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Medical Students – Clinical Vignette Podium Presentations
Corynebacterium Urealyticum: A Urinary Tract Infection with Serious Complications

First Author: Jessica Costales, MBS; Additional Authors: Phillip Napolitan, DO; Brian Hu, MD; Sharon Wang, DO; Affiliations: Western University, Arrowhead Regional Medical Center, Loma Linda University

**Introduction:** Corynebacterium urealyticum is an organism associated with a rare chronic urinary tract infection (UTI) that can cause calcification and encrustation of the urinary tract. These sequelae can lead to significant long-term morbidity.

**Case Description:** This case involves a 50-year-old man who is Foley-catheter dependent due to urinary retention from presumed benign prostatic hypertrophy. At his first visit over one year ago, he presented with a poorly draining Foley catheter and pelvic pain. Urinalysis demonstrated a pH of 8.4, pyuria, and triple phosphate stones. He was treated with empiric ceftriaxone for UTI. Culture later grew Corynebacterium spp. Subsequently, the patient had multiple emergency room visits for continued urinary catheter malfunction, requiring catheter exchange. At one visit, he was found to have acute kidney injury, a left obstructing kidney stone, and was admitted. Urinalysis showed high pH and triple phosphates, and urine culture grew Corynebacterium spp. He was treated with cefepime and a left nephrostomy tube was placed. A computed tomography scan of the abdomen and pelvis showed a left renal stone and calcified prostate.

One month later, the patient was readmitted for persistent hematuria and pelvic pain. Urine culture again grew Corynebacterium spp, susceptible to vancomycin, but resistant to erythromycin, clindamycin, penicillin, ampicillin, and TMP-SMX. Repeat CT scan demonstrated a progressively calcified prostate, enlarging left renal staghorn calculus with hydronephrosis, and diffuse thickening of the urinary bladder wall. The infectious disease service was consulted, and the diagnosis of encrusted cystitis and pyelitis caused by Corynebacterium urealyticum was made. Due to concomitant renal failure, the patient was placed on six weeks of daptomycin, and followed up Urology for definitive surgical intervention of the staghorn stones.

**Discussion:** Corynebacterium urealyticum is a multi-drug resistant gram-positive rod with noted urease activity. At risk for infection are patients with immunosuppression and existing lesions or trauma to the urothelium. Once in the urinary tract, its urease activity causes marked urine alkalization. This leads to urine saturation with struvite and calcium phosphate, resulting in encrusted cystitis and pyelitis. Successful treatment requires use of glycopeptide antibiotics (e.g. vancomycin), urine acidification, and surgical removal of calcifications.

This case illustrates the serious complications that can arise from chronic infection with C. urealyticum. Here, there was persistence of the pathogen on multiple cultures, causing rapid progression of urinary tract calcification and concomitant renal failure. It is of paramount importance for clinicians to be aware of this rare cause of UTI in order to avoid delay in diagnosis, administer the appropriate treatment, and prevent significant long-term morbidity.
West Nile Virus Induces Dancing Eye Syndrome

Mengjie Wu, Angene Johnson, David Patterson, Rachel Groff

Case presentation: A 41-year-old gentleman with history of spinal trauma status post several spinal surgeries and chronic arachnoiditis presented to the emergency department reporting vertigo, generalized weakness, headache, and fever developing over the past two days. On exam he was alert and oriented, with irregularly irregular tachycardia, tachypnea, and a temperature of 39.2°C. Additionally, he was noted to have pronounced truncal ataxia and multidirectional saccadic eye movements. There were no changes in sensation or strength, and no meningismus or rash. Initial labs were unremarkable. ECG indicated new onset of atrial fibrillation. MRI of the brain and spine was notable for spinal fluid collections consistent with his previous studies without new abnormality. Based on this presentation, the diagnosis of opsoclonus myoclonus syndrome was made and levetiracetam was initiated for symptom management. The investigation for an underlying etiology was initially complicated by inability to obtain CSF. As a result, he was treated empirically for meningitis with a ten day course of ceftriaxone and acyclovir. A serum paraneoplastic panel and PET CT was unrevealing for malignancy. Viral studies ultimately demonstrated West Nile Virus (WNV) infection, with positive serum WNV IgG and IgM. The patient underwent successful cardioversion for his new atrial fibrillation and was treated with 2g/kg IVIG, which was administered over the course of three days; steroids were withheld due to concern for ongoing infection. The patient experienced significant improvement in his disabling symptoms a month later.

Discussion: There have been nearly 44,000 cases of West Nile Virus (WNV) reported in the United States since 1991. Only a quarter of those infected develop symptoms, typically presenting with fever, headache, myalgias, and rash. About 1% develop neuroinvasive disease, characterized by encephalitis, meningitis, and flaccid paralysis. WNV infection is rarely associated with myocarditis; this has only been described in a few case and autopsy reports. Opsoclonus myoclonus syndrome (OMS) is a rare condition with an estimated 1 case per 10 million population. The characteristic ataxia (dancing feet) and random horizontal and vertical saccades (dancing eyes) are thought to be due to autoimmune attack on omnipause neurons in the cerebellum. OMS most commonly presents in children with neuroblastoma but can also occur as a paraneoplastic or parainfectious syndrome in adults. Treatment typically includes IVIG or plasmapheresis with high dose steroids. There have been only 4 reported cases of OMS occurring in patients with WNV. Our patient represents an extremely rare case of WNV-associated OMS as well as cardiac involvement from WNV. As the incidence of WNV rises, it will be increasingly important to consider this in the differential for patients presenting with sepsis and unusual neurologic and cardiac findings.
First Author: Nicklaus Ashburn Co-Authors: Jessica Gerard, Ryan Hughes MD, Jessie Bowers MD, Abhishek Dutta MBBS

Introduction: Vitamin E deficiency is associated with malabsorption syndromes. Clinical features include spinocerebellar ataxia, areflexia, dysarthria, muscle weakness, and diminished sensation and proprioception. In this case we discuss a 64-year-old female with abdominal pain and neurologic deficits secondary to vitamin E deficiency.

Case Description: A 64-year-old female with alcohol abuse and chronic pancreatitis presented with six months of weight loss, abdominal pain, vomiting, progressive weakness, and new-onset slurred speech and confusion. Initial examination revealed an ill-appearing female with dysarthria and generalized weakness. Laboratory workup was unremarkable with a lipase of 113. CT and MRI of the brain showed no evidence of acute ischemia. Her neurological function continued to decline, and her follow-up examinations revealed decreased sensation, areflexia in the lower extremities, and dysmetria. She received thiamine, zinc, B12, folate, and a multivitamin without improvement. Cerebrospinal fluid analysis was normal and electromyography/nerve conduction studies (EMG/NCS) were consistent with chronic axonal sensorimotor polyneuropathy. Her multiple sclerosis profile, HIV, SSA, SSB, vitamin B6, urine porphyrins, urine heavy metals, and a paraneoplastic panel were within normal limits. However, her serum vitamin E was low at 2.8 mg/L (normal 5.7-19.9). Repeat EMG/NCS showed a severe sensory-predominant polyneuropathy. Vitamin E supplementation resulted in improved neurologic function and repeat vitamin E level was normal at 6.0 mg/L. At two months post-discharge, her strength, sensation, and coordination had improved, and she could stand with assistance.

Discussion: Vitamin E is a lipid-soluble antioxidant that prevents the peroxidation of polyunsaturated fatty acids. Chronic deficiency results in sensorimotor deficits consistent with spinocerebellar and posterior column degeneration, including ataxia, impaired proprioception, dysdiadochokinesia, dysarthria, paresthesias, and dystonia. Pes cavus, titubation, retinitis pigmentosa, and seizures also occur. Previous research associates vitamin E deficiency with malabsorption syndromes such as cystic fibrosis, cholestasis, primary biliary cirrhosis, small bowel resection, systemic sclerosis, abetalipoproteinemia, and Common Variable Immunodeficiency.

Diagnosis is ultimately clinical and largely based on a malabsorption history and exam consistent with spinocerebellar and posterior column deficits. Nerve conduction studies may show decreased sensory nerve action potentials, reduced compound muscle action potential, delayed F response, as well as delayed and prolonged motor conduction. Treatment consists of vitamin E replacement and correction of the underlying pathophysiology. Spinocerebellar symptoms often resolve within months of treatment while posterior column symptoms can persist for years. In conclusion, vitamin E deficiency is a potentially reversible condition that should be considered for patients with malabsorption and peripheral neurological deficits.
“Failure to Thrive” in the Elderly: C-ing Past the Fog

First Author: Neil Mistry Second Author: Avital O'Glasser, MD

**Introduction:** Failure to thrive (FTT) is defined as weight loss greater than five-percent, accompanied by decreased appetite, poor nutritional status, and physical inactivity[1]. This complex clinical entity represents a range of pathologies, with psychiatric and socioeconomic influences. And while post-operative spinal cord injury in the setting of cervical stenosis is described in the literature, it has seldom been associated with FTT.

**Case Description:** The patient is a 73-year old female with a past medical history of osteoarthritis and end-stage renal disease on dialysis. She underwent an umbilical hernia repair twelve days prior to admission, and was brought to the ER with C. difficile colitis. On presentation, she was hypotensive (83/61mmHg) and tachycardic (113bpm). Her laboratory studies demonstrated a leukocytosis (12.7K cu/mm) and hypoalbuminemia (2.7g/dL). She was bedridden and markedly cachectic with an eight-percent weight loss from one year ago. Her neurological exam demonstrated symmetric weakness below the neck with patellar and Achilles tendon hyperreflexia, ankle clonus, and decreased sensation in both feet and arms.

Just a few months earlier, she was independently performing all self-care activities including walking several miles daily. She described progressive numbness and weakness in all extremities beginning three months ago but worsening precipitously after her surgery and intubation perioperatively. Initial testing was unrevealing, including a CT scan of the chest and abdomen for malignancy, serum B12 for subacute spinal cord degeneration, ACTH stimulation for adrenal insufficiency, and thyroid panel for apathetic hyperthyroidism. She then underwent a cervical spine MRI that demonstrated severe spinal canal stenosis with spinal cord deformities at C6-C7. Orthopedic Surgery evaluated her and performed an anterior corpectomy and fusion. Post-operatively, she showed improvements in lower extremity strength and was discharged to a rehabilitation facility.

**Discussion:** Failure-to-thrive may not be perceived as an acute, reversible process but recognizing when further investigation is warranted can greatly impact patients. By clearly defining the acuity of our patient’s change in the context of her previously normal functional status, we prioritized FTT during her admission and reached a diagnosis rather than discharging her after treating her C.difficile colitis. This case also highlights the importance of a detailed functional status assessment and neuromuscular ROS during a pre-operative evaluation. We suspect that she was symptomatic with cervical myelopathy prior to her hernia repair, but worsened quickly following intubation. Failure to identify and explore her frailty during pre-operative evaluation left her to carry an unrecognized and thus unmitigated risk into surgery.

The Yellow Mask: A Case of Obstructive Jaundice Disguising Diffuse Large B Cell Lymphoma

First Author: Lindsey Snyder Second Author: Curtis Mirkes, DO, FACP

**Introduction:** Primary non-Hodgkin’s lymphoma (NHL) of the bile ducts is very uncommon such that only about 1-2% of patients with malignant biliary strictures are diagnosed with NHL. Jaundice is typically a late manifestation of NHL, however it rarely can be the presenting symptom. Therefore, physicians must maintain a broad differential diagnosis for patients who present with symptoms of biliary obstruction particularly in patients with underlying HIV.

**Case:** A 61-year-old man with a 12 year history of HIV, well controlled on antiretroviral therapy with an undetectable HIV viral load and most recent CD4 count of 846, presented to the emergency department with a several day history of epigastric pain, nausea, post-prandial emesis, an unintentional 10 pound weight loss, and associated symptoms of biliary obstruction including pale stools, dark urine, diffuse pruritis, and jaundice. On presentation, he was afebrile with normal blood pressure and pulse. He had scleral icterus, epigastric and RUQ tenderness, and diffuse jaundice. There were no palpable lymph nodes. His initial lab work revealed a total bilirubin of 7, AST of 165 and ALT of 488, alkaline phosphatase of 123, and an elevated CA 19-9 of 149. Imaging with ultrasound and CT demonstrated intrahepatic and extrahepatic biliary dilatation, gallbladder sludge, and pericholecystic fluid. Due to suspicion of choledocholithiasis, ERCP was performed which revealed a stricture at the bifurcation of the right and left hepatic ducts without evidence of stones. A stent was placed along the major biliary stricture and brush biopsies obtained demonstrated primary bile duct large cell lymphoma with a high Ki-67 of 90%.

**Discussion:** Less than 1% of patients with lymphoma initially present with obstructive jaundice rather than the classic B-symptoms. Because of the rarity of bile duct lymphoma, it is often overlooked and not included in the differential for biliary obstruction. The diagnosis can be further obscured since cholangiocarcinoma can mimic bile duct lymphoma in endoscopic and radiologic appearance. Accurately distinguishing between these two diseases is crucial as the treatments are vastly different as one involves surgical resection and the other involves chemotherapy. Furthermore, although 10% of patients with HIV who develop a malignancy will acquire NHL, it is extremely uncommon for the lymphoma to arise from the bile ducts. This case is unique since it occurred in a HIV patient with an undetectable viral load. Although antiretroviral therapy may decrease the incidence rate, it does not completely eliminate the risk of lymphoma, suggesting that a patient’s cumulative viremia may play a role in the development of this disease.
Medical Students – Clinical Vignette Poster Finalists
Secondary Hyperaldosteronism Due to Wegener’s Granulomatosis of the Kidney

First Author: Michael A Landolfi Richa Sharma Dr. Waseem Allabban Dr. Mohamad Horani Dr. Mahmood Shahlapour

Secondary hyperaldosteronism is known to be caused by different etiologies resulting in reduced blood flow to the kidneys, such as: renal artery stenosis and heart failure. Other risk factors include hypertension and alcohol abuse. Little is known, however, of the association between Wegener’s Granulomatosis and secondary hyperaldosteronism. The vagueness of the initial presentation makes this diagnosis one that is difficult to establish. The key features include muscle weakness, fatigue, and hypertension with possible blurring of vision. This condition can occur across all ethnicities, and is seen in higher incidences with elderly women.

We present a 61-year-old female with secondary hyperaldosteronism, catalyzed by a pre-existing Wegener’s Granulomatosis. She has a past medical history of hypertension, acute congestive heart failure, and deep vein thrombosis. The patient initially presents with an abrupt sensation of numbness and tingling in her lower extremities, which later progressed to her upper extremities. She also had a recent episode of sinusitis. A renal biopsy reveals Wegener’s Granulomatosis, in combination with pauci-immune glomerulonephritis. Six months later, the patient returns with an altered mental status, headache, mydriasis, hypertension, and gurgling breathing. The patient is unarousable and has a seizure-like episode upon admission, consequently requiring intubation. She is diagnosed with PRES Syndrome. Her CT and CXR are unremarkable. The MRI displays multifocal areas of cortical and subcortical regions and abnormal FLAIR signal, which represents a reversible encephalopathy syndrome. Her lab findings are significant for: few WBC’s on LP, serum aldosterone 45.3ng/dl, renin 2.0ng/dl/hr, potassium 2.5 mmol/l, lactic acid 2.3 mmol/l, consistent with lactic acidosis followed by metabolic acidosis and fevers. Soon after, the patient develops worsening anemia with positive guaiac stool and weakness of her extremity, followed by an increase in renin of 3.6ng/dl/hr. Infectious causes are ruled out.

The patient’s high renin levels are not suppressed enough to suggest primary hyperaldosteronism, supporting elevated renin secondary to renal injury. The necrotizing glomerulonephritis, a part of the underlying vascular disorder, is most likely responsible for this finding. The patient is eventually diagnosed with malignant hypertension, which is related to the rise in renin, as this enzyme is directly proportional to the elevation in blood pressure via the renin-angiotensin-aldosterone pathway. In addition, negative test results for pheochromocytoma, adrenal tumor, and progressive multifocal leukoencephalopathy, which further supports that the patient’s symptoms are corticosteroid-induced, rather than catecholamine or infection induced. Wegener’s Granulomatosis is the direct cause of the acute kidney injury initially seen in this patient, presenting as necrotizing glomerulonephritis. This consequently resulted in elevated renin levels, and thus a unique, yet confirmable, case of secondary hyperaldosteronism.
Diagnostic Challenges of Indeterminate Biliary Strictures

First Author: Tim Liu, Dawit, S., Khosla, M., and Khosravi, F

Introduction: Indeterminate biliary strictures (IBDS) are a diagnostic challenge. IBDS occur when abdominal imaging and ERCP with routine cytologic brushing are non-diagnostic. They can be mischaracterized which may significantly affect a patient’s outcome. About 70% are malignant strictures. Of the 30% benign strictures, 15-24% undergo unnecessary surgery. We present a diagnostically challenging case with an IBDS requiring repeat endoscopic exploration and surgical intervention to determine the etiology.

