatment options include oral phosphates, calcitriol, and bisphosphonates. The physician will also closely monitor the patient's response to treatment and make adjustments as necessary. Regular follow-up appointments and laboratory tests will be important to monitor the patient's condition and ensure an effective treatment plan.

With a pediatric patient, it is recommended to involve a pediatric endocrinologist in the management of XLH as soon as the disorder is suspected or diagnosed.

Labs like serum phosphorus are relatively inexpensive and could be easily added to routine lab work if history is consistent with the typical presentation.¹ Also, because most XLH cases are due to inheritance, a diagnosis in one patient in a family practice would warrant further workup and genetic testing in other family members.³⁴ It's also important for physicians to screen for XLH when a patient presents with bone/tooth disorder, as symptoms may be mistaken for other conditions, such as vitamin D-resistant rickets. Therefore, physicians need to consider XLH in their differential diagnosis when evaluating patients with rickets or other bone and teeth disorders. Early

recognition and intervention could reduce the disease burden by reducing the severity of rickets and allowing for better skeletal development into adulthood.^{24,31,32,33} XLH can also lead to other health problems such as muscle weakness, bone pain, and difficulty climbing stairs or rising from a sitting position.

CONCLUSION

XLH is a genetic disorder characterized by low levels of phosphate in the blood caused by mutations in the PHEX gene. The disorder is primarily skeletal, with symptoms including short stature, bowing of the legs, and dental defects. XLH diagnoses are based on clinical symptoms, radiographic findings, and laboratory results. Treatment options include oral phosphate supplements, vitamin D, monoclonal antibodies, bisphosphonates, and orthopedic surgery. Early diagnosis and treatment can prevent severe complications and improve the patient's quality of life. Therefore, physicians need to screen for XLH and have a multidisciplinary approach to managing the disorder. Research on the genetic and molecular mechanisms of XLH is ongoing, and new therapeutic targets may be discovered in the future.

AUTHOR DISCLOSURES:

Steven H. Barag, DO, FACP, is a member of the JOFP-CA Editorial Board. All other authors have no relevant financial affiliations or conflicts of interest.

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Case Report

Osteomyelitis Of Unknown Origin

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KEYWORDS:

Bone
Osteomyelitis Infection
Staphylococcus Aureus
Staphylococcus Epidermis

ABSTRACT

Osteomyelitis is inflammation and or swelling of the bone. The infection site can either be at the bone or from another part of the body that has spread to the bone. Staphylococcus aureus and staphylococcus epidermis are responsible for most cases due to being a part of normal skin flora. Salmonella is rarely reported and accounts for 0.45% of all causative agents of salmonella. Salmonella osteomyelitis in immunocompetent adults is uncommon and occurs in approximately 0.8% of all Salmonella infections.

Myositis is muscle inflammation that can be due to both infectious and non-infectious causes. Infectious causes can be classified into pyogenic or non-pyogenic. Infection-related myositis occurs due to bacterial, viral, fungal, mycobacterial, or parasitic infections as the root cause. Bacteria and fungi are the most common cause of focal myositis. Myositis with Salmonella species is rare and has been reported with Salmonella Typhi and Salmonella Enteritidis.

INTRODUCTION

Salmonella is a non-spore-forming gram-negative bacillus that can cause a broad spectrum of human infections, such as gastroenteritis, typhoid fever, and bacteremia, and an asymptomatic carrier state can occur. Osteomyelitis is an extremely rare complication of Salmonella infection and occurs in approximately 0.8% of all Salmonella infections and typically infects the diaphysis of long bones, predominantly the femur and humerus.¹ Salmonella osteomyelitis is mainly seen in patients with hemoglobinopathies such as sickle cell disease or thalassemia, and it remains a significant cause of morbidity and mortality in this population. Salmonella osteomyelitis occurs specifically due to Salmonella typhi, which has a predilection for patients with diabetes mellitus, systemic lupus erythematosus,

lymphoma, liver and cardiovascular diseases, previous surgery or trauma, and patients on steroids. Few cases are reported in the literature in which salmonella osteomyelitis is seen in otherwise healthy individuals. In most cases, there is commonly a pre-existing history of intestinal infection.² Aspiration or biopsy can be utilized to identify pathogens to guide antibiotic choice. Empirical therapy with a third-generation cephalosporin is recommended until the strain's susceptibility is determined.

A febrile course, rash, splenomegaly, and gastrointestinal symptoms often characterize Salmonella bacteremia. Direct muscle infection invasion and circulating proteolytic toxins are proposed mechanisms for muscle involvement in bacterial infections.³ Muscle infections with salmonella are uncommon. The most common organism to cause

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focal muscle infections is *Salmonella* enteritidis. Typhoid-related myositis is considered rare. *Salmonella typhi* has been reported to cause rhabdomyolysis and focal abscesses.⁴

A study compared the clinical features of salmonella muscle infections with those who reported typical pyomyositis with staphylococcus aureus. The literature study was divided by sex, duration of symptoms at presentation, and muscle group involvement. The psoas muscle is most involved in those with salmonella infections when compared to typical pyomyositis, which also yields positive blood cultures. Additionally, mortality rates were higher in salmonella muscle infections than in typical pyomyositis.⁵ In this case report, we describe a case of salmonella osteomyelitis and myositis in a young man with no significant comorbidities who presented with left leg pain.

METHODS

A single patient case report was conducted after IRB approval.

CASE PRESENTATION

A 24-year-old male with no past medical history presented to the emergency room with progressively worsening left knee pain and swelling. He stated that he experienced intermittent pain in his left knee between 10/2021 and 12/2021, then again beginning 02/2022; pain and swelling had worsened in the last two weeks. The patient described the pain as sharp and radiating down to the toes when bearing weight on the left leg. The pain led the patient to begin using a walker. Along with intermittent fevers for two weeks, the patient reports night sweats and a 30 lb. weight loss in the last three months.

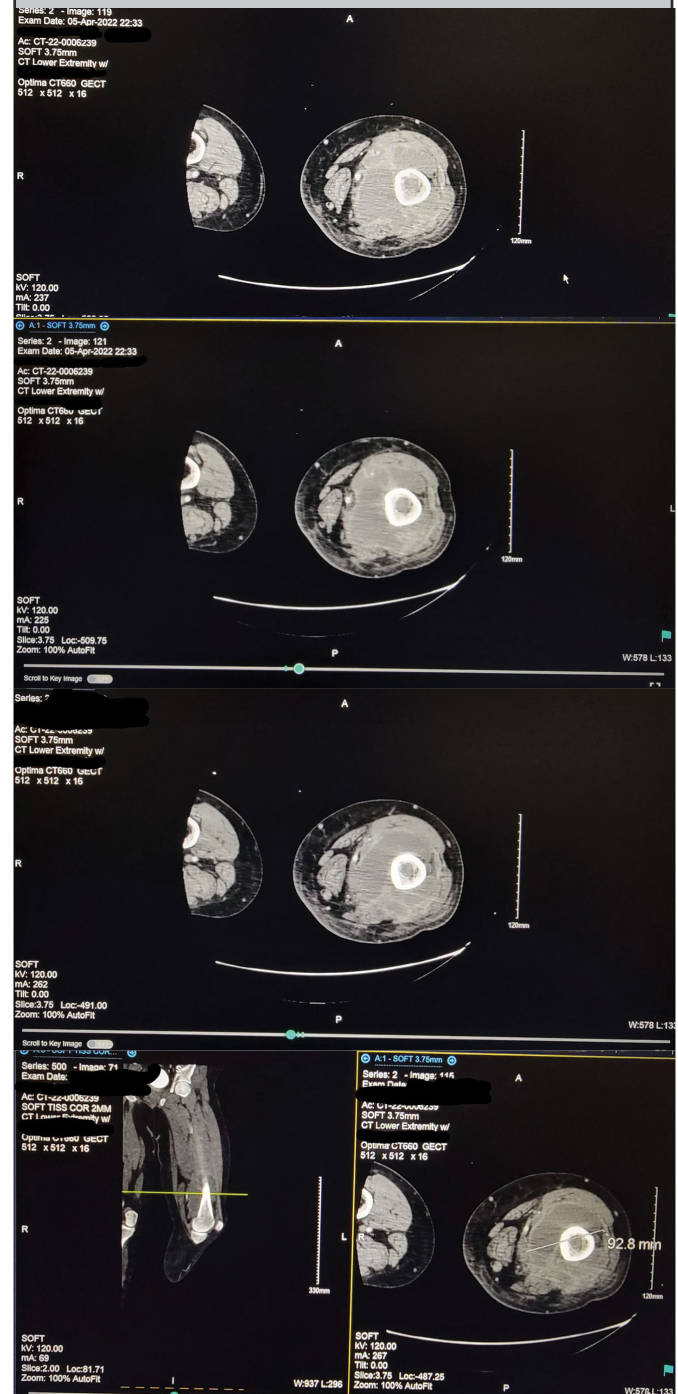
The patient denies any trauma, skin infections, drug use, smoking, alcohol, or travel but reports that he does have six dogs at home. Upon admission to the ED, the patient met the criteria for sepsis: vitals were remarkable for tachycardia (123 HR), WBC 23.4 with 6% bands, ESR 53, CRP 15.5, and glucose 468. He received one dose of Zosyn and Vancomycin in the ED.

The physical exam was notable for swelling and induration of the left thigh, knee, and foot—no tenderness to palpation or erythema. There were no skin lesions or wounds, range of motion in the left lower extremity was limited due to severe pain. CT imaging (Figure 1) indicated a large multilocular intramuscular abscess of the distal left thigh with osteomyelitis and an intraosseous abscess of the distal femur. Multiple specialist teams were consulted: Infectious Disease recommended holding IV antibiotics until cultures isolate an organism, Orthopedics recommended left knee arthrocentesis, and Interventional Radiology recommended fine-needle aspiration

FIGURE 1:
CTs of Left Lower Extremity W/Contrast:

Extensive variable periosteal reaction, from mid-femoral diaphysis to meta diaphysis.

Intraosseous/intramedullary complex collection, measuring 12cm x 2.2cm x 2 cm. Large Multilocular intramuscular abscess in the distal thigh with cloaca and intraosseous abscess involving distal femur.



of multilocular intramuscular abscess adjacent to left distal femur. A total of 410ml of purulent material was aspirated and sent for culture and sensitivity.

CT imaging indicated that the patient had osteomyelitis, and cultures from the leg abscess were positive for many salmonella species. The patient was started on Ceftriaxone 2g IV for six weeks. He was advised to continue following up with infectious disease outpatient and to follow up with his PCP regarding his diabetes.

DISCUSSION

This is a case study of a 24-year-old male with no significant past medical history (at the time of admission) who presented with sepsis and intermittent progressively worsening leg pain for months. Upon further workup, the patient was found to have undiagnosed type 2 diabetes mellitus with a hemoglobin A1c of 10.1. This potentially could be a contributing factor for the cause of this patient's infection; however, other causes of salmonella were unclear as he denied any other potential sources. In addition, the patient stated that he received a tattoo one month after the initial pain started, but no further information was provided.

Salmonella infection of bones and joints is rare, accounting for only 0.8% of all Salmonella infections and 0.45% of all types of osteomyelitis. However, they often occur in those immunocompromised, with sickle cell disease, or uncontrolled diabetes. Upon admission, the patient had elevated blood glucose levels and was diagnosed with diabetes but stated he was never diagnosed in the past. His infection's source is unknown, but it could be due to his uncontrolled diabetes.

The Infectious Disease team considered the patient's negative history and stated that the infection likely started within the bone and spread to the muscles. They recommended screening for tuberculosis, coccidioidomycosis, HIV, hepatitis, and syphilis, which all returned negative.

Regarding potential sources of infection, Salmonellosis can be divided into five separate or overlapping syndromes: enterocolitis (food poisoning), enteric (typhoid) fever, bacteremia/septicemia without localization, local infection, and a chronic carrier state. The mechanism of infection is usually through ingestion of contaminated water or food like eggs, poultry, non-pasteurized milk, snake meat, and snake-based traditional medications or skin contact with amphibians and cold-blooded reptiles, including snakes, lizards, and turtles.⁶ It is possible that the patient could have ingested salmonella contaminants unknowingly.

Successful treatment of osteoarticular Salmonella infection usually requires extensive and sometimes multiple debridements and prolonged antibiotic therapy. The antibiotic treatment

should ideally start after obtaining sufficient culture samples. Ampicillin, chloramphenicol, Azithromycin, third-generation cephalosporins like ceftriaxone, and fluoroquinolones like ciprofloxacin have all been used successfully in these cases.⁶ Administration of ceftriaxone via IV every 24 hours for six weeks also led to a successful outcome for this patient.

CONCLUSION

A 24-year-old male patient presenting with symptoms of left leg pain ultimately tested positive for a rare infection of Salmonella osteomyelitis. The source of the infection remains unknown, as the patient denied any common attributing events that would lead to Salmonella osteomyelitis. A treatment course comprised of Ceftriaxone 2g IV every 24 hours for six weeks administered by an outpatient infectious disease clinic. The patient continued to follow up with infectious disease outpatient and was referred to his PCP to help manage and control his diabetes.

AUTHOR DISCLOSURES:

No relevant affiliations or conflicts of interest.

Patient Informed Consent: Consent Given.

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Case Report

Gout: A Case Report

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KEYWORDS:

Allopurinol

Bullae

Gout

Pegloticase (Krystexxa)

Tophi

ABSTRACT

Gout is a common clinical condition, usually seen with typical manifestations of swelling, erythema, tophi, and heat at joint(s). However, in rare circumstances, gout can present atypically, and it is important to recognize and manage it with appropriate medical therapy. This case study dives into a particularly atypical presentation of tophaceous gout in a patient with numerous comorbidities that complicate management. Visually appreciating the tophi, in this case, allows one to get an idea of their distribution on the digits, their unique chalky-white appearance, and how the presentation changed after therapy was initiated. Additionally, learning about the in-depth management and step-wise escalation of treatment is a crucial takeaway from this case, especially in the backdrop of the patient's CKD3b and CHF - making selecting pharmacotherapy a challenge. After some trial and co-consultation with nephrology, the final effective treatment course for this patient involved using a combination of Allopurinol and Pegloticase (Krystexxa) together; this provided both a clinical improvement and a decrease in lab values of uric acid, dropping from 11.4mg/dL at peak to 4.4mg/dL.

INTRODUCTION

The pathophysiology of gout is believed to be related to both genetic and environmental factors, such as diet and lifestyle. The condition is characterized by elevated levels of uric acid in the blood, known as hyperuricemia, which can lead to the formation of uric acid crystals in the joints and surrounding tissue. The crystals then activate the immune system, leading to inflammation, pain, and the characteristic symptoms of gout, such as redness, warmth, and swelling in the affected joint.

Throughout history, gout has been documented in lay and medical writings dating back to ancient Greece and Rome. The disease was often associated with a lifestyle of excess and was considered a sign of wealth and affluence. In the Middle Ages, gout was referred to as the "disease of kings" due to its prevalence among the wealthy and powerful. Despite this association, gout was also recognized as a serious and debilitating condition, with early medical texts describing the symptoms and treatment of the disease.

With the advent of modern medicine, the understanding of the underlying causes and pathophysiology of gout has greatly improved, leading to more effective treatments and management strategies for the condition.

This case report provides visual and diagnostic insight into an atypical presentation of tophaceous gout in an elderly patient with numerous comorbidities (CKD3b and CHF). Additionally, this case report sheds light on the numerous trials of therapies used to help the patient with his comorbidities. Initially, the patient was treated with a Prednisone burst, but this caused fluid retention and CHF exacerbation. After consultation with Nephrology and initial stepwise escalation of different Urate-Lowering Therapy and steroid tapers, the patient finally found a combination of medical therapy that helped him clinically and showed a reduction in uric acid levels through laboratory levels.

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CASE

Patient Description and Case History

I.R., an 85-year-old man with Chronic Kidney Disease Stage 3b, Congestive Heart Failure, Dyslipidemia, Hypertension, and Gout, presented for evaluation of white bullae on the distal first through third digits of his left hand and a draining wound on his left third digit. Cloudy, pure-white, chalk-like material was expressed from the bullae of the third digit. This left a clear base after expression, and the fluid yielded a negative culture. Additionally, he had associated painful edema with moderate erythema of the hands.