Case: A 70 year old male presented with one month history of constant right-upper quadrant pain, nausea, pruritus, anorexia, weight loss, pale stools, and dark urine. Two days prior to admission, he was treated for choledocholithiasis and underwent ERCP with sphincterotomy, stone extraction and plastic stent placement. Pertinent laboratory findings were lipase 2860 IU/L, total bilirubin 8.9 mg/dL, AST 102 IU/L, ALT 99 IU/L, ALP 105 IU/L. Abdominal ultrasound showed mild common bile duct (CBD) dilatation and CT imaging was unremarkable. Given recent ERCP and elevated lipase, he was treated for pancreatitis. Bilirubinemia and abdominal pain worsened over the next two days. Magnetic resonance cholangiopancreatography revealed a dilated gallbladder, CBD stricture, and multiple intrahepatic and extrahepatic biliary tree strictures with intrahepatic and extrahepatic biliary tree dilatation. Repeat ERCP revealed a CBD stent occluded with stone debris. Plastic stent was replaced with no subsequent filling defect on cholangiogram. Cytology was negative for malignancy but atypical epithelial cells were present with brushing of the right hepatic stricture and CBD. EUS-FNA was then performed with a questionable mass at the head of the pancreas. Results were unrevealing. Tumor markers demonstrated CA 19-9 107 IU/mL and CEA 1.1 ng/mL. Given atypical cells noted, exploratory laparotomy was performed which identified a 1.2 cm mass of the CBD consistent of adenocarcinoma. Patient underwent extrahepatic biliary duct resection with Roux-en-Y hepaticojejunostomy and cholecystectomy. Pathology revealed metastatic cholangiocarcinoma.

Discussion: Cholangiocarcinoma is typically diagnosed at advanced stages, which is a main reason for its dismal prognosis of less than 24 months. Another reason is lack of definitive diagnostic criteria, with brush cytology, FNA and intraductal biopsy sensitivities less than 45% due to inadequate specimens and sampling errors. Standard strategies were unable to identify our patient’s IBDS etiology until CBD exploratory laparotomy and biopsy were performed. Early and accurate diagnosis is crucial as it affects patients’ outcomes, surgical candidacy, and targeted chemotherapies. In surgical patients with negative margins, 5-year survival is 20-30% compared to 0% in those with positive margins. However, most patients who present with advanced disease preclude surgery and overall survival is limited to a few months. Therefore, identifying ways to improve diagnosis and better differentiate malignant and indeterminate biliary strictures is imperative.
Severe Symptomatic Hypokalemia Caused by Oral Administration of Bentonite Clay in an Adult Male Patient

First Author: Erin Smallmon Additional Authors: Mahmood Shahlapour M.D., Edward Markman D.O., Jyothi Punnam M.D., Mohamad Hosam Horani M.D.

Background: Bentonite, also known as montmorillonite, is an organic aluminum silicate clay often used as a laxative homeopathic remedy, due to its ability to absorb water in the gastrointestinal tract. In addition, bentonite has previously been used in cases of gastrointestinal bacterial overgrowth for detoxification. In large amounts, bentonite can sequester essential electrolytes, such as potassium, and bind to specific medications. Here we will present a case of severe symptomatic hypokalemia in a male patient who was ingesting bentonite clay as a form of homeopathic medicine.

Case: A 65 year-old Caucasian male with a past medical history significant for essential hypertension, type 2 diabetes mellitus, and relapsing intermittent polyarthritis presented to the emergency department (ED) for evaluation of his symmetrical polyarthralgia, generalized weakness, and inability to ambulate. In the ED, the patient stated that his arthralgia and general weakness had been increasing in severity over the past week. His medications included enalapril, hydrochlorothiazide, and metoprolol. Upon further questioning, the patient stated that he had been taking Vitamin D (80,000 units), Vitamin A (20,000 units) and 2 tablespoons of bentonite clay daily, as prescribed by his homeopathic physician. Fever, fatigue, weakness and joint pain were observed. His physical exam demonstrated tenderness to palpation of his knees and ankles bilaterally with mild edema; however, no erythema or warmth was appreciated. In addition, subcutaneous nodules were seen on the patient’s elbows bilaterally. His laboratory data demonstrated leukocytosis, severe hypokalemia (2.9 mmol/L), hypercalcemia (11.7 mg/dL, corrected for albumin), hypovolemic hyponatremia and hyperuricemia. His electrocardiogram demonstrated sinus tachycardia, enlarged P waves, shallow T waves, and prominent U waves, consistent with hypokalemia. His knee and foot x-ray demonstrated mild bony erosions consistent with gouty arthritis with superimposed mild degenerative changes. The patient’s hydrochlorothiazide, vitamin A, and vitamin D were held on account of his severe hypokalemia and mild hypercalcemia. He was placed on colchicine, enalapril, metoprolol, methylprednisolone, sliding scale insulin, and a potassium replacement, and his clinical course was subsequently uncomplicated. Prior to discharge, his generalized weakness and arthralgia had completely resolved with the correction of his electrolyte abnormalities and the treatment of his suspected gout flare-up.

Discussion: Due to bentonite’s potential to bind positively charged ions, an important adverse effect of bentonite clay ingestion is hypokalemia. It is critical that patients who are prescribed bentonite clay be aware of signs and symptoms associated with hypokalemia. It is imperative they seek evaluation and prompt replacement in these circumstances, as severe hypokalemia can lead to cardiac arrhythmias and death. In conjunction with other potassium losing medications, like certain diuretics, bentonite may not be a safe alternative treatment.
ARIZONA POSTER FINALIST - CLINICAL VIGNETTE Alyssa Thomas

The Case of the Fibroid Takeover

Alyssa Thomas, Medical Student, University of Arizona College of Medicine-Phoenix, Class of 2018, Bisi Alli, DO MS, Millie Behera, MD, Vikram Deka, MD, Randall Ball, MD

Parasitic fibroids are a rare form of leiomyomas. Commonly found as a complication of a prior laparoscopic myomectomy or hysterectomy, this case represents an atypical presentation.

A healthy, nulligravida thirty-three year old African American female with a past medical history significant for asymptomatic uterine fibroids for ten years presented with progressive constipation, abdominal swelling, and two weeks of intermittent nausea. She had no other significant past medical, surgical, gynecological, familial or social history.

Vital signs were within normal limits with BMI 23. Her bowel sounds were normal. There was a smooth, mobile mass palpable from pubic symphysis to the midpoint of the umbilicus and xiphoid process (comparable to a twenty-eight week gravid uterus); mild right upper quadrant abdominal tenderness to palpation. Pelvic and remainder of physical exam were unrevealing.

Hemoglobin, FSH, LH, LDH, urine pregnancy test, and routine PAP smears were within normal limits. One week prior, she was evaluated in the Emergency Department with acute right upper quadrant abdominal pain and CT Abdomen/Pelvis findings consistent with 15 X 11cm multifibroid uterus and signs of infarction of a 12 X 8cm pedunculated, exophytic uterine fibroid noted in the right upper quadrant of the abdominal cavity. Outpatient T2 flair MRI and normal LDH were consistent with fibroid degeneration and unlikely leiomyosarcoma.

Due to the size, multifibroid uterus, and reproductive age of the patient, treatment options excluded hormonal therapy, ablation, or embolization. The patient underwent successful abdominal myomectomy with excision of over twenty intramural, subserosal, and pedunculated fibroids with aggregate size 15 X14 X 14cm and 1304g weight. Subsequently, routine diagnostic laparoscopy of the abdomen revealed an incidental parasitic fibroid adherent to both small and large bowel. After recommended post-operative rest of six weeks, the patient underwent excision of the infarcted parasitic fibroid 7.5 X 6 X 5.5cm confirmed by pathology. Both small and large bowel remained intact.

This case describes a rare, parasitic fibroid in a young, reproductive woman without prior history of uterine surgery found through laparoscopic evaluation. Of importance, non-surgical, uterine-preserving options are limited in reproductive women with large, multifibroid uteri and noted higher prevalence in African American women. Hopefully, future research will provide additional options.
The Nose Knows: Epistaxis as a Presenting Symptom for a p-ANCA Vasculitis

Ebaa Al-Obeidi B.Sc., Allen Seol M.D., Anish Patel M.D., Lloyd Rucker M.D. University of California, Irvine

Case: A 70 year-old male presented to the hospital with a several day history of epistaxis and gross hematuria. On initial labs, he was found to have prerenal acute kidney injury (AKI) with creatinine 2.77 (baseline 1.18) and supratherapeutic INR of 4.8. He had a history of recurrent VTEs treated with warfarin. He denied any dietary changes, medication non-adherence, recent illness, or trauma and there was no clinical evidence of infection. The epistaxis resolved without intervention, and vitamin K was given to correct the INR. He was started on aggressive hydration and achieved good urine output without hematuria. However, there was no improvement in creatinine. Renal ultrasound, Doppler, and CT of the abdomen and pelvis showed no structural pathology. Due to concern for possible intrinsic renal pathology, serologies were performed and were positive for p-ANCA and MPO antibodies, and negative for PR3, anti-GBM, ASO, and complement C3/C4. A renal biopsy subsequently showed one active cellular crescent and tubulointerstitial inflammation, consistent with a pauci-immune vasculitis. A non-contrast CT of the thorax showed no signs of pulmonary vasculitis. The patient was given 1g solumedrol for three days, and a dose of 100 mg rituximab prior to discharge. On discharge, his creatinine was still elevated at 2.92.

Discussion: This was a case of a patient with a history of idiopathic VTEs and prolonged PTT presenting with epistaxis, hematuria, and persistent AKI ultimately diagnosed with MPO-ANCA/p-ANCA pauci-immune vasculitis. ANCA-associated vasculitis is an autoimmune disease characterized by inflammation of small vessels. Patients may develop a broad spectrum of clinical features ranging from sinus disease and rashes to fulminant renal failure and life-threatening pulmonary hemorrhage. This case illustrates four interesting learning points. The first is that the initial epistaxis and hematuria were thought to be simply from the supratherapeutic INR, but ultimately an alternative explanation – vasculitis – was found. This emphasizes the point that a full evaluation is warranted in patients presenting with bleeding while on anticoagulation, and the presence of excessive anticoagulation should not impede complete evaluation. Indeed, Schuster and colleagues evaluated 29 patients who developed gross or microscopic hematuria while on anticoagulation and found a pathological cause in all but six of them [1]. The second interesting feature was the discovery of the vasculitis only after the AKI failed to resolve with fluids, prompting analysis of ANCA serologies. The third interesting point is the overlap in the diseases associated with c- and p-ANCAs and their low specificity for distinguishing between the pauci-immune vasculitis syndromes (Wegener, microscopic polyangiitis, and Churg-Strauss). This case is an example of an uncommon presentation of p-ANCA with epistaxis and hematuria; studies have reported that among vasculitis patients with renal and sinus disease, some (36%) are p-ANCA positive but most (64%) are c-ANCA positive [2]. Of note, while the ANCA subtype may not be helpful in categorizing pauci-immune vasculitides, it does have clinical utility in predicting relapse rate. There are three systems currently used to classify small-vessel vasculitis: the Chapel Hill Consensus Conference...
definition, the European Medicines Agency system, and the ANCA specificity (PR3 versus MPO). Lionaki et al found that ANCA specificity was the only system able to predict disease relapse, which was defined as the reactivation of vasculitis in any organ system following initial response to treatment [3]. PR3-ANCA patients were found to be twice as likely as MPO-ANCA patients to relapse. The final unique aspect of this case was the patient’s history of coagulopathy, specifically the history of VTEs and prolonged PTT. VTEs are becoming a more recognized complication of ANCA vasculitis, with one proposed mechanism identifying plasminogen as a target of the PR3 antibodies [4]. To date, there is no literature documenting the prevalence of prolonged PTT in ANCA vasculitis.

References:
Unfamiliar Territory: A Case of Prostate Cancer Metastases to the Testis and Brain

Case Presentation: An 83 year-old man with history of dementia and prostate adenocarcinoma status post radiation therapy presented with right scrotal swelling. Ultrasound of the right scrotum showed a 4.2cm solid right testicular mass concerning for malignancy. His serum prostate-specific antigen (PSA) had increased from 60ng/mL several months prior to 319ng/mL at the time of his scrotal ultrasound. He last underwent prostate cancer surveillance 4 months ago with a bone scan that was negative for metastatic disease. A right scrotal mass excision and orchiectomy were performed. Tissue from the right testis was strongly positive for prostatic specific acid phosphatase (PSAP) and NKX3.1 with the final pathology supporting metastatic prostate adenocarcinoma involving the testis.

One month later, the patient presented with altered mental status in the context of several months of worsening dementia. MRI brain demonstrated a 3.5 x 2.4 cm right parietal lobe mass. The patient’s PSA was found to be only 0.3ng/mL. However, biopsy of the mass showed features consistent with metastatic adenocarcinoma. Immunohistochemistry was weakly positive for PSA and strongly positive for NKX3.1, supporting prostatic origin of the tumor. A CT chest, abdomen and pelvis and repeat bone scan demonstrated no evidence of other metastases. He was treated with dexamethasone and 5 fractions of stereotactic radiotherapy with an improvement in mental status.

Discussion: The testis is a rare organ for prostate adenocarcinoma metastases. The incidence of testicular tumors due to metastases of any origin is only 0.02-2.5% in autopsy studies. It is suggested that the low temperature of the scrotum leads to unfavorable conditions for metastatic tumor growth.

Brain metastases from prostate adenocarcinoma are likewise very rare, occurring in just 0.6% of patients. Predominant symptoms include delirium (50%), headache (34%), and short-term memory deficits (17%). The patient’s mental status improved following treatment with dexamethasone and stereotactic radiotherapy. Therefore, the brain metastasis appears to have significantly contributed to his altered mentation, which may have been mistakenly attributed to worsening dementia. In addition, while serial PSA checks are considered the gold standard for monitoring disease status in patients with advanced prostate adenocarcinoma, our patient notably had a normal PSA level despite presenting with a metastatic lesion to his brain.

Conclusions: We present an unusual case in which the patient’s testis and brain were the first and only sites of metastatic disease from his prostate malignancy. In patients who present with newly discovered lesions and a history of prostate adenocarcinoma, it is important to include metastatic disease in the differential regardless of location until an evaluation of the tissue can be performed.
CALIFORNIA POSTER FINALIST - CLINICAL VIGNETTE Daria Gaut

An Usual Presentation of Gastrointestinal Mucormycosis

Daria Gaut Brian D. Cone Aric L. Gregson Vatche G. Agopian

Introduction: Mucormycosis has emerged as a major threat to transplant recipients with a high morbidity and mortality. Gastrointestinal mucormycosis is uncommon, with presenting symptoms usually abdominal in nature. We describe a liver transplant recipient who developed gastrointestinal mucormycosis with an initial manifestation of a femoral nerve palsy.

Case Description: Our patient was a 48 year old female with diabetes and hepatitis C-induced cirrhosis complicated by portal gastropathy and esophageal varices requiring transjugular intrahepatic portosystemic shunt (TIPS) procedure, hepatic encephalopathy requiring intubation, and renal failure requiring hemodialysis. She was transplanted at our institution with a model for end-stage liver disease (MELD) of 41 and had a relatively uncomplicated operative and post-operative course until post-transplant day (PTD) 3 when she complained of right knee and thigh pain. She developed right lower extremity weakness and knee buckling consistent with a right femoral nerve neuropathy on PTD 4 and the same day was found to have a leukocytosis with blood cultures positive for vancomycin-resistant enterococci (VRE). Despite removal of her indwelling hemodialysis catheter, arterial lines, and later port-a-catheter, her leukocytosis persisted and an increase to 42.18 x 10^3/μL on PTD 7 prompted a computerized tomography (CT) scan which revealed a contained cecal perforation in the retroperitoneum. She underwent an exploratory laparotomy which revealed extensive bowel necrosis and necessitated a right hemicolecotomy and segmental small bowel resection with ileostomy placement. Bacterial and fungal cultures from intrabdominal fluid at that time were negative, and histopathology revealed only transmural bowel necrosis. The patient’s white blood cell count continued to rise and she was taken back to the operating room PTD 10, at which time the right retroperitoneum appeared necrotic and extensive debridement was performed. On PTD 12, Rhizopus microsporus grew on preliminary cultures from retroperitoneal fluid, and the patient was initiated on an antifungal regimen of liposomal amphotericin B, caspofungin, and posaconazole with discontinuation of her immunosuppression. Retroperitoneal histologic examination later confirmed invasive mucormycosis. Despite two further intraoperative retroperitoneal debridements as well as aggressive antifungal therapy, the patient continued to deteriorate and ultimately succumbed to multisystem organ failure from overwhelming infection on PTD 19.

Discussion: This study reports a very unique and telling presentation of gastrointestinal mucormycosis. Femoral neuropathy, although most commonly reported in association with iatrogenic complications of pelvicoabdominal surgery or lithotomy position, may be a symptom of a deep-seated complication or infection in an immunocompromised patient. Furthermore, early initiation of antifungal therapy may be warranted in a patient with underlying risk factors for mucormycosis, such as immunosuppression, diabetes, and renal failure in our patient, even if typical signs of disease are not present.
DRESS Syndrome in the Setting of Refractory Seizure of Unknown Origin

Benjamin Lerman BS, Divya Parikh MD, Bo Wang MD, Jason Hom MD

Objectives:
1) Describe a case of Drug Reaction with Eosinophilia and Systemic Symptoms (DRESS) in the setting of refractory seizure of unknown etiology.
2) Review the relationship between pharmacotherapy with multiple aromatic antiepileptics and severe skin hypersensitivity reactions.
3) Discuss the clinical challenges of balancing elevated seizure risk with DRESS treatment in a clinically deteriorating patient.

Case: A previously healthy 24-year-old male was admitted to the ICU for tonic-clonic seizures. Extensive workup revealed no definite etiology for the seizures, and he was discharged on Lamotrigine, Phenobarbital, Keppra and Vimpat.

One month later, the patient developed fever and myalgias. After two days of worsening symptoms, he was re-admitted and found to have a rapidly progressive erythematous rash consisting of confluent papules with scattered peri-follicular elements. Exam was also significant for tender cervical lymphadenopathy but no mucosal involvement. He was febrile to 38.4°C, with eosinophils of 1.1K/uL and a significant transaminitis. Dermatology, Neurology and Hepatology were consulted. The patient was diagnosed with DRESS syndrome secondary to Lamotrigine vs. Phenobarbital and started on steroids. Due to the high concern for seizure, it was deemed unsafe to discontinue both anti-epileptics at once, and only Lamotrigine was discontinued.

By HD#2-3, the patient’s condition continued to worsen as transaminases rose to >1,000, fever persisted, and the patient developed confusion and asterixis consistent with hepatic encephalopathy. It became clear that Phenobarbital discontinuation was necessary; however because immediate removal put the patient at significant risk for seizure relapse, a 7-day taper was initiated. His cutaneous and hepatic symptoms did not begin to resolve until HD#9, 48 hours after the last dose of Phenobarbital was administered.

Discussion: The aromatic antiepileptic drugs (AEDs) Lamotrigine, Phenobarbital, Phenytoin and Carbamazepine are well known to be associated with hypersensitivity syndromes such as Stevens-Johnson and DRESS (1). Lamotrigine in particular has been found to cause these severe skin reactions in up to 1 in 300 adults, and as such was discontinued immediately once the diagnosis of DRESS was suspected (2). In a typical case, all potentially inciting medications would be removed concurrently. Cross-reactivity between AEDs occurs with substantial frequency, rendering it necessary that all be discontinued before improvement is expected (3).

Given this patient’s recent refractive seizures, however, it was not safe to discontinue both Lamotrigine and Phenobarbital simultaneously, which allowed the drug reaction to progress over the course of a Phenobarbital taper. This put the patient at risk for acute liver failure, which occurs in 60-80% of patients and is the most common cause of death in DRESS syndrome (4,5). This case demonstrates the importance of balancing risks of end organ damage from drug reaction and underlying disease in a complex patient.
Hemophagocytic Lymphohistiocytosis—A Diagnostic Conundrum

S Mokkarala MPH, D Bays MD, P McCabe MD, D Dwyre MD, M Henderson MD

Introduction: Hemophagocytic lymphohistiocytosis (HLH) is a rare, aggressive condition caused by overactivation of the immune system, often associated with infection or cancer. HLH has been reported in the literature as a possible trigger and early clinical manifestation of Hodgkin’s Lymphoma—a malignancy associated with human immunodeficiency virus infection. We describe a case of simultaneous HLH and Hodgkin’s Lymphoma in a patient with acquired immunodeficiency syndrome (AIDS).

Case Presentation: A 44 year old man with treatment-resistant AIDS and chronic hepatitis B co-infection presented to the emergency department with several days of nausea, vomiting, diarrhea, and recurrent fevers. He had two similar episodes in the previous year, which were treated presumptively as disseminated mycobacterium avium complex (MAC) infection. At admission MAC therapy with azithromycin and ethambutol was resumed. After one week, he developed jaundice, hepatosplenomegaly, and pancytopenia requiring multiple transfusions. MAC therapy was discontinued due to concern over hepatotoxicity and lack of clinical response. Peripheral smear showed scant schistocytes and no bite cells, suggesting possible thrombotic microangiopathy. Bone marrow biopsy (BMBx) showed caseating granulomas, CD30+/CD15+/PAX5+/CD45- large cells and rare Reed-Sternberg cells, diagnostic of Hodgkin’s Lymphoma; no hemophagocytes were noted.

The patient later developed respiratory failure, lactic acidosis, recurrent fevers, hypotension, and pancytopenia refractory to transfusions. The constellation of fever, pancytopenia, hepatosplenomegaly, and markedly elevated ferritin (12,225 ng/mL) met 4 of 8 the diagnostic criteria for HLH. He was treated with etoposide for HLH and solumedrol and vincristine for Hodgkin’s with initial improvement. Subsequently a soluble IL-2 receptor level returned markedly elevated (61,300 pg/mL), meeting an additional diagnostic criteria for HLH. However, he developed progressive liver failure, non-oliguric kidney failure, and sepsis with Candida albicans and VRE. He was transitioned to palliative care and died soon thereafter.

Discussion: Diagnosis of HLH is complicated by the absence of a confirmatory test. Because the cardinal symptoms (fever, organomegaly, and pancytopenia) are nonspecific, HLH was not initially suspected in our patient. Lack of hemophagocytes on BMBx further confounded the clinical picture, although hemophagocytosis is not a definite diagnostic criterion and is, according to some studies, most appreciable on serial BMBx examinations. Hodgkin’s Lymphoma typically presents with constitutional symptoms and cervical adenopathy, and the diagnosis is confirmed by the presence of Reed-Sternberg cells on lymph node biopsy. In this patient, the absence of palpable lymphadenopathy was unusual, as was making the diagnosis by BMBx. HLH and Hodgkin’s Lymphoma can rarely occur together in patients with AIDS and should be considered in immunocompromised patients with recurrent fever, hepatosplenomegaly, and pancytopenia. In this patient, diagnosis was hampered due to concern about the possibility of overwhelming infection.
Neurosyphilis Presenting as Unilateral Facial Nerve Palsy

Megan Trieu, BA; Jason Rabie, MD; Justine Korolyov, MD; Monica Tsai, MD; Richard Watson, MD; Michael Yang, MD

Syphilis is known as the “Great Imitator” for good reason. With its insidious onset and nonspecific presentation, it is often mistaken for other diagnoses or overlooked altogether. Here, we describe a case of an isolated facial nerve palsy as a rare manifestation of neurosyphilis.

A 53-year-old man presented to urgent care with acute-onset right facial droop preceded by four days of right eye dryness. He was prescribed prednisone and valacyclovir for presumed Bell’s palsy. However, serological testing drawn in clinic later revealed a reactive rapid plasma reagin (RPR) with a titer of 1:64 and a positive fluorescent treponemal antibody absorption (FTA-ABS). Thus, he was referred to our medical center for further evaluation.

The patient denied fevers, chills, headaches, neck stiffness, or skin lesions. He additionally denied recent travel, outdoor activities, tick bites, or known history of sexually transmitted infections. He had formerly been in a monogamous relationship with a male partner, who had been treated for syphilis over 20 years ago, but had otherwise abstained from sex for the past two years.

On exam, the patient was afebrile with no signs of meningismus. Neurological examination demonstrated an isolated right facial nerve palsy. CSF analysis revealed an elevated leukocyte count (47 leukocytes/mcL), elevated protein level (89 mg/dL), and normal glucose level (62 mg/dL). CSF gram stain and culture were negative. Herpes simplex virus (HSV) IgG antibodies and Varicella zoster virus (VZV) IgM antibodies were detected in CSF, but polymerase chain reaction (PCR) identified 0 copies of HSV or VZV DNA. No antibodies to West Nile virus, measles, mumps, or cryptococcus were detected in CSF. Additionally, serologic tests were negative for HIV, Hepatitis C virus, West Nile virus, and cryptococcus. Testing for Lyme disease was not performed, as there was low suspicion based on clinical history. Repeat RPR was reactive with a titer of 1:64 and FTA-ABS was positive. CSF VDRL was positive with a titer of 1:32, confirming the diagnosis of neurosyphilis.

On admission, empiric treatment for neurosyphilis was initiated with intravenous penicillin G (24 million units), and he had marked improvement in facial nerve function on this regimen. He was discharged home on a 14-day course of intravenous penicillin. This case illustrates a rare presentation of neurosyphilis as unilateral facial nerve palsy. While facial nerve palsy is frequently idiopathic, infectious causes should be considered, including neurosyphilis, HSV, VZV, and Lyme disease. Although incidence of neurosyphilis is low, it is easily diagnosed and treatable. Therefore, neurosyphilis, a great imitator, should be considered on the differential for any cranial nerve palsy.
Introduction: Drug reaction with eosinophilia and systemic symptoms (DRESS) is a drug-induced hypersensitivity reaction that presents with cutaneous findings, hematologic abnormalities, and multi-organ involvement. DRESS may be difficult to diagnose due to its nonspecific constellation of symptoms and relapsing course. We present a case of severe DRESS reactivation misdiagnosed as cutaneous T-cell lymphoma (CTCL).

Case: A 37 year-old Filipino male with a history of IgA nephropathy developed a diffuse morbilliform eruption six weeks after starting allopurinol for gout. He was admitted to an outside hospital with eosinophilia, transaminitis, and HHV6 positivity and diagnosed with DRESS. His skin eruption improved with oral prednisone and cessation of allopurinol. However, he continued to experience sporadic skin flares with variable response to oral prednisone, cyclosporine, and multiple courses of IVIG and plasmapheresis. Given his suboptimal therapeutic response and the suspicion for Sezary cells on peripheral blood smears, a skin biopsy was performed with findings suggestive of CTCL. The patient was started on ultraviolet B therapy and bexarotene. However, these agents were discontinued when he developed rapidly progressive exfoliative dermatitis, acute renal failure, and septic shock secondary to bacteremia, fungemia, and CMV viremia. He was transferred to a burn intensive care unit for further management. A repeat skin biopsy was obtained which favored the diagnosis of severe DRESS reactivation. A bone marrow biopsy was performed and demonstrated no evidence of lymphoma. T-cell receptor gene rearrangement also exhibited no clonality. The patient was thus treated with aggressive skin care and low-dose steroids for DRESS. However, the patient developed re-emergence of multiple line and skin infections, resulting in septic shock and death.

Discussion: Although most episodes of DRESS resolve with cessation of the offending drug and/or initiation of systemic steroids, relapses may occur even after the initial insult or exposure is removed. The variable time course of these recurrences can make it difficult to connect to the initial DRESS episode and lead to misdiagnoses. In particular, DRESS can be mistaken for cutaneous T-cell lymphoma as both present with dermatologic manifestations, multi-organ involvement, and atypical lymphocytes on peripheral blood smears. Prematurely initiating treatment for disparate conditions prior to a definitive diagnosis may exacerbate DRESS, increasing morbidity and mortality in patients with an established history of drug hypersensitivity. Additionally, these patients may be at increased risk for relapses due to a lower threshold of CD4 reactivation or re-emergence of latent viruses that can further compromise the immune system.

Conclusion: DRESS may rarely masquerade as CTCL. A thorough work-up is essential as prematurely initiating treatment may result in serious clinical sequelae in patients with ongoing drug hypersensitivity.
CALIFORNIA POSTER FINALIST - CLINICAL VIGNETTE Tiffany Yang

Not Just a Cough

First Author: Tiffany Yang Shiqian Li, Gabriel Waterman, Gina C. Rossetti, Stephanie K. Zia

Introduction: Propionic acidemia (PA) is an inherited deficiency of propionyl-CoA carboxylase, which is necessary in the metabolism of amino acids, odd-chain fatty acids, uracil, and cholesterol. It is an inborn error of metabolism (IEM) most commonly seen in the pediatric population. Patients may suffer from metabolic crises precipitated by catabolic stressors, which are medical emergencies and a challenge to manage.

Case Presentation: A 24-year-old Hispanic male with PA resulting in developmental delay, spastic paraplegia, failure to thrive, and seizure disorder, presented with a two-day history of post-tussive non-bilious, non-bloody emesis and associated fatigue. Home urinalyses demonstrated an increase in ketones from baseline 40mg/dL to 80mg/dL, and laboratories on admission showed hyperammonemia after onset of emesis. The differential diagnosis included aspiration pneumonia, community-acquired pneumonia, and influenza; gastroenteritis was ruled out due to lack of associated gastrointestinal symptoms. Chest x-ray did not show focal consolidation, and CBC revealed absence of leukocytosis. Pending final blood and urine culture results, the patient was started on an empiric 10-day course of metronidazole to clear propiogenic gut bacteria and H. pylori, given his prior history of C. difficile colitis. Aggressive reversal of catabolism was initiated with D10 NS at 1.5xM, and Zofran was administered to decrease the patient’s feed intolerance and nausea. His home feeding regimen was discontinued until symptoms of vomiting, ketonuria, and hyperammonemia resolved. Once catabolism was reversed and acidosis corrected, the patient’s specialized protein-limited diet, including levocarnitine 100mg/ml TID, was reinitiated as continuous feeds then titrated up to boluses.

Discussion: PA is an organic acidopathy due to a defect in or absence of propionyl-CoA carboxylase (PCC), an essential enzyme of the Krebs cycle and oxidative phosphorylation. PCC deficiency results in the accumulation of toxic metabolites, mitochondrial dysfunction, carnitine and CoA depletion. Patients with PA are at high risk of developing acute decompensation crises, which are episodes resembling sepsis, that frequently occur from mild viral illness, as exemplified in this case, as well as from physical or emotional stressors. Presenting symptoms of crises can range from nausea and vomiting, to encephalopathy, or multi-organ failure with electrolyte disturbances, ketonuria, hyperammonemia, pancytopenia. Multi-systemic signs and symptoms are expected, particularly in highly energetic organs, due to general mitochondrial dysfunction. Therapy should include immediate resuscitation with dextrose-rich fluids and electrolyte repletion, as was ordered for this patient. L-carnitine and metronidazole may be administered to increase propionic acid excretion and reduce the production of propionate by gut bacteria, respectively. Without aggressive reversal of catabolism and closure of the anion gap, patients can suffer irreversible metabolic brain injury or death. Complete nutrition should be promptly resumed.

This case illustrates the clinical manifestations of metabolic crises in PA. Acute decompensation episodes need to be swiftly recognized and aggressively managed as irreversible complications and death can quickly ensue without treatment.
Hemorrhagic Conversion after Treatment of Deep-Vein Thrombosis in a Patient with Subacute Ischemic Stroke

First Author: Janis Yee, BA, Daryl Banta, MD, Afrina Qutubuddin, MD, Emad Mogadam, MD

**Introduction**: Deep-vein thrombosis (DVT) is an overlooked complication in patients with ischemic stroke and can be found in up to 80% of patients who did not receive prophylactic anticoagulation. Bleeding is the primary adverse effect of any anticoagulant therapy and although the risk of major bleeding is usually less than 3%, hemorrhagic conversion remains a real concern in these patients.

**Case description**: A 38-year-old male with medical history of migraines presented to the emergency department with left sided flaccidity, facial droop and dysarthria shortly after rock climbing. CT head without contrast revealed a hyperdense right middle cerebral artery (MCA) consistent with thrombus, and CT angiogram showed a complete right internal carotid artery (ICA) occlusion likely due to dissection. Attempts to recannalize the ICA and MCA were unsuccessful. His recovery in the ICU was uneventful and during his stay, the patient did not receive any pharmacologic DVT prophylaxis and was only on sequential compression devices. He was transferred out of the ICU to the floor one week later. At this time, he was noted to have worsening lower extremity edema and a Doppler ultrasound showed clots in the left soleal, femoral and common femoral veins. An inferior vena cava filter was placed given the risk of intracerebral bleeding on anticoagulation. Three weeks after admission, the patient complained of increased right lower extremity pain and swelling and was found to have extensive acute thrombus extending from the right calf veins into the common femoral vein. Anticoagulation was initiated after clearance by neurosurgery and a CT head performed after starting therapy showed no evidence of acute intracranial hemorrhage. He was transitioned to low dose low molecular weight heparin two days later. The patient then reported nausea, vomiting, dizziness, and headache and stat imaging revealed large right MCA hemorrhagic conversion. Anticoagulation was discontinued immediately, however the patient became increasingly obtunded over the course of the day, requiring intubation and transfer back to the ICU. His blood pressure continued to decrease and unfortunately he became unresponsive to painful stimuli with fixed and dilated pupils and no response to cold caloric testing.

**Discussion**: This case illustrates the risk for hemorrhagic conversion in ischemic stroke patients where anticoagulation is initiated for DVT treatment. Many reports have been published on the use of anticoagulation for the treatment of atrial fibrillation in patients with acute ischemic stroke, however there remains a paucity of information regarding anticoagulation for treatment of DVT in these patients. More research needs to be done to determine appropriate timing of anticoagulation therapy and to identify screening tools that can stratify risk of bleeding in this patient population.
CONNECTICUT POSTER FINALIST - CLINICAL VIGNETTE Nicholas Apostolopoulos

"A Case of Spontaneous Rupture of a Gluteal Augmentation Injection"

First Author: Nicholas Apostolopoulos, Christina McLaughlin, MD; Omoye Imoisili, MD; Lee Katz, MD; Abhay Dhond MD

**Learning Objectives:** To recognize the growing use of non-FDA approved synthetic colloids for cosmetic surgery, and the major post-procedural complications associated with them.