Gout is a common clinical condition and frequently presents with the classic pattern of a sudden, painful, swollen, warm joint(s) during an acute flare or chronically, as arthritic pain with tophaceous nodules. Gout is characterized by hyperuricemia and the build-up of monosodium urate crystals in joints, which sometimes aggregate and are called “Tophi.”¹

Tophi develop in approximately 12–35% of patients with gout.² Usually, these tophi do not cause significant acute inflammation, as they are encased in a fibrous granulomatous matrix¹ and rarely occur in patients who have never had acute gouty arthritis. They are usually firm yellow or white papules or nodules, single or multiple. Tophi may erupt through the skin, discharging chalky masses of urate crystals. In our recent case seen at the Family Medicine residency clinic, a patient presented with atypical tophaceous manifestations of gout that are rarely seen.

This man was diagnosed with tophaceous deposits secondary to uncontrolled gout, presenting as whitish bullae. The bullae are characterized by a soft outer layer and filled with a material of chalk-like consistency. Typically gout is addressed through urate-lowering therapies (ULT - i.e., allopurinol, febuxostat, probenecid, lesinurad, and pegloticase), which are advanced in a stepwise manner to work as both prevention and therapy for tophaceous gout.² Clinically, “a uric acid level of <6mg/dl, has been associated with increased functionality of joints, a decrease in the number and size of tophi and improved overall control of symptoms.”² A likely proposed mechanism behind the formation of these bullae is a build-up of uric acid into crystals in the skin, rather than the typical presentation of crystals in the synovial fluid.^{3,4} What makes these specific bullae unique are their white color and stone-like appearance on the digits’ tips and the fluid’s chalk-like consistency.

Physical Exam

General Appearance: Uncomfortable and in pain. Elderly man with cane.

HEENT: NCAT. PERRLA. EOMI. Gingiva in good condition

Cardio: Normal rate and rhythm. No peripheral edema or cyanosis.

Respiratory: Clear to auscultation bilaterally without rales, rhonchi, or wheezing. No diminished breath sounds or accessory muscle use.

Skin/MSK: Left 3rd digit with about 0.5cm open wound with whitish stonelike mass adhered to bandage, which came off when bandage removed. The base of the wound has some whitish material that was cultured. Left thumb and 2nd digit have a whitish bullae with about 1-1.5cm diameter and pus excreting from tips of the digits. Tender to palpation without surrounding erythema and minimal edema.

Lab Results

H/H = 11.9/35.8 (9/21) → 12.3/37.1 (10/12)
→ 12.5/38.4 (11/09) → 13.4/20.6 (12/14)

MCV = 85

ESR = 32 (9/21) → 22 (10/12) → 20 (11/09) → 20 (12/14)

BUN/CR = 27/1.7 (9/21) → 35/1.8 (10/12) → 38/1.8 (11/09)
→ 39/1.8 (12/14)

eGFR = 40 (9/21) → 37 (10/12) → 38 (11/09) → 38 (12/14)

Uric Acid = 11.4 (02/09) → 11.2 (04/11) → 7.7 (07/14)
→ 5.0 (09/21) → 5.0 (10/12) → 4.4 (11/09) → 4.3 (12/14)

ALP = 149 (9/21) → 135 (10/12) → 131 (11/09)
→ 146 (12/14)

CRP = 1.3 (02/09) → 10.6 (6/28) → 15.1 (06/29)
→ 1.2 (07/27) → 0.5 (09/21) → 0.2 (10/12) → 0.3 (11/09)
→ 0.2 (12/14)

Wound Clx (aerobic, anaerobic, w/ gram stain) -
all clx neg (08/23)

Imaging Results

1. Finger Lt Min 2 Vw XR
2. Left hand and third finger soft tissue swelling
3. Progressive periarticular erosive changes. Query history of rheumatoid arthritis, other inflammatory arthropathy, or underlying renal osteodystrophy with brown tumor formation
4. Osteopenia. No radiographic indication of osteomyelitis
5. Atherosclerosis

TREATMENT PLAN

- (8/18): Norco for pain control. Clx pending. Keep the fingers wrapped. Start Medrol dose pack.
- F/u Rheumatology to start biologics or DMARD
- (8/23): Cleaned wound after pus excreted with chlorhexidine and rebandaged using non adherent dressing. No Abx. Ortho and Nephro referral.
- (08/30): Restart Medrol dose pack for gout flares. Cont work w/ nephrology and ortho on UA lowering strategies.
- (09/29): Tophaceous deposits have now solidified and there is good healing underneath with the apparent impending expulsion of tophaceous plaque. Erythema decreased Nephro and Ortho recs helped to reduce pt UA to 5. (taking Krystexxa and Colchicine). Additionally pt prescribed Medrol for flares.
- (11/22): White bullae continuing to heal. 1st and 2nd digits essentially completely healed and the third digit continues to heal by secondary intention. Cont Colchicine and Krystexxa.

EXPECTED OUTCOME

Slow healing of digits and gradual reduction in UA lab levels.

ACTUAL OUTCOME

Healing using Krystexxa and Colchicine combination helped both clinically and improved the patient's UA levels from severe range to normal. Importantly, the patient's kidney function only slightly decreased during this period.

DISCUSSION

Urate lowering therapies work well for most patients suffering from tophaceous gout. However, they are insufficient to manage an estimated 3–10% of gout cases in the USA.² Many gout patients have complex co-morbidities and medication profiles, making medical management challenging and even prohibiting the use of some medications.² This was true in the patient, as his congestive heart failure and chronic kidney disease limited medication options. In addition, the patient had presented five times in the last nine months to manage gout flares, which became further complicated by his CKD and CHF. Through consultation with nephrology, the patient from the clinic was treated with a reduced dose of Colchicine and intermittent 5 mg steroid bursts (Medrol Dose Pak). These were low doses, as a previous full dose Prednisone course of 40 mg for five days had caused fluid retention and CHF exacerbation. After two months of Colchicine, the patient was taken off of the medication due to gastrointestinal intolerance and ineffectiveness in improving symptoms.

After the patient's most recent clinic visit and a follow-up appointment with a nephrologist, we discussed starting more aggressive uric acid-lowering strategies. Fortunately for the patient, his uric acid levels decreased dramatically, down as low as 4.4 mg/dL (from a peak of 11.4mg/dL), on a combination of Allopurinol and Pegloticase (Krystexxa). This eventually led to a dramatic decrease in his erythema and his pain levels, which have significantly decreased since he first presented. In addition, the tophaceous deposits have now solidified, and there is healing by secondary intention under the plaques, which remain attached to the superficial layer.

CONCLUSION

This is a rare presentation of atypical tophaceous gout with white stonelike bullae and pus-like discharge from the tips of the affected digits. The patient's CHF and CKD3b comorbidities also complicated his medical therapy options. After consultation with Nephrology and Orthopedic Surgery, the patient found an effective combination (Allopurinol and Krystexxa) to dissolve the tophi and reduce uric acid levels within the normal range. Understanding the spectrum of gout presentation can help with future management. Reviewing the progressive step-wise escalation in urate-lowering therapies is equally important as reaching out to specialists when a patient has specific comorbidities.

FIGURE 1:

Chalky-White Bullae on first and second digits

**FIGURE 2:**

Healed bullae with tophaceous deposits

**AUTHOR DISCLOSURES:**

No relevant financial affiliations or conflict of interest.

INFORMED CONSENT:

The patient described in this report provided informed consent.

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Photos courtesy of Cameron MacInnis, MD, Faculty, Adventist Health Ukiah Valley Family Medicine Residency, Ukiah, CA

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OMS Voices

Screening for Loneliness in Older Adults: A Way to Better Address Mental Health in Primary Care Since the COVID-19 Pandemic

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2022 ACOFPCA Student Writing Award Winner

Part of the Osteopathic philosophy is understanding the patient as one unit of mind, body, and spirit. With this, an Osteopathic physician needs to understand the disparities of mental health in different groups, as well as the best screening tools available for understanding the mental health status of patients. This essay will unpackage mental health rates in the older adult population, how COVID-19 has affected mental health status, and whether screening for loneliness may be a more effective screening tool in the primary care setting.