**Case:** A 41 year-old Thai woman presented with a one week history of fevers and bilateral buttock pain with swelling, induration, and erythema. Two years prior, she received cosmetic buttock injections in Thailand with a filler known as “Aqualift” with no procedural complications. Of note, she was treated as an OSH one-month prior with IV ertapenem for similar symptoms. In the interim, she reported unchanged swelling and pain, prompting her to return for reevaluation.

Exam was notable for warmth, erythema, edema, and tenderness to palpation on the lateral buttocks bilaterally. A small, non-tender pustule about 10mm was noted above her gluteal cleft at midline. Labs revealed a WBC of 9.5 mg/dL and a CRP of 28.5 mg/L. Interestingly, initial blood cultures in the ED remained negative. Given the concern for abscess, an MRI of the bilateral hips was performed that showed extensive multilobulated and loculated fluid signals within the subcutaneous tissue replacing the gluteal muscles of the buttock region. Intravenous gadolinium revealed rim enhancement, suggestive of inflammation of the pseudocapsule of the buttock implants, as well as several other areas concerning for abscess formation. Although intravenous vancomycin and ertapenem were initiated, the patient continued to develop low grade fevers. Subsequently, severe tenderness developed over the gluteal cleft pustule, and within 12 hours of onset, the pustule ruptured and an opaque, brown fluid flowed freely from the site. Plastic surgery was consulted, and an incision and drainage at the site of the pustule was performed, and 1700 mL of fat, filler, and blood were removed. The patient subsequently reported dramatic relief of pressure and tenderness, including being able to maintain a seated position. A deep wound culture was sent and returned with *Parabacteroides distasonis* and the patient was discharged with an eight-day course of amoxicillin-clavulanic acid.

**Discussion:** According the manufactures’ website, “Aqualift” contains a suspension of 2.5-5% polyacrylamide gel in sterile water. Although known for its ability to resist enzymatic degradation and phagocytosis given its high level of biocompatibility, the product has also been found to harbor bacteria. Adverse effects include swelling, pain, and gel extrusion. The product can also give rise to late infections, biofilms, and abscesses. Most importantly, such injections are not regulated by the FDA and can harbor significant risk, the main being infection with abscess formation that often develops 8-12 months after implantation. This case further illustrates the dangers of non-regulated cosmetic synthetic colloids.
A Rare Cause of Septic Arthritis

First Author: Robert Birch, MS 3 Frank H. Netter MD School of Medicine Additional Author: Ankita Subedi, MD, PGY III St. Vincent's Medical Center

Introduction: Septic arthritis is a serious rheumatic disease that can lead to rapid joint destruction most commonly caused by staphylococcus and streptococcus species. Infection can be due to direct inoculation from trauma and procedures, or hematologic spread. Streptococcus viridans is an uncommon pathogen in septic arthritis. Our PubMed literature search yielded only four cases caused by Streptococcus mitis, a subgroup of S. viridans, which is part of the human oral flora. Here we report a case of septic arthritis of the knee due to S. mitis.

Case Description: An 80 year-old male with a past medical history of gout, osteoarthritis, myelodysplastic syndrome, aortic stenosis, mitral regurgitation and atrial fibrillation presented to the hospital with acute onset worsening left knee pain and swelling of 4 days. There was no history of trauma, knee procedures, or dental procedures. No fever or chills. Physical exam showed oral temperature 37.9°C, heart rate 72, blood pressure 123/72, respiratory rate 16, and oxygen saturation 97% on room air. There was poor dentition, normal pulmonary exam, a pansystolic murmur heard best over the apex, and abdominal exam was normal. Knee exam demonstrated decreased range of motion, diffuse swelling, warmth, tenderness, without erythema. Arthrocentesis with synovial fluid testing demonstrated WBC of 8,707 cells/mcL with 93% neutrophils, RBC of 715 cells/mcL, with no crystals. Gram stain was negative for any organism. Final Culture of the synovial fluid and blood culture showed S. mitis. The organism was speciated by matrix-assisted laser desorption/ionization time of flight mass spectrometry (MALDI-TOF). Knee X-Ray demonstrated severe degenerative changes with new left knee joint effusion. Because of the relationship of S. viridans bacteremia with subacute endocarditis, a transesophageal echocardiogram was performed, which showed no vegetations. He underwent incision and drainage of the knee and was treated with a 6 week course of penicillin G.

Discussion: The common symptoms of septic arthritis include pain, tenderness, warmth, swelling, and decreased range of motion. Laboratory investigation should include WBC count, ESR, CRP, as well as a synovial fluid joint aspirate. Synovial joint aspirate yielding a WBC count of greater than 50,000/mcL or greater than 90% polymorphonuclear cells has been associated with septic arthritis. If these lab values are not elevated, clinical judgment should guide treatment while the synovial fluid culture is pending. S. viridans bacteremia has been reported in individuals with poor dental hygiene, as with our patient. Activities such as flossing or tooth brushing can cause a bacteremia in such patients, so there may be no history of a dental procedure. We would suggest that although S. mitis is an uncommon cause of septic arthritis, viridans group streptococci should be considered in patients who have had a recent dental procedure and those with poor oral hygiene.
CASE: A 23-year-old female with a past medical history of migraines presented with a new onset tonic-clonic seizure. The patient was in her usual state of health until a few hours prior to admission, when she suddenly began experiencing a severe headache. Shortly after, the patient lost consciousness, collapsed and began seizing. On physical exam, the patient had generalized post-ictal muscle weakness and an inconsistent left-sided visual field cut, but was otherwise neurologically intact. A CT scan of the brain revealed a 4.2 cm x 2.4 cm hypodense area within the right parietal lobe with associated mild mass effect and vasogenic edema. Subsequently, a brain MRI demonstrated two enhancing lesions, including one with an open-ring pattern of enhancement involving the right parietal white matter, as well as another nonenhancing lesion. Lumbar puncture revealed cerebrospinal fluid with 49 white cells, a protein of 51 mg/dL and glucose of 100 mg/dL. No organisms or malignant cells were found, but three oligoclonal bands were present. There was no evidence of infection. She was presumed to have a tumefactive demyelinating lesion (TDL), and was consequently prescribed IV methylprednisone for 5 days and discharged home on an oral prednisone taper. Six weeks later, a repeat MRI demonstrated significant improvement, with a decrease in the size of the right parietal lesion, resolution of the enhancing areas and no new observable lesions.

DISCUSSION: We present this case to illustrate a common presentation of an uncommon demyelinating disease process, a TDL. TDLs are large (=2 cm) demyelinating areas in the brain that mimic intracranial tumors. Similar to multiple sclerosis (MS), TDLs are more common in young middle-aged women. Rather than present with symptoms of typical MS, however, TDLs present with symptoms more suggestive of an intracranial mass such as seizures, focal neurologic deficits and aphasia. TDLs are typically diagnosed by MRI, where they are associated with edema, an open-ring pattern of enhancement and mild mass effect. The differential diagnosis for TDLs includes brain tumors (primary or metastatic) and brain abscesses, though both of these show a complete ring, as opposed to an open-ring, pattern of enhancement. Furthermore, compared to tumors, TDLs are highly responsive to corticosteroids and tend to decrease in size overtime on serial imaging. When clinical and MRI findings are equivocal, a brain biopsy may be performed for a more definitive diagnosis. As the evidence was consistent with TDL in our patient, we opted to empirically treat her with corticosteroids and monitor her lesions with serial MRIs. Whereas some individuals with TDLs go on to develop MS, others have only a single demyelinating episode. In our patient, further evidence of a demyelinating episode would indicate MS, and would warrant more aggressive management with disease modifying therapies.

WORKS CITED:

Canagliflozin, a novel oral agent developed for the treatment of type 2 diabetes, lowers blood glucose levels by blocking sodium-glucose co-transporter-2 proteins (SGLT-2) in the proximal tubules of the kidney to increase urinary excretion of glucose. Euglycemic diabetic ketoacidosis (DKA), with blood glucose levels below 250 mg/dl, is a rare adverse effect associated with SGLT-2 inhibitors. Certain risk factors, such as poor oral and low carbohydrate intake, may predispose patients to this dangerous complication.

A 61-year-old woman with poorly controlled type 2 diabetes (HbA1c= 11.2%) and Stage IIIIB large cell neuroendocrine tumor of the cecum, currently undergoing chemotherapy with cisplatin/etoposide, presented with two weeks of atypical chest pain, generalized fatigue, poor oral intake, and a subsequent 10-pound weight loss.

On admission, her exam was notable for tachycardia, absence of fever, an overall cachectic appearance and reproducible chest pain. Labs were significant for leukocytosis (18,900/mm$^3$) and an anion gap metabolic acidosis (anion gap = 23, venous pH = 7.29, HCO$_3^-$=17) with normal lactate (0.7 mmol/L) and moderately elevated acetone (1.8 mmol/L). Blood and urine cultures were negative, as were three sets of cardiac enzymes. Urinalysis was significant for ketones and glucose. With intravenous hydration alone, the patient’s serum glucose decreased from 229 mg/dl to 100 mg/dl, but anion gap metabolic acidosis persisted (anion gap = 16).

Further history revealed the patient had initiated canagliflozin one week prior to presentation, raising the suspicion for canagliflozin-induced euglycemic DKA. Beta-hydroxybutyrate returned elevated at 51 mg/dl, confirming the diagnosis. The patient continued to receive intravenous hydration along with intravenous insulin infusion, and the anion gap metabolic acidosis resolved within 12 hours.

At follow-up, the patient was found to have a strong family history of both type 1 and type 2 diabetes mellitus. Antibody testing for islet cell antibody, glutamate decarboxylase antibody, and pancreatic islet cell antibody were negative, which combined with a normal c-peptide, further confirmed the diagnosis of type 2 diabetes.

This case highlights the importance of recognizing atypical presentations of DKA with lower-than-expected glucose levels associated with SGLT-2 inhibitors. With blood glucose less than 250 mg/dl and anion gap metabolic acidosis, the diagnosis of euglycemic DKA should be confirmed with beta-hydroxybutyrate level greater than 40 mg/dl (in adults) and arterial pH<7.3. Patients expected to undergo physical stress such as surgery and those who are vulnerable to decreased oral intake, such as this patient undergoing chemotherapy, should avoid SGLT-2 inhibitors. In this case, weight loss and decreased oral intake caused a shift to fat metabolism, further promoting ketogenesis. Internists should be aware of the rare but life-threatening complication of euglycemic DKA associated with SGLT-2 inhibitors.
GEORGIA POSTER FINALIST – CLINICAL VIGNETTE Sheila Bhavsar

Severe Pasteurella Infection with Treatment Requiring ECMO and Intra-aortic Balloon Pump

First Author: Sheila Bhavsar Second Author: Emily Quick Bear Third Author: John Morelli

Introduction: Pasteurella species are part of the oral flora of cats and dogs. It is a zoonosis associated with skin and soft tissue infections and a complication of bites and scratches. Invasive infections by Pasteurella species are rare and associated with significant morbidity and mortality.

Case Presentation: A 36 year-old immunocompetent female presented to urgent care with pain after receiving a dog bite to her left hand. Past medical history was significant for cardiac complications related to ASD. Medication allergies included sulfa drugs, penicillin, and vancomycin. The patient was prescribed cephalexin for cellulitis of the left hand secondary to her dog bite. The following day, the patient reported worsening edema of her hand and throbbing pain. Patient was seen in the ED and vitals were stable. Physical exam revealed redness, swelling and warmth of her left hand. Labs showed no abnormalities. Patient was given IV cefuroxime and discharged. She presented later that evening with a fever of 101.3°F and worsening cellulitis. Patient was admitted to the hospital and immediate surgical debridement was performed. She was given levofloxacin due to multiple allergies to other antibiotics. However, 20 minutes after initiation of levofloxacin, the patient developed mental status change, diffuse maculopapular rash, and hypotension. She required IV epinephrine x2 followed by intubation and infusions of norepinephrine and phenylephrine. An EKG and echocardiogram showed sinus tachycardia, ST elevation in the lateral leads, and a reduced EF of 10% with biventricular heart failure. Findings suggested stress-induced cardiomyopathy. She was transferred to another hospital for extracorporeal membrane oxygenation and an intra-aortic balloon pump. Ceftriaxone and clindamycin were also started, and the EF subsequently improved to 35%. *Pasteurella stomatis* and *Pasteurella canis* were isolated from wound culture. Blood cultures were negative.

Discussion: This is an instructive case for the proper management of an infected dog bite, as well as treatment of the rare organism *Pasteurella stomatis*. In another case, *P. stomatis* was associated with hemorrhagic sepsis. First-line treatment for Pasteurella infections are penicillins. However, this was not an option for this patient due to allergy. Other options include carbapenems, tetracyclines, and third-generation cephalosporins. Treatment options were encumbered by the patient’s unique antibiotic allergies and anaphylactic responses, which led to delay in effective treatment. Side effects of levofloxacin include potentially fatal symptoms, such as QT prolongation and torsades de pointes tachyarrhythmia. This case report highlights rare complications of a rare pathogen. Although it is a generally susceptible pathogen, the patient was faced with severe heart failure caused by a rare complication of levofloxacin. The present case emphasizes the importance of appropriate initial treatment for animal bites.
GEORGIA POSTER FINALIST - CLINICAL VIGNETTE Joyce A Hsu

Levamisole-Induced Vasculitis and Associated Spontaneous Renal Bleed from Contaminated Cocaine

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Introduction: Levamisole is a frequently used contaminant found in approximately 70% of cocaine in the United States. Given the increasing prevalence of cocaine use, clinicians should be able to recognize the characteristic presentation of levamisole-induced vasculitis in order to begin appropriate treatment.

Case Description: A 43-year-old African American woman, status post total abdominal hysterectomy bilateral salpingo oophorectomy for fibroid uterus presented to the emergency department with complaints of right flank pain. Computed tomography (CT) imaging of the abdomen revealed a very large right perinephric hematoma and hemoperitoneum, for which she was admitted. A selective bilateral renal angiogram demonstrated no evidence of active extravasation and noted several tiny pseudoaneurysms in the distal branches of both renal arteries, which was suggestive of polyarteritis nodosa. During her hospital stay, she developed a spontaneous renal artery bleed, for which she underwent coil embolization. Rheumatology was consulted after the patient developed a painful, purpuric rash over the pinnae of her ears bilaterally, with purpura and nodules over her arms. A urine drug screen was positive for cocaine and gas chromatography-mass spectroscopy revealed levamisole in the urine. Serologies were positive for anti-nuclear antibodies (ANA), cytoplasmic antineutrophil antibodies (c-ANCA), and perinuclear antineutrophil antibodies (p-ANCA). The patient was stabilized and discharged from the hospital and counseled to discontinue cocaine use. However, the patient continued to abuse cocaine and developed similar lesions in the bilateral lower extremities over the next six months. She was referred to Plastic Surgery for further care.

Discussion/teaching point: Due to the increasing prevalence of levamisole-contaminated cocaine, physicians should be aware of the characteristic cutaneous changes in levamisole-induced vasculitis as well as the less common systemic complications of this condition. This leukocytoclastic vasculitis classically presents as a painful pruritic rash involving the acral areas, along with a unique constellation of autoantibodies. The diagnosis in this case was further complicated by the spontaneous renal artery bleed, which was attributed to the levamisole contaminant. The symptoms of systemic and cutaneous vasculitis resolve upon discontinuation of contaminated cocaine, however, the lesions will continue to recur with continued use. The case highlights the importance of keeping high suspicion for vasculitis associated with levamisole use in patient with history of cocaine abuse.
Skin-Deep Diagnosis: An Unusual Presentation of Systemic Lupus Erythematosus

Rachel Pocock, M4; Karen Law, MD

Lupus panniculitis (lupus profundus) is a rare initial presenting symptom of systemic lupus erythematosus (SLE). It presents with inflammatory nodules or plaques and may be mistaken as cellulitis. Panniculitis is itself an uncommon disorder characterized by inflammation of the subcutaneous fat.

A 43-year-old Asian woman presented to the emergency room with a six-week history of worsening right hip rash. She had been on trimethoprim/sulfamethoxazole for the previous two years to treat acne vulgaris. Her rash was painful and associated with fevers, chills, and nausea. The patient was initially prescribed a 10-day course of trimethoprim/sulfamethoxazole for presumed cellulitis. When the rash did not improve, she was prescribed two alternative oral antibiotics for cellulitis. The patient was ultimately admitted and started on IV vancomycin and meropenem for refractory skin and soft tissue infection.

On admission, the patient’s vital signs were temperature of 38.1 °C, blood pressure of 122/69 mmHg, heart rate of 90 bpm, and respiratory rate of 22. Skin exam demonstrated an erythematous, warm, tender rash covering the right hip and buttock. Musculoskeletal exam was unremarkable. Labs were notable for WBC 3.4k cells/mcL, Hgb 9.7 gm/dL, ALT 215 unit/L, and AST 225 unit/L. An MRI of the right hip showed nonspecific skin thickening and subcutaneous edema suggestive of uncomplicated cellulitis.

A biopsy was ordered given lack of improvement. It showed subcuticular and dermal inflammatory infiltrate, perivascular inflammation, and increased dermal mucin deposition, consistent with lupus panniculitis. Upon further questioning, the patient endorsed hair loss and malaise. Antibiotics were discontinued. The patient was started on methylprednisolone 30mg twice daily. Within 24 hours, she noticed improvement in her rash and malaise. Autoimmune laboratory work-up revealed a positive ANA (titer 1:320), a positive SSA antibody (9.3 unit/mL), and decreased complement levels (C3 36 mg/dL, C4 10 mg/dL). She was diagnosed with lupus panniculitis as the presenting symptom for SLE. At two-week follow-up, the patient’s rash was nearly resolved on prednisone 20mg BID. Hydroxychloroquine 400 qday was added to her regimen and within a few months her leukopenia and transaminitis also resolved.

This patient presented with lupus panniculitis masquerading as cellulitis in the setting of undiagnosed SLE. Several lessons may be gleaned. First, panniculitis can mimic cellulitis. When symptoms do not respond to therapy as expected, the differential diagnosis must be broadened and further workup should be initiated. Second, this case highlights a rare initial presentation of SLE. Only 10-20% of patients with lupus panniculitis are ultimately found to have SLE and the condition has an estimated prevalence in SLE patients of only 2-3%. Diagnosis and treatment of SLE as this patient’s underlying condition was essential for her recovery and long term health management.
The Great Mimicker – Neurosarcoidosis Masquerading as a Pituitary Macroadenoma

Neurosarcoidosis is characterized by noncaseating epithelioid granulomas of the nervous system. Unfortunately, studies indicate that only 50% of cases of neurosarcoidosis are diagnosed due to its many clinical and imaging manifestations and its rarity.

A 47 year old African American female patient presented to the emergency department with a headache that began two weeks prior. The headache was primarily in the left-frontal area and pressure-like. She had similar headaches for 2 months with nausea and vomiting. Additional questioning revealed blurry vision for one year in her left eye and decreased peripheral vision, with associated cold intolerance and 50 pound weight loss in the last 2 months. There was no galactorrhea, and she was post-menopausal. Past medical history was significant for sarcoidosis, though it was never emphasized by multiple specialist physicians. It was not part of the neuroimaging history. Physical exam at this time revealed bitemporal hemianopsia. CT scan showed a pituitary tumor. MRI showed a 10 x 20 x 20 mm tumor expanding the intrasellar compartment and extending into the suprasellar cistern, abutting and elevating the optic chiasm. The tumor extended into the left cavernous sinus abutting the cavernous segment of the left internal carotid artery. There was intense homogeneous enhancement of the tumor mass, concerning for a pituitary macroadenoma. On endoscopy guided sellar biopsy, it was identified as neurosarcoiosis. Post-surgery, she had mild blurry vision in her left eye. Labs revealed low LH (<0.07 mIU/mL), FSH (0.82 mIU/mL), and free T4 (0.47 ng/mL) and an inappropriately normal TSH (1.31 mIU/mL), all suggestive of pituitary insufficiency. The patient was being treated with corticosteroids, so cortisol level was not taken. Unfortunately, pituitary hormone levels were not analyzed before surgery, but her weight loss and cold intolerance suggests that she was suffering from pituitary insufficiency.

Involvement of the sellar region by sarcoidosis is overall an infrequent occurrence, comprising less than 1% of all intrasellar lesions. Patients typically present with an infiltrative lesion on imaging studies and clinically with symptoms related to diabetes insipidus or hyperprolactinemia. Our patient did not have either of these but had symptoms of pituitary insufficiency as hypothyroidism. This case highlights the importance of keeping a high suspicion for neurosarcoiosis in African American patients with remote history of sarcoid. This case also emphasizes the importance of biopsy in such patients to establish a concrete diagnosis.
Anti-NMDA Receptor Encephalitis Presenting as an Acute Psychiatric Episode: A Case Report

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Background: Anti-NMDA receptor encephalitis is a severe form of autoimmune encephalitis that commonly affects young women and is a known paraneoplastic syndrome of ovarian teratomas [1-3]. The clinical course starts with a non-specific, flu-like prodrome followed by prominent psychiatric symptoms including psychosis, agitation and confusion [4, 5]. The initial psychiatric symptomatology is so common that patients are often initially admitted to psychiatric wards. As the disease progresses, patients begin to develop seizures, movement abnormalities, autonomic instability and require ICU-level care [6]. If untreated, or misdiagnosed, this condition can be fatal or result in severe, long-term disability. AIMS: Describe the initial psychiatric symptoms of anti-NMDA receptor encephalitis. Methods: Case report and literature review. Results: A 22-year old female presented with a headache for 5 days and AMS for 1 day. She previously presented to another medical center with similar symptoms but the definite diagnosis was not revealed. She did not respond to questions, spoke incoherently, and had right-sided weakness. A urine toxin screen was negative for any substances. Her CSF showed a lymphocytic pleocytosis, but a head CT and MRI (without contrast) showed no acute intracranial abnormality. A BIOFIRE assay was performed and was negative for any bacteria, viruses or fungi. A PET/CT scan showed asymmetric brain metabolism consistent with diffuse encephalopathy. A paraneoplastic or autoimmune etiology was suspected and the patient was started on a 5 day regimen solumedrol and IVIG, however her neurological status did not improve after completing the regimen. A workup for ovarian teratomas (including TVUS with doppler, pelvic CT/MRI, CA-125) returned unremarkable. She was started on plasmapheresis and her neurological exam began to improve slightly. An anti-NMDA receptor antibody assay returned positive and weekly rituximab was added to her regimen, which resulted in a marked improvement in her neurological status. The patient continued to improve and was discharged to a regional hospital in stable condition on tube feeds and seizure prophylaxis. Conclusion: This case report highlights the importance of considering anti-NMDA receptor encephalitis when acute psychiatric symptoms are accompanied by extrapyramidal symptoms, autonomic dysfunction and neurological decompensation. This consideration is especially important for psychiatrists, as most patients are initially evaluated by psychiatry before neurology or hospitalist teams become involved in the patient’s care. About 4% of NMDA-receptor encephalitis patients present with isolated psychiatric episodes, without any neurologic involvement [7]. More research and dissemination of knowledge are required to improve clinicians’ ability to make the diagnosis of anti-NMDA receptor encephalitis, as well as exclude high utility diseases based on clinical and radiological evidence.
A 50-Year-Old Man with Polyarticular Pain, Rash, and Quotidian Fever

Gregory L Damhorst, Mahesh Swaminathan, James Kumar

Arthralgia is among the most common patient presentations; however, joint pain with multisystem symptoms warrants further exploration of underlying processes, including less-common rheumatologic syndromes.

A 50-year-old male presented to the emergency department complaining of 2-3 weeks of worsening right knee pain and swelling. During the previous three days, he had made two visits to convenient care facilities because of this joint pain and rash which had variably involved the upper extremities, back, abdomen, and lower extremities. The patient also reported a one-month history of feeling febrile only at night and temperature was measured to be 104 F two days ago. The patient denied any trauma or injury involving the affected joint, as well as recent change in topical products or medication. A review of past medical history revealed previous episodes of swelling of the hand and right ankle, and distant symptoms suggestive of juvenile idiopathic arthritis. He was not taking any medications and reported no other remarkable history. Upon examination in the emergency department, there was mild swelling and warmth of the right knee, as well as warmth of bilateral shoulders. Wrist tenderness with active motion was noted. There was a rash suggestive of urticaria on the left lower abdomen. The temperature was 99.1 F. ESR was 95 mm/h and CRP was 159.00 mg/L, and there was a leukocytosis of 27.37/microliter including a neutrophil count of 25.86/microliter. Uric acid was 3.4 mg/dL. Urinalysis showed a small amount of blood, 65 RBCs per microliter, and calcium oxalate crystals. Serum ferritin was 4855.4 ng/mL. Blood cultures were drawn and treatment was initiated with vancomycin and ceftriaxone. Indomethacin was prescribed for pain. The patient was admitted for further evaluation. Serology testing for rheumatoid factor, cyclic citrullinated peptide antibody, ANA, myeloperoxidase antibody, proteinase 3 antibody, cryoglobulin S and P, HIV-1/HIV-2, hepatitis B and C, HTLV, and lyme disease were negative. Serology for parvovirus B19 and Epstein-Barr virus were suggestive only of past infection. Complement C3 and C4 levels were normal. Urine nucleic acid testing for chlamydia and gonorrhea were negative. Septic arthritis was ruled out by aspiration of the synovial fluid which was performed on day 2 of the hospitalization. On day 4 of hospitalization, the patient developed a painful tongue ulcer and complained of intermittent blurry vision. The rash had also spread to the thighs and shoulders.

Based upon on this work-up and presentation, a clinical diagnosis of adult-onset Still’s disease was made by the managing team. Still’s disease is a less-common rheumatologic condition of which clinicians should be aware which must be considered in the setting of arthritis with other inflammatory symptoms.
Background: Breast cancer is the most common tumor in women. Approximately one-third of women with breast cancer will develop metastasis and in 10% of the cases distant metastases are already present at the time of the diagnosis. Common sites of metastases include the bone, brain, liver, and lung. The common bile duct (CBD) is rarely a site of metastasis breast cancer; few cases of obstructive jaundice have been described in literature due to widespread liver metastases involving the extrahepatic ducts. We report an exceptional case of obstructive jaundice due to metastatic infiltration of the CBD in absence of liver metastasis.

Case Presentation: A 57-year-old woman who had undergone a complete mastectomy six years ago due to infiltrating ductal breast cancer is admitted with obstructive jaundice. The patient has a known history of metastatic breast cancer. In 2010 the patient had metastasis to the bone in the pectoris muscle and chest wall. The patient had recurrence in 2014 with metastasis to the right temporal lobe of the brain on MRI. The patient is s/p chemotherapy and radiation. Her initial laboratory workup revealed worsening LFTs and tumor markers in normal ranges. Imaging (computed tomography, magnetic resonance) scans suggested extrahepatic dilation of the biliary tree and stenosis of the middle portion of the CBD with no liver involvement. An endoscopic retrograde cholangiopancreatography (ERCP) confirmed presence of the marked biliary stricture and dilation of bile duct. A wall stent was placed in across the biliary stricture and across the ampulla. Fine needle aspiration and immunohistochemistry analysis revealed the tumor was metastatic breast cancer and not primary biliary cancer. Pathology showed multiple foci of carcinoma and multiple surgical margins were positive.

Discussion: Although metastatic breast cancer to the biliary ducts has low incidence, it is possible for metastatic breast cancer to spread to the regional lymph nodes of the bile duct leading to direct extension into the CBD. Our patient was originally thought to have cholangiocarcinoma, however the cytology of the distal CBD demonstrated metastatic breast cancer. Symptomatic relief was achieved with placement of wall stent. This report highlights the importance of differentiating diagnosis from cholangiocarcinoma from metastatic disease. 27 Cases of metastatic breast cancer to the CBD are reported in the literature with 10 cases involving the extrahepatic duct, 6 cases involving extrahepatic lymph nodes with direct extension into the bile duct, 2 cases of the Ampulla of Vater with extension into the CBD, 3 undetermined cases and 6 cases of CBD involvement. In conclusion, patients with history of breast cancer presenting with obstructive jaundice should be further evaluated to determine primary biliary cancer versus metastatic disease.
Neuro-Disseminated Tuberculosis in Young College Student

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Case Presentation: A 22-year-old otherwise healthy female presented to the ED with night sweats and diplopia for four days. Six months ago, she moved to the United States from India for education. Initial physical exam was notable for temperature of 99.7°F and left costovertebral angle tenderness.

Admission labs were notable for hyponatremia to 122. A chest x-ray revealed a left upper lobe cavitory lesion. Pan-CT showed psoas abscess, osteomyelitis in L1/L2 discs, and microabscesses in the liver. Brain and spinal MRI showed ring-enhancing lesions and leptomeningeal enhancement. A lumbar puncture was significant for 106/UL WBC, 153 mg/dL protein, and 39 mg/dL glucose. Based on these findings, the patient was placed in respiratory isolation and admitted to general medicine with high concern for disseminated tuberculosis. Despite fluid resuscitation, her continued hyponatremia and deteriorating mental status prompted intubation and admission to intensive care.

In consultation with the infectious disease team, the patient was started on an empiric drug regimen for neuro-tuberculosis: rifampin, isoniazid, pyrazinamide, levofloxacin, and dexamethasone. She had received childhood BCG vaccination and was unaware of any sick contacts. An extensive infectious workup was negative including HIV, herpes, mononucleosis, varicella, cytomegalovirus, respiratory viruses, fungal studies, blood and CSF bacterial cultures and PCR. A Quantiferon Gold assay was positive. The patient was discharged once stabilized and cleared for lumbar osteomyelitis. Two weeks after discharge, BAL and CSF cultures confirmed mycobacterium tuberculosis.

Discussion: The key aspect of this case was early suspicion for tuberculosis and timely initiation of respiratory isolation and treatment. Variable presentation and low prevalence makes this a challenging diagnosis. In 2014 there were 357 cases of disseminated tuberculosis in the U.S., with fewer than 100 cases of neuro-tuberculosis. While foreign-born, this patient is otherwise atypical given she is young, immunocompetent, and vaccinated. Studies show the BCG vaccine has approximately 50% efficacy 15-20 years after immunization, with best prevention against disseminated and neuro-tuberculosis. Delay of confirmation further complicates the diagnosis and is associated with worse outcome. Prompt treatment is necessary because neuro-tuberculosis has up to a 65% mortality rate. Given her advanced infection, it is encouraging she continues to recover with little reduction in function and ability to return to her education.

References:

Objective: To improve awareness and describe a case of rarely seen Weil’s disease in the United States as a potential reversible cause of renal insufficiency and hepatic failure, in a patient with recent travel history to endemic areas. To review pathognomonic findings of leptospirosis and treatments.

Case Description: A 46-year-old male presented to a Midwestern emergency department with complaints of a seven-day history of fever and a three-day history of myalgias. He also endorsed recent oliguria and darkened urine, but no frank hematuria. The patient had returned from Jamaica two weeks prior where he swam in freshwater and experienced multiple insect bites. On physical examination, the patient’s vital signs were within normal limits. He was diffusely jaundiced and demonstrated scleral icterus and bilateral conjunctival suffusions. He had muscular tenderness to palpation in his calves and thighs and a truncal maculopapular rash. The patient’s labs revealed leukocytosis, thrombocytopenia, renal and hepatic insufficiency, an elevated creatinine kinase, and a urine dipstick positive for blood without microscopic hematuria. His acute kidney injury was believed to be secondary to rhabdomyolysis, and he was treated with aggressive fluid resuscitation. Broad-spectrum antibiotics were administered, including doxycycline and ceftriaxone, due to a high suspicion of leptospirosis. The patient’s condition drastically improved after initiation of antibiotics and fluids. On subsequent days, his Leptospira antibody resulted with titers of 1:100. At an eight month follow-up visit, he made complete recovery, denied residual symptoms, and had no metabolic derangements.

Discussion: Leptospirosis is a widespread and prevalent spirochetal zoonotic disease endemic to tropical areas of the world, with an estimated 873,000 new cases annually resulting in 48,000 deaths. It is rare in the United States, with most cases due to travel exposures. As world travel becomes more prevalent, we will continue to encounter foreign endemic diseases. The presentation of leptospirosis infection ranges from sub-clinical seroconversion to jaundice and renal failure (Weil’s disease), adult respiratory distress syndrome, myocarditis, and rhabdomyolysis. Many of the signs and symptoms of this disease are non-specific, including fever, headache, myalgias, and rash. The presence of conjunctival suffusions, which are bilateral uniform reddening of the palpebral conjunctiva, are characteristic and virtually pathognomonic of the disease. Antibody testing often takes time and delays in treatment can cause rapid clinical deterioration. In such cases, empiric treatment should be initiated to cover spirochetemia before confirmation of laboratory tests. Prompt recognition and antibiotic therapy can lead to rapid reversal of symptoms and decreased morbidity and mortality, as seen with our patient.
A Different Kind of Takostubo

Introduction: Reverse takotsubo cardiomyopathy (TCM) is a rare variant of TCM. It has only recently been reported in literature and very few case reports exist. It shares with classic TCM the pathophysiology, but differs in imaging aspects that can help correctly diagnose patients with this disorder. We present a patient with clinical findings suggestive of reverse TCM triggered by acute medical illness.

Case Description: A 68-year-old woman with past medical history of hypertension and endometrial cancer status post hysterectomy presented with abdominal pain due to small bowel perforation. Post surgical resection, she was hemodynamically stable, but developed tachycardia and elevated troponin of 2.4 mg/µL. No electrocardiographic evidence of acute ischemia was noted. A transthoracic echocardiogram (TTE) showed depressed ejection fraction (EF) of 25%. Wall motion showed left ventricular apical hypokinesis with hypokinesis of basal-anterior, septal, lateral and inferior walls. There was right ventricular dilation with depressed function. Her TTE 3 months ago had shown normal EF and wall motion. Her troponin downtrended and she was initiated on medical management.