Addressing and screening for mental health in the older adult population (with “older adults” commonly defined as age 60 or older¹) has been an ongoing problem in primary care since before the COVID-19 pandemic, with an estimated 20% of older adults experiencing mental and neurological disorders.¹ Yet it is also known that depression is commonly underdiagnosed in the older adult population; it is hypothesized that this is due to depressive symptoms commonly co-existing with other problems or comorbidities occurring in this population, as well as the issue of mental health still being a highly stigmatized topic that patients may be uncomfortable bringing up on their own.^{1,2}

A more commonly used mental health screening tool in the primary care setting

today is the Patient Health Questionnaire-9, a nine-question survey used to screen for depression. Numerous studies show that the PHQ-9 is an effective screening tool for depression.^{3,4} However, with mental health still being highly stigmatized, patients may feel inclined to answer “no” to these questions when they know they are being asked about their mental health.³

While the definition varies slightly between sources, loneliness is generally defined as “a discrepancy between one’s actual and desired level of social connection.”⁵ Loneliness and its association with depression were explored in the study “Typologies of loneliness, living alone and social isolation, and their associations with physical and mental health.”⁶ The study grouped older adults based on feelings of loneliness, social isolation, and living alone and determined how these factors affected the group’s health. The study showed that the groups with the highest loneliness and isolation scores also had the highest depressive symptoms.⁶ On top of just mental health, groups who experienced loneliness and social isolation were also more likely to report poor health in general.⁶

During the height of the COVID-19 pandemic and the shelter-in-place orders, loneliness and social isolation were higher

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than ever before. A 2021 longitudinal phone-based study titled “Social Isolation and Loneliness Among San Francisco Bay Area Older Adults During the COVID-19 Shelter-in-Place Orders” found that 54% of participants felt worse loneliness, depression, and anxiety during the pandemic, as well as 40% of socially isolated individuals having difficulty finding help with functional needs.⁵ In addition, the study “Evaluation of COVID-19 phobia and the feeling of loneliness in the geriatric age group” found that “loneliness scores were significantly higher in singles, those with higher levels of education and income, those who live alone, who was a relative of a healthcare worker, and whose relatives were infected with COVID-19”.⁷ These studies together show how much of an impact COVID-19 had on feelings of loneliness in older adults. In addition, sub-populations of older adults were identified as having more risk for loneliness.

With loneliness generally increasing in the older adult population compared to other adults and even more elevated since the COVID-19 pandemic, studies are exploring whether it may be better to use a loneliness scale to screen for depression initially. The study “Loneliness and Mental Health: Recommendations for Primary Care Intakes” completes a cross-sectional survey study that integrated UCLA’s 3-item loneliness scale to help better understand a patient’s mental health status.⁸ The three questions included in UCLA’s loneliness scale include “How often do you feel that you lack companionship,” “How often do you feel left out?” and “How often do you feel isolated from others?”. These questions are answered on a 3-point scale, with “hardly ever” given 1 point, “some of the time” given 2 points, and “often” given 3 points. A scale of 3-9 points is used to determine the participant’s level of loneliness.^{8,9}

In addition to using the UCLA loneliness scale, the study also evaluated other variables, including social interaction, religiousness, and household income, to compare how those factors affected patients’ perceptions of their mental health.⁸

TABLE 1:
UCLA 3-Item Loneliness Scale^{8,9}

	Hardly Ever	Some of the Time	Often
How often do you feel that you lack companionship?	1	2	3
How often do you feel left out?	1	2	3
How often do you feel isolated from others?	1	2	3
Total Score _____ (3-5= ‘not lonely’, 9= ‘lonely’)			

The results showed that loneliness seemed to be the only significant variable out of the four listed above.⁸ Because of this, the authors concluded that incorporating the 3-item UCLA Loneliness Scale would better provide information on a patient’s mental health status during the healthcare intake process.⁸ In addition to determining that the UCLA 3-question loneliness scale is an effective mental health screening tool, the study also commented on using the loneliness scale over the PHQ-9. “When individuals are screened with specific mental health tools, such as the Patient Health Questionnaire-9, it is clear that the questions are about depression, anxiety, or suicidal tendencies. Patients might decline to respond if they did not visit primary care for mental health. Including more concise and broad questions, such as the 3-item Loneliness Scale during the intake process, will allow the assessment of mental health status. Individuals might be less reluctant to respond since the intention to assess mental health status is not as obvious.”⁸

“A single question assessment of loneliness in older adults during the COVID-19 pandemic: A nationally-representative study” explored whether the 3-question loneliness scale was more or equally effective compared to a single-question initial screening.¹⁰ The study surveyed older adults using either the UCLA loneliness scale or the single question: “Are you feeling lonely?”. Older adults were surveyed before and after the beginning of the COVID-19 pandemic.

Results showed “The single question had 90% sensitivity and 83% specificity for identifying individuals scoring ≥ 6 points on the UCLA scale, with a lower rate of false negatives in COVID-19 data compared to pre-pandemic data (3% vs. 10%).”¹⁰ While more extended loneliness screenings are still essential for a more comprehensive understanding of what is contributing to an individual’s loneliness, a single-question survey may make screening for loneliness more feasible in the busy clinical setting and has the potential to be incorporated into a more comprehensive assessment to understand individuals and social-determinants of health better.¹⁰

With increased loneliness in the older adult population after the COVID-19 pandemic, combined with the effectiveness of using a loneliness screening questionnaire for assessing mental health status, incorporating a Loneliness Screening Tool in one’s primary care practice may help physicians better understand mental health in the older adult population. In addition, knowing that loneliness is a major contributor to mental health in older adults since the COVID-19 pandemic allows physicians to give better recommendations for treating mental health in this population. A literature review written by Bhutani S *et al.* noted that while quarantine, social distancing, and illness further propagated feelings of loneliness in older adults, there was also an enhanced sense of community after the stay-at-home orders were lifted.¹¹ There is potential for patients to treat their post-pandemic loneliness by finding a community of individuals with similar interests.

While many individuals turned to technology during the pandemic to stay connected, the Kotwal, AA *et al.* study regarding Social Isolation and Loneliness in San Francisco Bay Area older adults noted that many older adults felt their inability to adapt to technology made them even more disconnected from their friends and family.⁵ In addition, this population also suffered from decreased access to their healthcare as most practices turned to telehealth during the stay-at-home orders, with some implementing telehealth even after the shelter-in-place restrictions have been lifted. So, while using technology to connect with others may be a solution for some in this post-pandemic world, understanding that it may not be appropriate for all patients, especially older adults, is crucial.

Screening for mental health in older adults is essential to understand the patient best and better treat their mind, body, and soul as an Osteopathic Physician. It is necessary to continue researching mental health screening tools and treatments as society develops to diagnose best and treat patients. Addressing

loneliness in older adults by using the one-question “Are you feeling Lonely?” or the UCLA 3-question loneliness survey may help physicians understand how a patient is adapting to living in the post-pandemic world and allows physicians to better advise their patients on how to cope with their feelings of loneliness and depression.

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Message from ACOFPCA Convention Chair

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Attention all osteopathic family physicians! Looking for a fun and educational experience? Look no further than the ACOFPCA'47 convention and scientific medical seminars at Disneyland, Anaheim, CA, August 2-6, 2023.

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Steven H. Barag, DO, FACP

Steven H. Barag, DO, FACP
ACOFPCA Convention Chair

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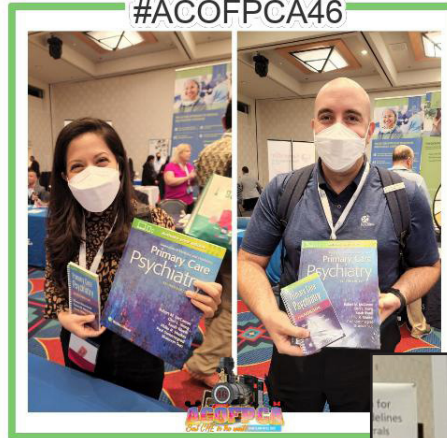
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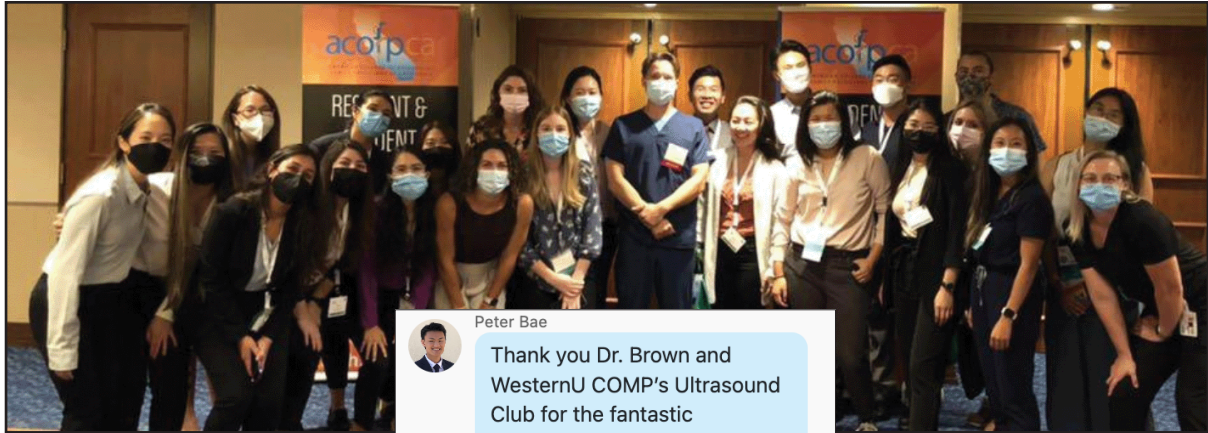


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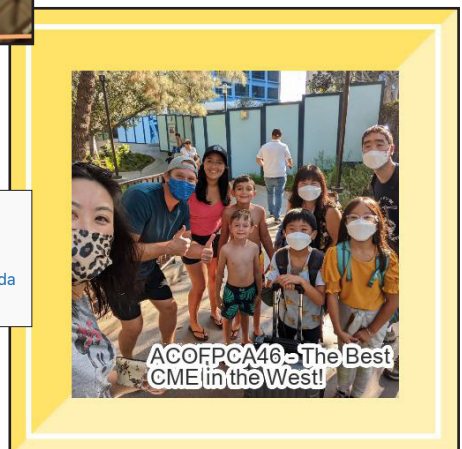
Hao K. Cao, D.O.

I am whipped with Dole... (first ever Dole Whip)



Maria Yeh
Internist
TPMG

KP DLC Work Fam and family - with Linda Okamoto, DO and 1 more



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Annual Convention

2022 ACOFPCA Research Abstracts and Poster Competition

This issue of the *Journal of Osteopathic Family Physicians of California (JOFP-CA)* features abstracts from the posters presented at the 2022 American College of Osteopathic Family Physicians of California Convention and Scientific Seminars (ACOFPCA'46), which took place on Saturday, July 30, 2022.

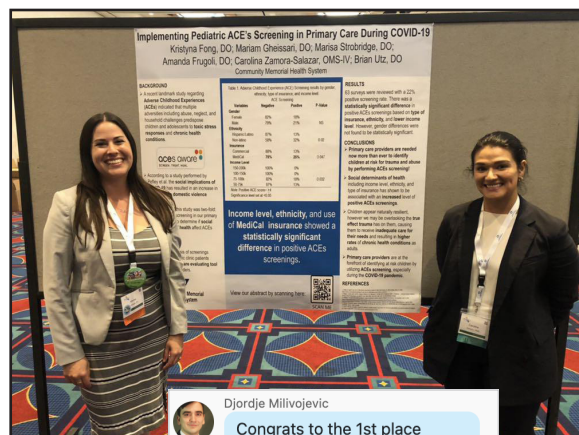
Abstracts submitted by students and residents for the poster competition were judged, and the first - second - and third-place winners are designated below.

To enhance the readability of this special feature, abstracts have been edited for basic style only. The content has not been modified; the information provided reflects information that the primary author, including professional degrees and affiliations, submitted.

Neither the ACOFPCA nor the JOFP-CA assumes responsibility for the content of these abstracts.

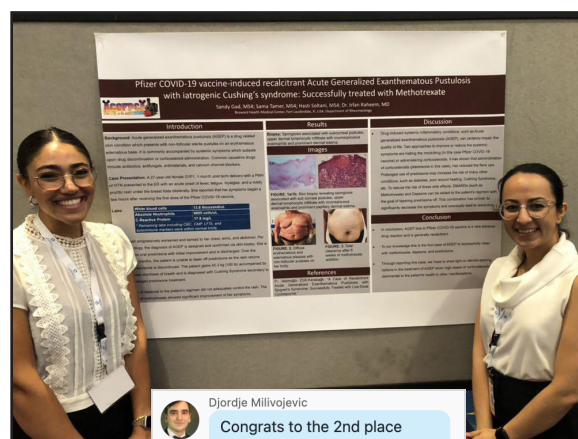
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FIRST PLACE WINNER



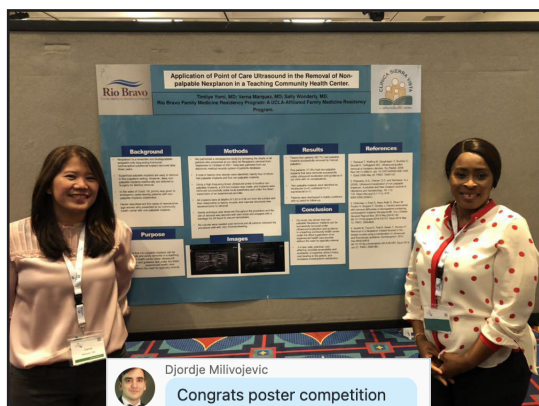
 Djordje Milivojevic
Congrats to the 1st place poster competition award winners!

SECOND PLACE WINNER

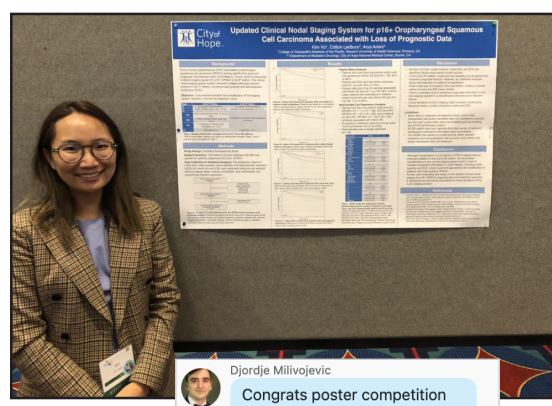


 Djordje Milivojevic
Congrats to the 2nd place award winners of this year's poster competition!

THIRD PLACE WINNERS



 Djordje Milivojevic
Congrats poster competition award winners tied for 3rd place!



 Djordje Milivojevic
Congrats poster competition award winner tied for 3rd place!



1st place winner in ACOFPCA'46 Poster Competition

Implementing Pediatric ACE's Screening in Primary Care During COVID-19

Kristyna Fong, DO¹; Mariam Gheissari, DO¹; Marisa Strobbridge, DO¹; Amanda Frugoli, DO¹; Carolina Zamora Salazar, OMS¹; Brian Utz, DO¹

¹Community Memorial Health System, Ventura, CA

Background: A recent landmark study regarding Adverse Childhood Experiences (ACEs) indicated that multiple adversities, including abuse, neglect, and household challenges, predispose children and adolescents to toxic stress responses and chronic health conditions. According to a study performed by Pefley et al., the social implications of COVID-19 have resulted in an increase in phone calls to domestic violence hotlines. The purpose of this study was twofold: to increase ACEs screening in our primary care office and to determine if social determinants of health affect ACEs scores.

Methods: Retrospective analysis of screenings performed on pediatric clinic patients utilizing the ACEs Aware evaluating tool by primary care providers. Income level, ethnicity, and use of MediCal insurance showed a statistically significant difference in positive ACEs screenings.

Results: 63 surveys were reviewed with a 22% positive screening rate. There was a statistically significant difference in positive ACEs screenings based on the type of insurance, ethnicity, and lower income level. However, gender differences were not found to be statistically significant.

Conclusion: Primary care providers are needed now more than ever to identify children at risk for trauma and abuse by performing ACEs screening. Social determinants of health, including income level, ethnicity, and type of insurance, has shown to be associated with an increased level of positive ACEs screenings. Children appear naturally resilient; however, we may be overlooking the true effect trauma has on them, causing them to receive inadequate care for their needs and resulting in higher rates of chronic health conditions as adults. Primary care providers are at the forefront of identifying at-risk children by utilizing ACEs screening, especially during the COVID-19 pandemic.

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Support – Dr. Graal Diaz

Ethical Approval – NA

Informed consent – N/A



2nd place winner in ACOFPCA'46 Poster Competition

Pfizer COVID-19 Vaccine-induced Recalcitrant Acute Generalized Exanthematous Pustulosis with Latrogenic Cushing's Syndrome: Successfully Treated with Methotrexate

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Background: Acute generalized exanthematous pustulosis (AGEP) is a drug-related skin condition that presents with non-follicular sterile pustules on an erythematous, edematous base. It is commonly accompanied by systemic symptoms which subside upon drug discontinuation or corticosteroid administration. Common causative drugs include antibiotics, antifungals, antimalarials, and calcium channel blockers.