Discussion: Takostubo cardiomyopathy is a transient, reversible left ventricle dysfunction, precipitated by a physical or emotional stressor. The catecholamine surge during stressful events overwhelms the sympathetic nerve system in the myocardium by over-stimulating and consequently inhibiting the adrenergic receptors at the apex. It is hypothesized that with aging, the apical adrenergic receptors become more prevalent compared to basal regions of myocardium, explaining the apical hypokinesis and hyperdynamic base seen on the TTE in patients with TCM.

Reverse TCM has been reported to develop postoperatively and in acute medical illnesses, including pheochromocytoma, subarachnoid hemorrhage, sepsis and ingestion of stimulants. Earlier age of onset is seen in reverse TCM due to the abundance of adrenergic receptors at the base, leading to clinical manifestation of basal hypokinesis and ballooning. The right ventricular dilation on our patient’s TTE suggest biventricular involvement, which is witnessed in 25-42% of patients with reverse TCM. A 12-lead ECG may show signs of ischemia, most commonly ST segment elevation or depression. Our patient demonstrated atrial tachycardia and poor R wave progression in the absence of ischemic changes, a finding that has not been described in literature. Given the transient nature of TCM, complete resolution is expected. Our patient was initiated on medical management, but due to her advanced malignancy, palliative services were consulted. We present a case of reverse TCM in a terminally ill woman who presented with bowel perforation status post small bowel resection, who developed atrial tachycardia and poor R wave progression on EKG, elevated troponins, and acutely reduced left ventricular EF secondary to biventricular hypokinesis. We hope to illustrate the clinical significance of early recognition of reverse TCM to ensure timely medical management and prevent clinical deterioration.
**INDIANA POSTER FINALIST - CLINICAL VIGNETTE Laila Mossa-Basha**

**Chasing the Dragon**

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**Introduction:** Heroin overdose constitutes over 20% of all emergency department visits related to drug misuse or abuse.\(^1\) Since 2000, the number of deaths related to drug overdose has increased 137%, including a 200% increase in the number of deaths involving opioids.\(^2\) Because heroin can only be detected on urine drug screen for up to 48 hours, clinical presentation is important for diagnosis. Non-cardiogenic pulmonary edema has been attributed to heroin injection, while inhalation of heroin has been associated with acute interstitial pneumonia presenting as hypoxia and frothy, pink-tinged pulmonary secretions.\(^3\) We present a case of heroin inhalation resulting in alveolar hemorrhage in an otherwise clinically stable patient.

**Case Description:** A healthy 19-year old male was transferred to our hospital with complaints of hematemesis, hemoptysis, and epistaxis. He also reported shortness of breath, persistent cough, and chills. Upon admission to the outside hospital, vitals were stable and physical exam was positive for course rhonchi of the right lung field. Chest x-ray revealed a diffuse alveolar process of the right lung representing pneumatic infiltrate versus intrapulmonary hemorrhage. Further imaging with CT demonstrated diffuse right lung patchy opacities, concerning for alveolar hemorrhage. Laboratory tests revealed a leukocytosis of 16.1 and hemoglobin of 14. Given the unusual presentation of alveolar hemorrhage isolated to two lobes, further history-taking revealed that the patient had inhaled heroin 2 days prior to the onset of symptoms. Pulmonary consultation confirmed our diagnosis of alveolar hemorrhage secondary to heroin inhalation. The patient was managed conservatively with resolution of his symptoms 4 days after heroin use.

**Discussion:** Heroin inhalation has been infrequently reported in the literature, and when reported, typically presents as acute interstitial pneumonia. Our patient demonstrates a unique presentation of heroin inhalation overdose. Initially, he did not admit to heroin use, so we were unsure of what was causing his epistaxis, hemoptysis, and hematemesis, and if they were all related. After admission, it was determined that the bleeding began in his nose due to irritation from the inhalation of heroin. This then resulted in blood entering the GI tract, causing hematemesis. Moreover, the inhalation of heroin caused a chemical pneumonitis with alveolar hemorrhage and hemoptysis. To our knowledge, this is the first reported case of alveolar hemorrhage due to heroin inhalation.

**References:**

A Case of Serum Sickness-Like Reaction from Re-Initiation of Infliximab in Fistulizing Crohn's Disease

Andrea Sitek, MS4; Amanda Jobe, MD; Aroop Pal, MD

Introduction: Infliximab was the first biologic approved in the treatment of Crohn’s disease and is commonly used today. A delayed systemic reaction or serum sickness-like reaction is a known complication in patients receiving treatment with Infliximab who have had prior exposure. We present a case of a 26-year old patient who developed severe serum sickness-like reaction as a result of a delayed second infusion.

Case Presentation: A 26-year old male with Crohn’s disease presented with acute onset of severe, symmetrical polyarthralgia and myalgias. His presentation was striking and pain so severe that he could hardly move and had difficulty opening his mouth. He also reported mild dysphagia to solids and liquids. Physical exam was remarkable for bilateral synovitis of his MCPs, PIPs, wrists, elbows, shoulders, knees and ankles as well as a macular, erythematous rash over his bilateral wrists and forearms and a malar-appearing rash on his face. He developed intermittent fevers the night of admission with a mild leukocytosis. He received an Infliximab infusion nine days prior to admission. He had been exposed to multiple infusions of Infliximab as an adolescent; his initial exposure to Infliximab caused an allergic reaction with hives. He denied any recent travel, insect bites or sick contacts. His procalcitonin was elevated at 7.88, but an extensive infectious workup was negative. An extensive rheumatologic workup was negative, as well. The patient showed marked clinical improvement on IV steroids and was discharged on a steroid taper. Roughly two weeks after completing his steroid taper, patient reported mild redevelopment of his symptoms. This led to concern for recurrence of his delayed reaction, and he was reinitiated on steroid treatment.

Discussion: A delayed serum sickness-like reaction is a known complication in patients with prior exposure to Infliximab, and according to the literature, is most commonly associated with a distant second infusion (= 20 weeks from the first infusion). The clinical manifestations include: polyarthralgia, myalgias, rash, fever, pruritis, edema, sore throat, and dysphagia and generally appear 3-12 days after infusion. It is important for physicians to be aware of such a complication as the presentation can be striking and can mimic several infectious and rheumatologic diseases. It is also important for prescribers to be aware of this association when considering Infliximab as part of a regimen. Several treatment strategies have been outlined in an effort to reduce the incidence of a severe reaction. Strategies include concomitant treatment with steroids or immunomodulators and the development of structured induction and maintenance regimens that avoid long periods between treatments.
ST Segment Annotation

Kristin Andres BS, Meenakshi Bhalla MD

Case Report: A 28 year old male with no significant past medical history presented with substernal chest pressure of 3 days’ duration with associated productive cough, myalgias, chills and fever to 104.6 F. He had visited his PCP 3 days prior and was prescribed amoxicillin for presumed upper respiratory infection without relief. On presentation he was febrile (103 F) and tachycardic. Physical exam was notable for coarse breath sounds and dullness to percussion over the base of the right lung, and tachycardia with normal rhythm and no extra heart sounds. Chest x-ray revealed an opacity in the right lower lobe of the lung concerning for pneumonia. EKG revealed ST elevation in precordial leads V1-3 and an incomplete right bundle branch block (RBBB). Cardiology was consulted due to suspicion of Brugada syndrome. The ST elevation resolved once the patient was afebrile. The patient was scheduled for an outpatient Flecanide drug challenge test for definitive diagnosis of Brugada syndrome and evaluation of need for ICD placement.

Discussion: When ST segment elevation is seen on EKG a primary concern is ischemia. However, a variety of conditions other than STEMI can result in ST elevation including but not limited to: pericarditis, early repolarization, left bundle branch block (LBBB), left ventricular hypertrophy (LVH), hyperkalemia and Brugada syndrome. In some of these conditions the observed ST changes are normal variants observed in healthy individuals without underlying cardiac disease. However, in others ST changes may indicate maladaptive remodeling of the myocardium, inflammatory processes, or even disturbances of the cardiac conduction system that place the patient at increased risk for sudden cardiac death (SCD). Therefore, it is of upmost importance to accurately identify the cause of a patient’s ST elevation. Patient demographics, comorbidities, clinical presentation and physical exam are key in distinguishing between ischemic vs non-ischemic ST elevation. However, features of the EKG itself can also help to distinguish between the potential causes of ST elevation. Attention to ST segment morphology is particularly important in evaluation of ST elevation in asymptomatic otherwise healthy patients since some morphologies are benign and require no further workup (early repolarization) while others are associated with fatal arrhythmias (Brugada). Diagnosis of Brugada syndrome relies on the recognition of classic EKG findings of an incomplete RBBB and coved ST elevation >2mm in one or more of the precordial leads. Patients with this EKG pattern and a family history of SCD or a personal history of ventricular arrhythmias, syncope or agonal nocturnal breathing are at high risk of having Brugada syndrome and warrant further electrophysiology workup to assess for necessity of ICD placement.
MARYLAND POSTER FINALIST - CLINICAL VIGNETTE Parth Maheshwari

A “Graves” Case of Ulcerative Colitis

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Refractory Ulcerative Colitis is a clinical dilemma that requires a meticulous workup for precipitating reversible etiologies. It should be dealt with rapidly due to its high mortality and morbidity from related complications.

A 42 year old African American male inmate with a recent diagnosis of Ulcerative Colitis (UC) was transferred for management of an UC flare. The patient was diagnosed 2 months back to have UC by biopsy, when he presented with bloody diarrhea, abdominal pain and systemic symptoms. At the time of diagnosis, he was started on oral steroids and discharged after a moderate response. He subsequently represented to an outside hospital for a flare up and was started on steroids again. However, he failed to respond to this and continued to have symptoms. Further investigation revealed a suppressed TSH, elevated free T4 and T3 levels. No treatment was initiated for the hyperthyroidism and the patient was discharged on a steroid taper to follow up in clinic. The patient was then sent to another hospital for his unrelenting symptoms, was started on IV steroids, and given a single dose of IV infliximab, but did not respond and was then subsequently transferred to our hospital. On arrival the patient was noted to have SIRS with a BP of 123/59, HR of 113, and temperature of 37.2°C. He was severely cachectic and in distress. His abdominal exam was significant for diffuse tenderness with no guarding. His serum laboratory work revealed a Sodium of 129 mmol/L, WBC of 10.7, Hb of 10.3 g/dl, Platelets of 431, ESR of 86, CRP of 12.4 mg/dl, TSH of 0.00, T4 of 2.9 ng/dl, T3 of 10.1 pg/dl and positive thyrotropin antibodies. Thyroid ultrasound revealed a diffusely enlarged thyroid gland. CT scan abdomen revealed pancolitis consistent with severe acute UC. Stool antigen study was negative for C.diff. The patient was started on propranolol, and methimazole for the hyperthyroidism and repeat thyroid function tests confirmed resolution. For the UC flare he was started on oral mesalamine along with IV steroids. Due to a poor response, he was also started on mesalamine enemas after a few days. Pt gradually started to improve and was eventually discharged with methimazole, propranolol, steroids and mesalamine.

This case illustrates the high association of autoimmune thyroid disorders with inflammatory bowel diseases (IBD) (3.8% vs 1.3% for the younger population). The presence of coexisting thyroid disorders should be entertained in cases of IBD that are refractory to initial therapy. Early treatment of underlying hyperthyroidism can help in a more rapid control of UC symptoms and prevent unnecessary morbidity. The systemic symptoms of hyperthyroidism and IBD are similar and can muddy the picture leading to delays in diagnosis. Moreover, the presence of hyperthyroidism can aggravate the symptoms of IBD and render it refractory to therapy and similarly untreated UC can set off hyperthyroidism.
Acute Genital Ulceration Caused by Salmonella Typhi

Shreya Madhavaram, Thomas Treadwell MD

INTRODUCTION: Typhoid fever, caused by the bacterium Salmonella enterica serotype Typhi, is endemic in developing countries, especially south-central Asia and affects 22 million individuals worldwide each year (CDC). It is transmitted by contaminated food or water and presents as a systemic infection. A rare manifestation of typhoid fever is genital ulcerations, with only 20 cases ever reported in literature.

CASE DESCRIPTION: A 29-year-old Indian woman presented to the emergency department with a fever of 102, malaise, body aches, abdominal cramps and headaches. She had just returned from northern India visiting friends and relatives with her husband. The onset of these symptoms started 4 days prior to her return back to the United States. The patient had consulted a physician in India, who made the diagnosis of urinary tract infection and gave the patient a twice-daily 5-day course of fixed-dose combination tablet of cefixime 200 mg and ofloxacin 200 mg. She had taken 5 doses with no resolution of symptoms. The patient is sexually acting in a monogamous relationship and her month long trip to India included a history significant for multiple mosquito bites, transient fever that resolved, consumption of street food, and the use of a commode with a high-pressure jet-spray fountain to wash off the bottom after urination and defecation. On physical examination, pertinent negatives included the absence of a rash, or significant tenderness in her abdomen. However, on further examination, patient was found to have painful necrotic vaginal ulcers. Laboratory studies revealed a negative malaria smear, normal chemistries, 3 positive blood cultures for Salmonella Typhi, a positive urine culture for E.coli, negative HIV antibodies, negative anti-treponemal antibody, and a negative culture for Herpes simplex. The blood culture isolate was resistant to fluoroquinolones (FQ). The patient received a 14-day course of ceftriaxone. Fevers ablated after 4 days of treatment, and there was slow resolution of fatigue and ulcers.

DISCUSSION: This case illustrates the rare presentation of genital ulceration as a manifestation of typhoid fever. The pathogenesis and mechanism of the ulceration are unknown. Possible mechanisms are bacterial emboli, direct inoculation by feces and urine, and effects of endotoxin. This case emphasizes the need to include enteric fever as a differential diagnosis for genital ulcerations in patients with travel history to areas with endemic typhoid. Our patient brings into focus the emergence of FQ resistance in typhoid fever, particularly in India, and the importance of education and vaccination in travelers.
MICHIGAN POSTER FINALIST - CLINICAL VIGNETTE Olusola Ogundipe

When Botox Works Too Well: The Unmasking of Myasthenia Gravis

First Author: Olusola Ogundipe, RN, BN, MS4 Other Author: Kedareeshwar Arukala, MD; Supervising Author: Anupam A Sule, MD, PhD, FACP.

Introduction: Myasthenia gravis (MG) is painless fatigable muscle weakness, acquired forms of which have a reported annual incidence of 3-4/1,000,000 population. Botulinum toxin is a potent neurotoxin that is approved for the treatment of dystonic conditions and for cosmetic indications.

Case report: A 52 year old woman was seen after receiving Botox injections. On presentation patient had left sided facial droop and ptosis but no other neurological findings. Initial labs, CT, MRI and carotid duplex were non-contributory. Avoiding anchoring heuristic and framing effect biases, an ice pack test was performed which led to provisional diagnosis of MG. Confirmation was provided by decremental muscle response on EMG and swallow dysfunction on swallow assessment. Laboratory testing was negative for MuSK, AChR antibodies, HIV, EBV, varicella, VRDL, HSV, Borrelia burgdoferia, RNP and Smith antibodies. Patient received pyridostigmine and physical therapy with encouraging results. She was discharged to follow up with neurology. Pyridostigmine was weaned, but later resumed due to bilateral ptosis.

Discussion: Myasthenia gravis is a potentially life threatening condition with up to 20% of patients experiencing a myasthenic crisis with respiratory failure and inability to manage secretions. Some authors have reported significant morbidity association with use of Botox, suggesting a theoretical contraindication to the use of Botox in patients with known MG.

Conclusion: Administration of Botox in MG may increase its potency and adverse effects. Physicians should have a high index of suspicion of MG in patients with recent cosmetic procedures presenting with ptosis or acute dystonia.
INTRODUCTION: The Clinical Institute Withdrawal Assessment of Alcohol (CIWA) scale is a well validated tool in quantitatively assessing the severity of acute alcohol withdrawal and determining its management. CIWA can also be used in managing stimulant overdose.

CASE: A 63-year-old gentleman with a past medical history of alcoholism (sober for 3 years) and depression reported that he drank eight bottles of wine over three days due to worsening depression. He was agitated, anxious and complaining of generalized pain. He denied auditory or visual hallucinations. His vital signs were stable. His blood alcohol concentration was 0.3%, urine drug screen was negative and his CIWA score was 28. His family revealed that he had recently re-filled his armodafinil and all 72 pills were gone. He required lorazepam infusion titrated to CIWA score and he responded well.

DISCUSSION: The patient was receiving armodafinil for treatment resistant depression. Although our patient openly admitted to his history of alcohol abuse and recent binge drinking, his clinical presentation was more suggestive of stimulant overdose than acute alcohol withdrawal. The CIWA scale was utilized for directing treatment with benzodiazepines, although the origin of intoxication was not alcohol and this patient was not experiencing delirium tremens at presentation.