Case Presentation: A 27-year-old female G1P1, 1-month post-term delivery with a past medical history of hypertension presented to the emergency room with an acute onset of fever, fatigue, myalgias, and a mildly pruritic rash under the breast folds bilaterally. She reported that her symptoms began a few hours after receiving the first dose of the Pfizer COVID-19 vaccine. The rash progressively worsened and spread to her chest, arms, and abdomen. Per dermatology, the diagnosis of Acute Generalized Exanthematous Pustulosis (AGEP) is assigned and confirmed via skin biopsy. She started on oral

prednisone with initial improvement and is discharged. Over the following months, the patient is unable to taper off prednisone as the rash returns when prednisone is discontinued. The patient gains 45.3 kg (100 lbs) accompanied by new onset shortness of breath and is diagnosed with Cushing's Syndrome secondary to the prolonged prednisone treatment. The addition of dapson to the patient's regimen did not adequately control the rash. The addition of methotrexate showed significant improvement in her symptoms.

Discussion: Drug-induced systemic inflammatory conditions, such as AGEF, can certainly impair the quality of life. Two approaches to improve or reduce systemic symptoms are halting the insult/drug (in this case, Pfizer COVID-19 vaccine) or administering corticosteroids. It has shown that the administration of corticosteroids (prednisone in this case) has reduced the flare-ups. Prolonged use of prednisone may increase the risk of many other conditions, such as diabetes, poor wound healing, Cushing Syndrome, etc. To reduce the risk of these side effects, Disease-Modifying Antirheumatic Drugs (DMARDs) and Dapsone can be added to the patient's regimen with the goal of tapering off prednisone. This combination has proven to significantly decrease the symptoms and lead to resolution.

Conclusion: AGEF, due to the Pfizer COVID-19 vaccine, is a rare adverse drug reaction and is generally recalcitrant. To our knowledge, this is the first case of AGEF to successfully clear with methotrexate, dapson, and prednisone. Through reporting this case, we hope to shed light on steroid-sparing options in the treatment of AGEF when high doses of corticosteroids are detrimental to the patient's health in other manifestations.

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Tied for 3rd place in ACOFPCA'46 Poster Competition



Application of Point of Care Ultrasound in the Removal of Non-palpable Nexplanon in a Teaching Community Health Center

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Background: Nexplanon is a reversible non-biodegradable progestin-only long-acting hormonal contraceptive subdermal implant removed after three years. Superficial palpable implants are easy to remove in the outpatient setting. However, deep non-palpable implants are traditionally referred to surgery for elective removal. In the wake of Covid -19, priority was given to emergency cases leaving patients with non-palpable implants unattended. Herein described are five cases of reproductive-age women who presented at our community health center with non-palpable implants.

Purpose: To show that non-palpable implants can be successfully and safely removed in a teaching community health center under ultrasound localization and guidance and under the direct supervision of an experienced healthcare provider without needing specialty referral.

Methods: We performed a retrospective study by reviewing the charts of all patients who presented at our clinic for Nexplanon removal from September to October 2021. Data was gathered from our electronic medical records system of patients database. Twenty-nine women were identified, twenty-four of whom had palpable implants and five non-palpable implants. Using a high-frequency linear ultrasound probe to localize non-palpable implants, a 3-5 mm incision was made, and implants were removed successfully under local anesthesia and under the direct supervision of an experienced provider. All implants were at depths of 0.22 to 0.56 cm from the surface, and their relationship to fascia, muscle, and vascular structures was assessed prior to removal. Sterile technique was observed throughout the procedure, and the site of removal was secured with steri strips and wrapped with a bandage for 24 hours to secure hemostasis. No sutures were needed post-removal, and all patients tolerated the procedure well, with very minimal bleeding.

Results: Twenty-four patients (82.7%) had palpable implants successfully removed by manual palpation. Five patients (17.3%) had non-palpable implants that were removed successfully under ultrasound localization and guidance in our clinic with no complications. Non-palpable implants were identified as intrafascial (n=3); subfascial (n=1); suprafascial (n=1). Patients were discharged in stable conditions with no need for follow-up.

Conclusion: Our study has shown that non-palpable Nexplanon implants can be successfully removed under ultrasound localization and guidance in a teaching community health center under the direct supervision of an experienced healthcare provider without the need for specialty referral. It is fast, safe, practical, and cost-effective, provides accessibility and availability of expertise without heavy cost bearing to the patient, and increases overall patient satisfaction.

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Support: None

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Informed Consent: Obtained from all participants.

Tied for 3rd place in ACOFPCA'46 Poster Competition



Updated Clinical Nodal Staging System For p16+ Oropharyngeal Squamous Cell Carcinoma Associated with Loss Of Prognostic Data

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Background: Due to human papillomavirus (HPV) associated oropharyngeal squamous cell carcinoma (OPSCC) having significantly improved prognosis, the American Joint Committee on Cancer (AJCC) introduced a distinct staging system for p16+ OPSCC in its 8th edition. The clinical nodal staging system removed

multiple pathologic factors present in the 7th edition, including nodal quantity and extracapsular extension (ECE). We aimed to characterize whether the simplification of the staging system resulted in the loss of prognostic value.

Methods: The National Cancer Database (NCDB) was queried for patients diagnosed with p16+ OPSCC. Patients with no staging information, metastatic disease, who did not receive definitive surgery or radiation, or who had unknown follow-up were excluded. The prognostic impact of nodal size, nodal quantity, nodal laterality, and ECE on overall survival (OS) was assessed using survival analysis with the Kaplan-Meier method, univariable, and multivariable Cox proportional hazards regression. A total of 21,868 patients from the NCDB met the inclusion and exclusion criteria. Patients included in the study have p16+ oropharyngeal cancer with positive nodal invasion and without metastatic disease. Patients with unknown staging information, metastatic disease, without definitive surgery or radiation, and unknown follow-up were excluded from the study.

Results: A total of 21,868 patients met the inclusion criteria. On Kaplan Meier analysis, patients with more than one positive lymph node had significantly inferior OS ($p < 0.001$; r OS: 82% vs. 86%). Patients with ECE also had inferior outcomes ($p < 0.001$; 5-yr OS: 82% vs. 75%). A large nodal size of > 6 cm was also associated with inferior OS ($p < 0.001$; 5-yr OS: 66% vs. 82%). Lastly, patients with contralateral or bilateral nodal involvement also had inferior OS ($p < 0.001$; 5-yr OS: 71% vs. 84%). On multivariable Cox regression, having more than one positive node ($p < 0.001$; HR [95% CI]: 1.17 [1.07-1.28]), ECE ($p < 0.001$; HR [95% CI]: 1.20 [1.04-1.38]), and a node > 6 cm ($p < 0.001$; HR [95% CI]: 1.52 [1.30-1.79]) remained associated with inferior OS. Node laterality was no longer significant ($p = 1.00$).

Conclusion: Although the incorporation of p16 status in OPSCC staging was an important addition to the AJCC 8th edition, the associated simplifications in the current staging system result in the loss of valuable prognostic information in nodal staging, including nodal quantity and ECE, which could limit appropriate risk stratification of patients with node-positive OPSCC. Further work evaluating the impact of the updated clinical nodal staging for p16+ OPSCC prognostication and treatment selection is warranted and should be considered for future iterations of the AJCC staging system.

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A Cry-o for Hepatitis C Treatment: A Rare Case of Mixed Cryoglobulinemia Related to Untreated Hepatitis C

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Background: Cryoglobulinemia is characterized by nonspecific symptoms that can present with skin, renal, pulmonary, or cardiac involvement. Mixed cryoglobulinemia (Type II/III) is frequently associated with hepatic C virus infection in about two third of cases. The diagnosis is challenging due to variability in clinical presentation. However, it is a treatable disease that can be managed in the primary care setting.

Case Report: In this case vignette, we describe a 51-year-old woman with a history of methamphetamine drug use, untreated Hepatitis C, and diastolic heart failure who presented with fluid overload, abnormal kidney function, and a pruritic, violaceous bilateral lower extremity rash. The patient demonstrated low C3 and C4 complement levels and microscopic hematuria concerning for membranoproliferative glomerulonephritis. Other causes of immune-mediated vasculitis were excluded. A renal biopsy demonstrated rare active crescentic injury consistent with cryoglobulinemic glomerulonephritis. Rare active crescentic injury and cryoglobulin deposits of IgG and IgM complexes were detected in glomeruli.

Treatment: Hospital course consisted of furosemide, intravenous steroids, plasmapheresis, and rituximab, after which the patient's rash and renal function improved. The patient was successfully cured with undetectable hepatitis C RNA viral load after the completion of sofosbuvir/velpatasvir. This is an atypical presentation of mixed cryoglobulinemia as the classic skin finding of non-palpable purpura is usually found in type I cryoglobulinemia. Early recognition of this disease is critical as it can resolve with prompt treatment of hepatitis C, which can now be managed effectively in the outpatient setting.

Conclusion: It is crucial for primary care physicians to recognize the features of this disease, as delays in treatment can result in significant end-organ damage. New treatment regimens are available for hepatitis C, which targets the underlying pathology in mixed cryoglobulinemia and can allow for curative treatments. In future presentations similar to this case, a less invasive diagnostic method of a skin biopsy could have been attempted.

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Informed Consent: Verbal consent given.

Feel the Burn

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Background: Liposuction is the most popular cosmetic procedure. It is added as an adjunct to many standard surgical procedures. Additional technology is being integrated to target skin laxity and rhydes which are not readily treated with liposuction. J-Plasma/Renuvion devices and previously developed BodyTite, incorporate the proprietary utilization of helium gas under the skin in subdermal applications for skin tightening. In this case vignette, we describe an unusual complication of thermal injury.

Case Presentation: A 37-year-old African American female with chronic anemia, hypertension, hyperlipidemia, and depression presented with a five-day history of waxing/waning fevers and erythema on her abdomen that began shortly after undergoing a liposculpture procedure involving J-Plasma technology.

Crepitus was palpated over the sternum, flanks, abdomen, and lower back. Presence of a discolored, warm, and tender area of induration with erythema in the right upper abdomen. Two surgical entry incisions were noted in the pelvis bilaterally, with one 2-3 cm irregularly shaped skin lesion noted in the mid back.

Further evaluation with computerized tomography (CT) scan demonstrated postsurgical changes along the abdominal wall with increased fluid density/edema and a moderate amount of subcutaneous emphysema. She was started on intravenous ceftriaxone and vancomycin for suspected cellulitis but demonstrated clinical worsening of pain and erythema with persistently normal WBC and procalcitonin despite antibiotic therapy. Infectious disease and general surgery were consulted. A repeat CT scan excluded the development of an abscess or fluid collection. Differential diagnosis was expanded to include thermal injury, and antibiotics were subsequently de-escalated to levofloxacin and doxycycline. Topical treatment using silver sulfadiazine was added, and she was discharged with clinical improvement in her symptoms. By her six-month follow-up, she had received further outpatient treatments, including multiple rounds of infrared light therapy and lymphatic massage techniques, with significant clinical improvement but with some residual hyperpigmentation.

Discussion: Thermal injuries have been an extremely rare finding in patients undergoing cosmetic procedures. Treatments targeting skin laxity and rhydes may confer a higher risk for thermal injuries. It is important to note that presentations can mimic cellulitis or surgical site infection.

Conclusion: Early recognition and treatment are important to improve cosmetic outcomes. Our patient significantly improved her thermal injury with topical silver sulfadiazine, infrared light therapy, and lymphatic massage techniques. However, she did have some persistence in hyperpigmentation. We present this case to increase awareness of this rare complication.

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Ethical Approval: N/A

Informed Consent: Patient consent was obtained.

Impact of COVID-19 pandemic on non-COVID Related Lung Transplants

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Background: Since its onset, SARS-CoV-2 (COVID-19) has swept the nation with its profound impact on the medical community, prompting U.S. health officials to declare a mandatory quarantine period. While extensive research has been done on the pathology and disease process of COVID-19, a gap exists in understanding the impact the disease had on other pulmonary disorders. With limited resources and decreased hospital admittance, patients with critical lung diseases may not have received the necessary care. To understand the impact of the disease on lung transplants, we analyzed waitlist additions and transplants performed.

Methods: We used the Organ Procurement and Transplantation Network (OPTN) data from 2017-2022. The years were split from pre-COVID (2017-2019) to COVID years (2020-2022), and averages were compared. The data was analyzed using the patient-listed diagnosis using EXCEL.

Results: In waitlist additions, lung transplants dropped 8.10%, and in transplants performed, there was a 1.25% drop. The top 3 diagnoses for waitlist additions in pre-COVID years were idiopathic pulmonary fibrosis, COPD/Emphysema, and cystic fibrosis; these three diagnoses made up 61% of all U.S. lung waitlist additions. During COVID years, cystic fibrosis waitlist additions dropped 79.2%, while COPD/Emphysema dropped 26.3%, both statistically significant. Idiopathic pulmonary fibrosis waitlist additions, however, remained virtually unchanged.

Conclusion: Percentages suggest COVID had a significant impact on waitlist addition for lung transplants rather than transplants performed (8.10% vs. 1.25%), indicating patients were not being added to the waitlist. The biggest drop in waitlist additions came from COPD/Emphysema and cystic fibrosis diagnoses.

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Financial Disclosures: The authors have no financial interests to disclose.

Support: N/A

Ethical Approval: N/A

Informed Consent: N/A

Pilot Study: Barriers to HbA1c Testing at a Federally Qualified Health Center

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Background: COVID-19 has impacted healthcare globally, challenging the ability of diabetic patients to self-manage their condition. This observational study focuses on addressing the effect of the COVID-19 pandemic on HbA1c testing rates by investigating social determinants of health like health literacy (HL) and transportation barriers.

By February 2022, through the administration of a short ten-question survey, the study aimed to identify two barriers to HbA1c testing that hindered patients at the Omni Health Gettysburg Clinic in Fresno County from completing their required annual HbA1c testing. Identifying these barriers will provide areas for future interventions in patient education regimens and other procedures to increase HbA1c testing by 20% at Omni.

Methods: To identify patient barriers regarding diabetes management, we conducted a ten-question survey designed at the 5th-grade reading level and crafted it using a 5-point Likert scale. The impact of the COVID-19 pandemic was assessed using the number of missed appointments and missed medication doses (Questions 2,4,7). Effects of transportation on HbA1c testing were assessed by whether transportation played a role in missing appointments and mode of transportation (Questions 1,3,5).

HL was assessed using questions 8, 9, and 10. These questions were analyzed based on the numerical value assigned to the available answer choices. For questions 8 and 9, „All of the time” was given a numerical value of 1, and „None of the time” was given a value of 5. For question 10, „None of the time” was given a numerical value of 1, and „All of the time” was given a numerical value of 5. A lower value correlated to Inadequate/Marginal HL, with patients scoring 1 or 2 at the most risk of low HL. These questions were adopted from Chew *et al.*¹

Medical students surveyed patients over the phone at variable days and times of the week. Patients were asked to confirm their name and DOB and provide verbal informed consent before the survey. Patients who refused to take the survey were not contacted again. Patients who did not respond were called two more times (a total of three times) in an attempt to collect data.

Results: Our pilot study showed that transportation did not pose a barrier, but HL proved to be a cause of concern. Out of a sample size of 7:

- Survey Completion rate: 28%
- Six patients did not feel confident filling out health forms on their own
- Three patients had a family member/hospital worker help them fill out health forms.
- Five patients reported that they missed taking 1+ doses of their medications in the past month.
- No patients reported difficulty understanding written information. Patients reporting difficulty filling out forms independently and needing assistance scored 1 or 2 on questions 8 and 10. Two of the three patients who needed help filling out their forms also did not feel confident filling out these forms independently. As a result, 6 out of 7 patients surveyed fall within the inadequate/marginal HL category, with 2 of these patients displaying the lowest HL as they had low scores on both questions 8 and 9. Additionally, these six patients

showed low adherence rates to HbA1c testing (did not schedule an appointment within the last six months), as well as abnormal HbA1c levels (>7%). Only one patient displayed adequate HL but was still categorized as having a low HbA1C compliance rate.

Conclusion: HL was a major social determinant of health that impacted HbA1c testing rates. While the COVID-19 pandemic may have contributed to this finding, the study does not directly confirm this contribution. Additionally, results showed that transportation did not pose a barrier to HbA1c testing rates as the majority had access to their own transportation with their own vehicle.