CONCLUSION: Physicians should recognize that stimulant overdose can mimic alcohol withdrawal and prevent anchoring bias and framing effects in the diagnostic evaluation. CIWA scale and benzodiazepines can be effectively used for management of stimulant overdose.
Psychic Moans: An Unusual Presentation of Multiple Myeloma

Frederique St-Pierre, Omar Yasin MD,MS, Jonas Paludo MD, Alexandra P. Wolanskyj MD

Visual hallucinations are defined as the perception of an object or event in the absence of an external stimulus. Although hallucinations are commonly associated with psychiatric disease, the differential diagnosis is in fact quite broad. Physicians should consider serious and even life-threatening underlying conditions when patients present with such symptoms.

A previously healthy 65 year-old woman presented to the hospital with a five-day history of nausea and fatigue. She also had a recent history of visual hallucinations occurring sporadically throughout the day, each lasting for a few minutes. These hallucinations were distressing to her, and consisted of cursive writing on the walls. She had no apparent delusions, agitation, or disorganized speech. Her physical exam was unremarkable, and mental status exam was normal. Laboratory investigations were significant for hypercalcemia with a total calcium of 14.1 mg/dL, acute kidney injury with a serum creatinine of 2.5 mg/dL, and normocytic anemia with a hemoglobin of 11.5 g/dL. She was treated with IV fluids and furosemide, and her visual hallucinations completely resolved within three days. Her calcium normalized quickly, but her creatinine remained elevated despite fluid administration. Further investigations revealed parathyroid hormone suppression at 10 pg/mL, as well as elevated serum and urine protein with a serum IgG lambda M-spike of 1.4 g/dL. Renal biopsy showed evidence of cast nephropathy. Bone survey revealed no lytic lesions but did show scattered osteopenia. A bone marrow biopsy confirmed a diagnosis of an IgG lambda multiple myeloma.

Psychosomatic manifestations of multiple myeloma have been described in the literature on a few occasions. Some case reports have documented mood disturbances, namely depression and mania, and a study has reported four cases presenting with delirium. Isolated visual hallucinations, however, have rarely been described. A recent case report has documented a patient presenting with visual hallucinations three months prior to having overt symptoms of the myeloma. Potential causes of hallucinations in multiple myeloma include hypercalcemia, renal failure and infections. Increased cytokine levels may also be contributory. In this vignette, the clinical evolution suggests hypercalcemia as the most likely putative cause. Visual hallucinations in patients with hypercalcemia have been described, and are best underscored in the classic “painful bones, renal stones, abdominal groans, and psychic moans” of primary hyperparathyroidism. This case highlights that visual hallucinations may be the first presenting symptom of cancer-associated hypercalcemia. Disturbing and anxiety-inducing symptoms of visual hallucinations may be completely reversible with timely diagnosis and initiation of effective therapy directed at the underlying cause. It is imperative to maintain an elevated level of clinical suspicion for malignant causes of visual hallucinations in order to optimize patient outcome.
MINNESOTA POSTER FINALIST - CLINICAL VIGNETTE Robert Ward

A Rare but Important Complication of Statin Use

First Author: Robert Ward Second Author: Weihuang Vivian Ning Senior Author: Shadi Dowlatshahi

**Case Presentation:** 80 year-old female with history of dyslipidemia on statin therapy, and diabetes presented to the clinic with a three month history of progressive weakness. She initially presented with lower extremity weakness and was found to have mildly elevated transaminases. Statin therapy was held. However, her symptoms did not improve, and transaminases remained persistently elevated. Right upper quadrant abdominal US revealed steatosis. The patient’s lower extremity weakness progressed to include the upper extremities with dysphagia and dysphonia. She was admitted to the hospital due to worsening examination findings. On admission, vitals were stable. Physical exam revealed decreased strength in all extremities, a mute Babinski sign and absent deep tendon reflexes. In addition to mildly elevated transaminase, creatinine kinase (CK) was significantly elevated. Autoimmune, infectious, and malignancy work up were negative. Thoracic spine MRI showed hyperintense signal changes of the posterior musculature concerning for inflammation. Electromyography (EMG) findings were consistent with a myopathic process. Muscle biopsy revealed numerous muscle fibers in various stages of necrosis and myophagocytosis. Patient was diagnosed with statin-induced immune mediated necrotizing myopathy (IMNM). Rheumatology was consulted and recommended high dose steroids and intravenous immunoglobulin. Patient’s symptoms significantly improved within a week and she was transferred to a rehabilitation facility for further physical therapy.

**Discussion:** IMNM is a rare and serious condition that is distinct from other myopathies, such as polymyositis or inclusion-body myositis. Patients typically present with proximal muscle weakness and myalgia, which persists even after statin therapy is discontinued. Severe cases can lead to dysphagia or diaphragmatic weakness causing respiratory distress. Laboratory data is significant for an elevated CK level, and mild transaminase elevation. EMG findings are consistent with a myopathic process and MRI will show evidence of muscle edema. On histology, IMNM classically displays myofiber necrosis and regeneration, with minimal lymphocyte infiltration. This constellation of findings supports a diagnosis of IMNM. Autoantibodies against 3-hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase are present in the biopsy specimens of the majority of patients exposed to statins, confirming the diagnosis of statin-induced IMNM. Patients are initially treated with corticosteroids and may require additional immunosuppressive agents, depending on the severity of the weakness and the initial response to steroid treatment.

**Conclusion:** IMNM is a rare but clinically important diagnosis. The majority of prescribers of statin therapy are internists and cardiologists, most of whom are unaware of this condition. It is essential for clinicians to consider IMNM in the differential when symmetrical proximal weakness persists after statin cessation.
**MISSOURI POSTER FINALIST - CLINICAL VIGNETTE** Ryan Morrow

Chapter Winning Abstract

Morrow RP, Shuler J, & Rojas-Moreno C

**Introduction**: Hyponatremia is a common electrolyte abnormality encountered in hospitalized patients. Sodium correction must be done at a slow rate due to the risk of central pontine myelinolysis with rapid correction.

**Case Description**: A 60-year-old male with a past medical history of HTN, HLD, and T2DM presented to an ER after falling at home. Leading up to the fall, he claimed to have a three-day progression of weakness. On physical exam, he was alert and oriented with minor bruising to his lower extremities and no neurologic findings. Initial labs revealed a sodium of 96 mmol/L and elevated troponin. He was transferred to the CICU for NSTEMI evaluation and hyponatremia correction. On admission to the CICU, his sodium was 100 mmol/L and corrected with 3% NS. Within ten hours his sodium level was 110 mmol/L. Intravenous fluids were switched to D5W. Hyponatremia was likely secondary to thiazide diuretic use. His sodium was slowly corrected and he progressed well without any neurologic deficits. Ten days after admission, psychiatry was consulted for altered mental status due to his labile mood and inappropriate crying spells. Psychiatry discussed etiologies of pseudobulbar affect and recommended a MRI to assess for an organic cause. MRI results revealed central pontine myelinolysis.

**Discussion**: Central pontine myelinolysis is a consequence of rapid sodium correction and can result in locked-in syndrome. The suggested correction rate for hyponatremia is to increase sodium by 0.5 mmol/L/h. If a patient is acutely symptomatic, correction can be increased to 2 mmol/L/h for the first 2-3 hours or until asymptomatic. This patient’s sodium was initially corrected at a rate of 1 mmol/L/h and resulted in central pontine myelinolysis. However, he did not exhibit locked-in syndrome or any of the common neurologic deficits associated with central pontine myelinolysis.
NEBRASKA POSTER FINALIST - CLINICAL VIGNETTE Sydney Marsh

Nocardia Mastoiditis in an Immunocompromised Patient with Recurrent Otitis Media

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Introduction: Nocardia, a gram positive bacteria, is found primarily in the immunocompromised population. We present a case of nocardia causing mastoiditis in a patient with history of recurrent otitis media.

Case Presentation: A 72 year old male with past medical history of multiple myeloma presented with six weeks of persistent right ear drainage. The initial computerized tomography (CT) scan six weeks prior revealed right otitis media and bilateral mastoiditis. He underwent a course of ertapenem, then was switched to ceftazidime and levofloxacin for four weeks without resolution. A follow-up CT scan revealed a right mastoid effusion, and culture of the ear drainage was taken at that time. Subsequent MRI revealed a one cm right temporal dural-enhancing nodule, prompting admission. Exam was significant for right otorrhea with erythema and induration of the tympanic membrane. No erythema or fluctuance was noted over the right mastoid. Additionally, right sided Bell’s palsy with inability to close the right eye was present. Initially, vancomycin and meropenem were started; however, therapy was adjusted to Bactrim, moxifloxicin, and doxycycline, as results of the ear culture revealed Nocardia farcinica. Follow up was arranged with Infectious Disease clinic after 6 weeks of therapy.

Discussion: Nocardia species are opportunistic infectious agents often found in the immunocompromised population, producing chronic granulomatous suppurative infections. Nocardia farcinica is an increasingly recognized pathogenic strain of the gram positive Nocardia species. The most common presentation is pulmonary nocardiosis, seen in HIV patients. Few case reports have been published regarding Nocardia causing mastoiditis. Diagnosis of Nocardia mastoiditis can be made with visualization of the organism in gram stained specimens of ear exudate. It is important to recognize the organism clinically in order to treat with appropriate antibiotics, as sulfonamides are the first line agent. However, in this case, due to inadequate prior treatment with IV antibiotics, the unexcluded possibility of a polymicrobial infection, and our patient’s optimistic clinical picture, a multi-drug treatment plan, based on antibiotic susceptibilities, was instituted.

In conclusion, we report a rare case of Nocardia causing mastoiditis in a patient with multiple myeloma. High suspicion for this organism is needed in diagnosing and initiating treatment with antibiotics appropriate for the patient’s particular situation.
NEBRASKA POSTER FINALIST - CLINICAL VIGNETTE Evan Olson

Spontaneous Coronary Artery Dissection Identification and Management: A Case Report

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Introduction: Spontaneous coronary artery dissection (SCAD) is a rare cause of sudden cardiac death classically seen in otherwise healthy, peripartum females. However, it would be prudent to recognize that it can be seen in the elderly as well. We present a case of SCAD of the second obtuse marginal artery in a post-menopausal female who presented with sudden onset of shortness of breath and chest pain.

Case: A 62-year-old quadriplegic, multiparous female presented to the emergency department (ED) after an episode of sudden onset chest pain. Her past medical history was significant for atrial fibrillation, hyperlipidemia and hypothyroidism. En route vitals showed: blood pressure 71/41, heart rate 79, respiratory rate 22 and temperature 35.9°C. Upon arrival to the ED, she was apneic with pulseless electrical activity, cardiopulmonary resuscitation was commenced and an unsynchronized shock caused return of spontaneous circulation. She was intubated and taken to the intensive care unit (ICU) after an electrocardiogram showed non ST-segment elevation myocardial infarction; initial troponin was <0.04 ng/mL. In the ICU, she was given intravenous normal saline, started on a heparin drip and administered broad spectrum antibiotics. The next day her troponin rose to 22.3 ng/mL. A transthoracic echocardiogram (TTE) revealed a left ventricular ejection fraction (LVEF) of 20-25% with grade III diastolic dysfunction and moderate mitral valve regurgitation. Cardiac catheterization revealed spontaneous coronary artery dissection at the second obtuse marginal branch of the left circumflex coronary artery, but revascularization could not be performed. Three days later, a repeat TTE showed LVEF improved to 45-50%. An implantable cardioverter defibrillator was placed and dual anti-platelet therapy was started. The patient was discharged, and she is alive and well 3 months later.

Discussion: Spontaneous coronary artery dissection (SCAD) is typically seen in young, healthy, peripartum women presenting with chest pain and cardiogenic shock. However, it is important for clinicians to recognize less common presentations of SCAD, as seen in this case. This is because SCAD is associated with greater than 25% mortality when unrecognized, while it has a near 100% survival when identified early. The etiology of SCAD is debated, but it is generally accepted that vessel wall weakness is an important risk factor. The management of SCAD continues to be a challenge as no guidelines for treatment exist. The paucity of knowledge about SCAD necessitates a concerted effort to document cases and their management so that we can develop guidelines for best management. In addition, clinicians must be quick to recognize and assess patients with SCAD due to its high mortality late in the disease process.
Paraesophageal Hernia: A Great Imitator

Introduction: Physicians are challenged in assessing patients with chest pain. A paraesophageal hernia occurs when the stomach fundus herniates through the phrenoesophageal membrane. Although often presenting asymptptomatically or with vague gastric symptoms, paraesophageal hernias may mimic the nature and location of myocardial ischemia.

Case: A 73 year old female presented to the emergency room with sudden onset substernal chest pain radiating to her left arm. She had five seconds of sharp shooting pain in her left chest that self-resolved after rolling over from laying on her side. The chest pain returned three hours later at a 3/10 intensity that worsened with deep inspirations. She denied dyspnea or dysphagia. With a concern for signs of heart disease, she went to the ED for further evaluation. Past medical history was significant for hypertension, diabetes, hyperlipidemia and what she believed to be similar "small heart attacks". While in the ED, aspirin and sublingual nitroglycerin alleviated her pain. Upon physical exam, a 3/6 systolic ejection murmur was heard along the left sternal border. No other abnormal findings were observed. Troponins, electrocardiogram and chest x-ray were noncontributory. The patient denied a cardiac stress test to definitively rule out cardiac disease but agreed to a transthoracic echocardiogram for further evaluation of atypical chest pain. Interestingly, the echocardiogram displayed a large echo-dense mass beneath the left ventricle, moderate bilateral enlargement and moderate tricuspid regurgitation. The possibility of an esophageal cause of the pain was confirmed by a chest CT which revealed a large paraesophageal hiatal hernia with retained food products. Her arm pain was likely referred from diaphragmatic irritation by the hernia.

Discussion: Chest pain is the second most common presenting complaint to the emergency room. This case illustrates the complexity in differentiating cardiac versus noncardiac causes of chest pain. The patient in this case had significant coronary artery disease risk factors accompanied with substernal chest pain radiating to the left arm which was relieved with nitroglycerin. Although hiatal hernias are typically asymptomatic or present with gastroesophageal reflux, postprandial fullness and nausea, previous cases in literature have also described a nature and location that is otherwise indistinguishable from cardiac disease. An esophageal origin of chest pain can be uniquely identified from other possible causes by symptoms of dysphagia and precipitation of chest pain through postural changes. Difficulty persists in effectively identifying noncardiac causes of chest pain. Because untreated acute coronary syndrome is life-threatening, patients undergo an extensive diagnostic workup including EKG, cardiac enzymes and cardiac stress testing. Maintaining a broad differential and performing a thorough history and physical exam may help reduce unnecessary costs in evaluating patients with acute chest pain. Further, patients with a negative cardiac workup for chest pain in the ED may benefit from outpatient management as an effective means to decrease hospital burden.
A Case of Staph Lugdunensis Causing Destructive Native Valve Endocarditis

Makayla Romboy MSIII, Swetal Patel MD, Yousef Elmofti MD, John Varras MD

Introduction: Staph Lugdunensis is a gram-positive, coagulase-negative bacteria that is part of the normal skin flora. Infections are uncommon and usually involve the skin and soft tissues. It has also been reported to cause discitis, peritonitis, and brain abscesses and is an important cause of endocarditis.

Case Report: A 59-year-old obese female with a history of congestive heart failure and type 2 diabetes mellitus was admitted with a history of progressive left upper extremity weakness and pain. On admission, she was afebrile with a pulse of 78, respiratory rate of 18, and blood pressure of 141/63. On physical exam, her left upper extremity strength was 2/5. She had 5/5 strength in all other limbs without cranial nerve involvement. Her WBC was 12.6, CRP was 144, and ESR was 87. MRI of the cervical spine showed slightly elevated signal intensity in the C5-C6 disk space with minimal irregularity endplates. The initial differential diagnosis was suspicious for discitis. The patient was started on vancomycin and ceftriaxone for presumed discitis. Blood cultures obtained at time of admission grew gram-positive cocci in clusters, identified as Staph Lugdunensis, and antibiotics were changed to nafcillin following sensitivity report. A few days later, the patient became septic with altered mental status and worsening renal function. Repeat blood cultures continued to be positive for S. Lugdunensis despite appropriate antibiotic therapy and the patient’s health continued to decline. At this point, infective endocarditis was suspected. A transesophageal echocardiogram (TEE) was obtained and showed multiple vegetations on the posterior mitral valve, the largest ranging 1.5-2 cm, with tearing of the posterior leaflet. Cardiothoracic surgery was consulted and recommended valve replacement. Patient experienced respiratory distress and was intubated and upgraded to the ICU where ceftaroline and linezolid were added to her therapy. Unfortunately, she expired before surgery was able to be performed.