The assessment of HL using this survey has its limitations. The questions and the scoring process are not validated tools for assessing HL. Thus, the accuracy of the stratification of patients into different HL levels through this survey should be considered. A potential improvement to this survey would be to have the patients undergo assessment through a validated tool like the Test of Functional Health Literacy in Adults (TOFHLA).

The authors acknowledge that the study has low power due to the small sample size (n=7). Additionally, the day of the week and the time of day at which survey collection was done could have substantially impacted the completion rate (i.e., calling on the weekend vs. weekday might have yielded a higher completion rate). These offer avenues for improvement in future iterations of the study.

For future interventions, the study may benefit from streamlining the time of surveying the patients involved in this study. Furthermore, patients who suffer from barriers to HL and transportation may benefit from educational material like HbA1c brochures and increased follow-up from the FQHC.

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Informed Consent: N/A

2022 Student Writing Awards

ACOFPC-CA is excited to announce the winners of the first and second-place ACOFPC-CA 2022 Student Writing Awards on the COVID-19 pandemic's effect on mental health in primary care.



In first place, we have Mandy Helle, OMS (California Health Sciences University College of Osteopathic Medicine – Class of 2025), whose submission “Screening for Loneliness in Older Adults: A Way to Better Address Mental Health in Primary Care Since the COVID-19 Pandemic” was an outstanding example of thoughtfulness and research. Ms. Helle will be awarded a \$500 prize, and ACOFPC-CA will publish her essay in the 2023 issue of JOFPC-CA.



In second place, we have Kelvin V. Luu, OMS (Touro University California College of Medicine – Class of 2025), whose submission “Mental Health and the Impacts of Connection in the COVID-19 Pandemic” was also an outstanding example of a clear and well-written examination of the mental health impact of COVID-19. Mr. Luu will be awarded a \$250 prize.

Congratulations to both winners on their exceptional work, and thanks to all students who submitted entries. The quality of submissions was impressive, and the ACOFPCA Scholarship committee was honored to read and consider them. The topic of the pandemic's effect on mental health in primary care is of great importance, and we hope that the insights shared in these submissions will contribute to the ongoing effort to address the mental health needs of our patients.

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Attention medical students and residents!

The countdown is on! Take advantage of the chance to compete in the ACOFPCA'47 Poster Competition and showcase your original research and case reports to peers and experts in the field.

This competition is open to all current ACOFPCA member medical students and family medicine residents, and it's an opportunity you want to take advantage of - the top three posters will win cash prizes of \$500, \$250, and \$100. And all submitted poster abstracts will be featured in JOFPCA, the official peer-reviewed journal of ACOFPCA.

If you're not a member, don't worry - membership is complimentary. Sign up at acofpca.org.

This is your chance to showcase your scientific research and clinical expertise at the ACOFPCA'47 Poster Competition. Register now and get started on preparing your winning poster.

Don't wait any longer! The deadline for submitting your abstract is May 15, 2023.

For more information, call or email Mark Shiu, DO, FCOFP, at academicchair@acofpca.org or 800-379-9292.

**View Instructions, Judging Criteria, and Submit Your Application
for the ACOFPCA'47 Poster Competition at ACOFPCA.org**



College Updates



Hello everyone! My name is Mandy Helle, OMS-II and the ACOFP founding president at California Health Sciences University! Our ACOFP chapter just had our one-year birthday, and we have had a tremendous founding year!

We started 2022 by having a panel of family medicine faculty talk to students about why they chose family medicine and describe a typical day in their life. Then, at the end of the spring semester, we partnered with SAAO and hosted a “Solve the Case” event where students got to practice taking a history and decide which OMT techniques would be best in the clinical scenario.

At the beginning of the new school year, we hosted a family medicine bingo for the first years to learn about the enormous

scope of care within the family medicine field. During the fall semester, our chapter also started volunteering monthly with MMI in Fresno to sort and package medical supplies for the organization to send on their mission trips.

We are proud of the growth of our chapter in just one year, from 0 members to now just under 100 members! We have exciting plans for future events, including a resident panel and a talk about incorporating psychiatry into a family medicine practice! We are also working with the Lavendar Alliance club at our school to give students more training with LGBTQIA+ standardized patient encounters before starting clinical rotations. We are excited for the year to come and to see how much more our chapter will grow!



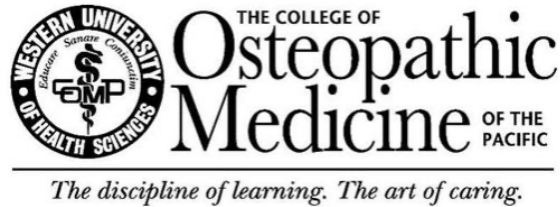
This is Luan Nguyen, OMS-III, from Touro University California, with our updates. We started off the school year with Clubs Day, where we had over 40 new students signed up to be members of our organization. We also hosted multiple events to promote family medicine to our OMS-I and OMS-II students.

The first event was “Osteopathic Manipulative Medicine (OMM) in a Primary Care Setting.” We had Dr. Sebastian Groot from John Muir Health speak with students about how he utilizes OMM in his family practice. He also demonstrated how he integrates osteopathic structural exams into a normal physical exam for his patients. The event offered a unique opportunity for us to see how the techniques that we spent hours in the lab practicing could be utilized in practice.

Another big event that we hosted was the “Primary Care Summit.” Primary Care Summit is an annual event organized together by SA-ACOF, Internal Medicine Club, Ob/Gyn

Club, and Pediatrics Club at our university. The objective is to advocate and promote primary care to medical students. This year, we were able to host over 60 students and six physicians from those four specialties. During the Q&A portion, our guest physicians offered their insights about the opportunities that primary care offers and the challenges that they faced in their practice. They also shared their thoughts about how we, as medical students, could advance and advocate for osteopathic medicine in our future practice.

Our chapter has also collaborated with another organization on campus, Osteopathic Physicians and Surgeons of California, to promote osteopathic medicine to local undergraduate schools. We worked together on outreach events where we presented about the unique aspects of our field and answered questions that prospective students may have. We hope to further promote osteopathic medicine and, specifically, family medicine to our students and our community.



Hi everyone! This is Peter from WesternU COMP in Pomona, CA. 2022 was an exciting year for our student ACOFP chapter, and I would love to share some of the highlights with you.

Our mission is to help COMP students explore family medicine and all the possibilities this field can offer, and one of the main ways we accomplished this was through our guest speaker series. Each month, we invited a family medicine physician to speak to our chapter about how they pursued their passion in this specialty and where it led them: sports medicine, LGBTQ+ health, rural medicine, family medicine as a hospitalist – the list goes on! These talks were especially valuable because our speakers always went beyond telling stories and giving advice about the profession – in keeping with the true DO spirit, they also shared wisdom on how to take care of ourselves and stay aligned with our values.

In the summer, about 30 students from our chapter attended the ACOFPCA46 Student-Resident Forum at the Disneyland Hotel. The day was filled with engaging lectures, procedure workshops, and opportunities to connect with residents, and we are so grateful to ACOFPCA for organizing this event.

We can't wait for ACOFPCA47!

The fall semester was busy as well. We had more than 50 new members join our chapter during our school's club week, and we want to keep this growth rate going! As COVID restrictions lighten up, we will have more opportunities to hold in-person events. We kicked off 2023 with an "OMM in Primary Care" workshop with one of our faculty, Dr. David Redding, and about 40 students came to learn how OMT might lower blood sugar levels in diabetic patients!

In February, we will host a Primary Care Banquet where COMP students can connect with physicians in family medicine, sports medicine, OB/Gyn, pediatrics, and OMM/ NMM to learn more about these specialties. Then our new 2023 student board (who have just been elected!) will transition in to take our chapter to even greater heights. They are incredibly passionate about partnering with other clubs to hold health fairs and free clinics in the community, and we are so excited to see what they accomplish!

2023 Call for Papers



The *Journal of the Osteopathic Family Physicians of California* is the ACOFP-CA's official peer-reviewed journal. The bi-monthly publication features clinical images and articles about preventive medicine, managed care, osteopathic principles and practices, pain management, public health, medical education, and practice management.

Submissions

Submit your article for peer review consideration at acofpca.org/page/submissions. Articles must be original in nature and may not be published in any other periodical. Materials for publication should be of clinical or didactic interest to osteopathic family physicians. Any reference to statistics and/or studies must be footnoted. Material by another author must be in quotations and receive appropriate attribution. ACOFP-CA reserves the right to edit all submissions. Visit acofpca.org to view author guidelines and policies.

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