Discussion: This case highlights the importance of early suspicion, imaging and surgical intervention of endocarditis with S. lugdunensis bacteremia. Studies have shown that S. lugdunensis bacteremia is associated with endocarditis in up to 50% of patients. Unlike other coagulase-negative staph species, S. Lugdunensis can cause a destructive native valve endocarditis with a high mortality rate despite appropriate antibiotic therapy. Because of this strong association, it is important to obtain a TEE as soon as blood cultures are positive as early surgical intervention is often imperative. Delay in diagnosis of endocarditis from staph lugdunensis can significantly worsen prognosis. Due to Staph Lugdunensis ability to destruct a native heart valve rapidly, it is important to obtain a TEE as soon as it is identified in blood cultures and to consider early cardiothoracic surgical consultation and intervention.
Capnocytophaga canimorsus is an uncommon but serious cause of sepsis and meningitis that particularly affects asplenic patients and alcoholics. The slow growth, relative fastidiousness, and sometimes atypical CSF results seen with C. canimorsus mean that it may be missed unless special care is taken to ensure its isolation.

A 63-year-old man presented to the Emergency Department with acute onset of disorientation, confusion, and altered behavior following 5 days of nausea, vomiting, fever, and anorexia. His past history was significant for dog bites on his forearm and cheek one week prior, chronic alcohol use (4 beers per day), and untreated hypertension. On exam the patient was confused, lethargic, and uncooperative without apparent meningeal signs or focal neurologic findings. His bite wounds were healing, with local ecchymoses but no erythema, edema, or drainage. He was febrile (100.8 F), hypertensive (170/86), and tachypnic (28). Laboratory studies revealed severe thrombocytopenia and leukocytosis. The patient was admitted for sepsis with meningitis vs. alcohol withdrawal. He was treated empirically with vancomycin, ceftriaxone, ampicillin and Solu-medrol, and started on an alcohol withdrawal protocol. However, due to the patient’s agitation and thrombocytopenia, it was felt that it was not safe to proceed with lumbar puncture during the first 24 hours of admission. By hospital day two, however, his mental status and platelet count had improved, and so a lumbar puncture was done. His CSF showed WBCs of 308 (with a lymphocytic predominance), RBCs of 251, protein of 95, and glucose of 59; no bacteria were observed on gram stain. Acyclovir was added to cover possible herpes encephalitis. Over the next several days the patient continued to improve. The acyclovir was discontinued after herpes PCR came back negative, and the vancomycin and ampicillin were discontinued after CSF bacterial culture returned negative, as well. Blood cultures were negative at five days of growth; however, the lab had been informed of the team’s suspicion of Capnocytophaga and continued incubation. Five days later, final blood cultures revealed Capnocytophaga canimorsus in all bottles. The patient continued to improve and was discharged home uneventfully. He completed a total of 14 days of ceftriaxone as an outpatient.

This case highlights the importance of careful history taking, clinical suspicion of Capnocytophaga, and close collaboration with the lab to ensure accurate diagnosis and appropriate duration of treatment. Due to the delayed LP after antibiotic administration, CSF gram stain and culture were unhelpful, and prolonged incubation of blood cultures was essential for making the diagnosis.
Necrotizing Autoimmune Myopathy (NAM) associated with 3-hydroxy-3-methylglutaryl-coenzyme A Reductase (HMGCR) antibodies has been described in statin-induced and statin-naive patients. Proximal muscle weakness is the presenting symptom in HMGCR NAM. CK levels can exceed 10x normal values. Statin-induced cases involve two thirds of HMGCR NAM patients and are more likely to respond to immunosuppressive therapy. Muscle biopsy confirms the diagnosis. We report a case with progressive oropharyngeal dysphagia as the presenting complaint with poor response to treatment. To our knowledge, there has been only one previously reported case of statin-exposed HMGCR NAM with a similar presentation.

A 79 year old gentleman presented with four weeks of progressive dysphagia to solids and liquids, a 25lb weight loss and fatigue. He denied odynophagia, vomiting, dyspnea, fevers, skin changes, or arthralgias. No recent vaccinations were administered. Over time he also reported pain with weakness in bilateral lower extremity proximal muscle groups. Increased effort was needed to rise from the sitting position. Once upright he could ambulate. He denied tobacco or alcohol use. He has diabetes treated with metformin, hypertension controlled with medications and hyperlipidemia treated with daily atorvastatin for the past 2 years. Statin was discontinued 2 weeks prior to admission. Age appropriate cancer screening was completed. On exam HR was 96, BP was 137/65 and RR was 18 without hypoxia. He was thin with notable temporal wasting and gargled speech. No neck masses were detected. Cardiopulmonary and abdominal exam were normal. Rashes and edema were absent. Neurological exam revealed intact cranial nerves, no tremors, fasciculations or muscle wasting, no difficulty in raising arms above his head but visible difficulty rising from a chair with a subsequent normal gait, symmetric reflexes and normal cerebellar and sensory testing. Labs included a CPK of 8185, aldolase of 346 (normal < 8), AST/ALT of 176/395 (subsequently normalized), normal renal function, and a hemoglobin of 10. TSH and B12 levels were normal. HIV, T-SPOT, Hepatitis B/C were negative. Vitamin D levels were low. A barium swallow confirmed cricopharyngeal paralysis. MRI brain was normal. Myopathy workup was pursued. Myositis panel antibodies including Jo-1, Mi-2, SRP, U2-snRNP, U1-RNP, NXP-2, and TIF1 were all negative. Anti-HMGCR antibodies were markedly elevated at > 200 (normal < 20). Biopsy revealed muscle fiber necrosis, phagocytosis, macrophages and regeneration with minimal inflammation. Despite steroids, IVIG and Rituximab, the patient’s clinical condition deteriorated with inability to ambulate and continued need for PEG feeding.

We highlight two variations to the traditional description of statin-induced HMGCR NAM: oropharyngeal dysphagia replacing the classic presentation of proximal muscle weakness and progression of disease despite immunosuppression.
NEW MEXICO POSTER FINALIST - CLINICAL VIGNETTE Christopher Anstine

Henoch-Schonlein Purpura: A Case Masquerading as Crohn’s Disease with Atypical Rash

Christopher Anstine, Tanya Greywal, MD, Mary Lacy, MD

Introduction: Henoch-Schonlein Purpura (HSP) is a systemic vasculitis related to IgA deposition in small vessels. HSP is characterized by palpable purpura, polyarthralgias, renal disease, and abdominal pain. In adults, HSP is rare and often presents atypically with severe symptoms, making early diagnosis challenging.

Case Description: A 20-year-old man visiting from China presented to a community hospital with severe nausea, vomiting, and abdominal pain after eating. Symptoms were not relieved with pain or anti-emetic medications. The patient underwent esophagogastroduodenoscopy (EGD) showing distal duodenal ulceration suspicious for Crohn’s disease (CD). However, biopsies were reportedly negative. Subsequently, the patient developed hematemesis, hematochezia, and a localized petechial rash of his left wrist. The patient was transferred to our hospital and underwent another EGD and colonoscopy showing diffuse ulceration associated with fibrinous exudate in his stomach, duodenum, terminal ileum, and colon. The presence of edematous terminal ileum with cobblestoning and skip lesions was again concerning for CD. However, biopsies showed ischemic changes without evidence of CD. The patient then developed new petechiae evolving into confluent purpuric plaques over the abdomen, legs and ankles bilaterally. Patient history, laboratory, and urine studies were negative for arthralgias and renal disease. A vasculitis work-up was initiated including skin biopsy that indicated leukocytoclastic vasculitis and direct immunofluorescence positive for IgA deposition in vessels. A diagnosis of HSP was made and the patient was started on high-dose corticosteroids with resolution of gastrointestinal symptoms.

Discussion: This case illustrates the atypical nature and diagnostic difficulty of HSP in adults when abdominal pain and gastrointestinal bleeding present before a rash. The incidence of HSP in adults is rare at 1.3 per 100,000 when compared with the incidence of CD in the United States at 3.1 to 14.6 per 100,000. CD peaks in incidence around age 20. However, CD is most common in Northern European and Ashkenazi Jewish populations, and the incidence in China is much lower with an estimated 0.848 per 100,000 people affected. Rashes are uncommon in the presentation of CD. The suspicion for HSP should therefore be higher when a petechial or purpuric rash not consistent with CD is seen, or in patients who are not of Northern European or Ashkenazi Jewish descent. Early skin biopsy of lesions can also aid in expediting diagnosis and treatment, while improving clinical outcomes. When initial skin biopsy indicates leukocytoclastic vasculitis, follow-up with direct immunofluorescence has a sensitivity and specificity for HSP of 0.81 and 0.83 respectively, and a positive predictive value of .84.
Introduction: Idiopathic systemic capillary leak syndrome (SCLS), also known as Clarkson’s disease, is an extremely rare disease whose current molecular etiology remains unknown despite a 26% increase in published cases since 2006.\(^1\) Since its discovery in 1960, there have only been 250 recorded cases of SCLS in the literature.

Patient: A 24-year-old Hispanic female, with a medical history of aplastic anemia, gastroschisis, short gut syndrome, and CKD. Past medical history includes more than 100 admissions for abdominal pain with resulting diagnoses ranging from blind loop syndrome, SBO, and small-intestinal bacterial overgrowth (SIBO). In 2007, she began presenting with episodes of localized edema further complicated by pericarditis, midbrain hemorrhages, and seizures. For this admission the patient presented with fatigue, and lower extremity swelling and discomfort. Physical exam showed a blood pressure of 80/50 at time of admission. The patient had mild swelling of her labia and lower extremities, extending up to the thighs, which rapidly transitioned to a generalized edema. Labs showed an album of 3.6 mg/dl, a BUN of 24 mg/dl and creatinine 1.57 mg/dl—consistent with her baseline renal insufficiency. The rest of her lab data was at baseline. The consideration for SCLS was based upon her multiple presentations of spontaneous bouts of generalized edema, along with the sudden presentation of hypotension. The diagnosis was confirmed by 1) An equally spontaneous remission of edema and hypotension—consistent with the recruitment phase of SCLS, 2) A response to a therapeutic trial of theophylline treatment.

Conclusion: Patients with SCLS usually present with episodes of unexplained edema, hypoalbuminemia and fluctuation in blood pressure. Patients frequently experience SCLS relapses despite being on combination theophylline, IVIG or IV aminophylline therapy. To our knowledge, this is the first reported case of a young patient diagnosed with SCLS and has not experienced a relapse in her symptoms since her initiating treatment with theophylline. Our goal is for physicians to be aware of this condition and the possibility of mono-therapy with theophylline as a safe and effective treatment for SCLS.

Clinical Significance: This novel case will aid physicians in the workup and treatment of symptoms suggestive of systemic capillary leak syndrome. It offers a new opportunity of mono-therapy for SCLS—leading to an increase in patient satisfaction and quality of life. It also provides a thorough review of SCLS and other rare but important diagnoses to consider when evaluating critically ill patients who present with episodic symptoms -reducing the traditional delay in diagnosing patients.

Life-threatening Re-reflux of a Large Hiatus Hernia in an Elderly Patient

First Author: Joseph P. Donnelly, St. George's University, School of Medicine, Grenada, West Indies. Senior Author: Ajeetpal Hans, MD, Department of Medicine, Christiana Care Hospital Partners, Newark, DE.

Introduction Hiatus hernias in adults are generally viewed as a benign finding with management focused on symptom control. Here we present a case in which chronic sequelae of a large hiatus hernia lead to multiple acute life-threatening events.

Case Description An 81-year-old woman presented to the hospital following a seizure precipitated by an aspiration event while eating breakfast sausage at her skilled nursing facility. She is known to have atrial fibrillation with a permanent left-sided pacemaker and a large hiatus hernia identified over 60 years prior. She has a history of multiple aspiration events requiring intubation with difficulty weaning from the ventilator, including three now-reversed tracheostomies. Arriving to the Emergency Department hypoxic and in atrial fibrillation with rapid ventricular rate, she was admitted for further management. The next morning while drinking tea the patient experienced another aspiration event and subsequently went into PEA arrest. Pulses were regained after two rounds of CPR, but shortly after the patient began agonal breathing and desaturated requiring intubation. She was successfully extubated four days later. Bronchoscopy for suspicion of tracheal stenosis at nine days post-extubation confirmed stenosis inferior to the vocal cords obstructing approximately 70% of the airway. Upon exhalation and cough, the obstruction occluded approximately 80-90%. CT scan review revealed a massive sliding-type hiatus hernia approximately 8-10 centimeters aperture with a nearly completely inverted stomach resting in the right thorax. Given the size of the defect and her advanced age, the patient was deemed not to be a surgical or tracheal stent candidate. She returned to her baseline status without further escalation. Her swallow including FEES study did not reveal any further aspiration and she was discharged to a rehabilitation facility for further conditioning.

Discussion While rare, large hiatus hernias have been implicated in a variety of cardiopulmonary symptomatology through a transient mass effect. Our case demonstrates an additional pathophysiological mechanism associated with re-reflux and the “two sphincter” hypothesis. The massive size of the hernia increases the volume trapped and re-refluxed back into the esophagus. The size also obliterated the second sphincter normally provided by the right diaphragmatic crus during transient intra-abdominal pressure increases. Multiple aspiration events led to multiple tracheostomies and severe tracheal stenosis. Acutely, increased intra-thoracic pressure from coughing resulted in re-reflux and aspiration of the tea into an 80-90% occluded trachea and subsequent hypoxic respiratory failure and PEA arrest. Our case affirms that very large hiatus hernias should not be dismissed in the differential diagnosis of intra-thoracic symptoms and complications.
Progressive Familial Intrahepatic Cholestasis: An Atypical Presentation

Zara Ilahi B.A., Priya Mallikarjuna M.A

We report a 21 year old male with an atypical presentation of Progressive Familial Intrahepatic Cholestasis (PFIC) Type 1 Disease.

On admission, the patient presented with rhabdomyolysis, hypocalcemia and bilateral shoulder tenderness. From the age of 18 months, the patient has had periodic episodes of hyperbilirubinemia associated with jaundice, fatigue, weakness and pruritus. Complications including Vitamin K malabsorption coagulopathy resulted in cervical hematoma. Jaundice gene chip analysis for ATP8B1/ABCB11 was negative. Diagnosis was confirmed by analysis from liver core needle biopsy and electron microscopy which showed hepatocytic cholestasis with pseudogland formation and ductular reaction. Coarsely granular byler bile was focally identified. Magnetic resonance cholangiopancreatography showed a thickened gallbladder without stones or ductal disease.

PFIC is a group of inherited disorders affecting bile transport with a prevalence ranging from 1 in 50,000 to 1 in 100,000 births (1). PFIC has three classifications. In PFIC 1 and 2, bile secretion is affected whereas in Type 3 there is a defect in biliary phospholipid secretion. Gamma glutamyl transpeptidase is low to normal in PFIC 1/2 and increased in PFIC 3. PFIC 2 has a higher incidence of early onset malignant hepatocellular tumors due to liver damage. End stage liver disease is a consequence of PFIC: presenting within the first decade in PFIC 1, the first few years of life in PFIC 2 and between the 1st and 2nd decades in PFIC 3. One of the main distinguishing factors between PFIC 1 and 2 is that PFIC 1 can present with extrahepatic manifestations, such as diarrhea, pancreatitis, short build and sweat chloride abnormalities.

PFIC Type 1 (Byler disease) is due to a defect in ATP8B1 gene on chromosome 18. There are two proposed theories for the pathophysiology of PFIC. Theory one involves the ATP8B1 gene that encodes the FIC1 protein—an ATPase transmembrane protein involved with flipase activity on the hepatocyte membrane. The F1C1 protein moves phosphatidyserine and phosphatidylethanolamine intracellularly through the plasma membrane of the hepatocyte which creates a higher concentration of these phospholipids in the inner portion of the membrane. This mechanism protects the membrane integrity from the concentrated bile salt within the lumen. Without this barrier, there is significant hepatocyte destruction. The second theory hypothesizes that the mutated ATP8B1 function downregulates farnesoid X receptor (FXR). FXR is a nuclear receptor that is responsible for decreasing the bile salt exporter pump (BSEP) and increasing hepatocyte bile acid production. A mutation in this receptor causes a bile acid overload in the hepatocyte (2). Further investigation is required to explore a correlation between the presenting rhabdomyolysis and PFIC.

References:

2- Chen et. al (2004). Progressive Familial Intrahepatic Cholestasis, Type 1, is associated with decreased farnesoid X receptor activity. Gastroenterology; 126: 756 - 764.
NEW YORK POSTER FINALIST - CLINICAL VIGNETTE Niaz Memon

An Uncommon Etiology of Ascites

First Author: Niaz Memon Khan, H., Aung, K., Kadakia, M., Yuan, J., Brown., W., Sukhai, D., Hasan, M.

Introduction: Pancreatic ascites is seen in 1% of all cases of ascites. Etiologies include pancreatic duct disruption and leaking pseudocyst, where patients may present with positive fluid wave and shifting dullness. Pancreatic ascites is often confused with spontaneous bacterial peritonitis (SBP) or portal hypertension. In our report, we present a patient with history of chronic pancreatitis in the setting of pancreatic ascites.

Case: A 64-year-old female, with PMH of pancreatitis, COPD, large ascites s/p paracentesis, chronic alcohol and tobacco abuse, presented for abdominal pain, increasing abdominal girth, and non-bilious vomiting over the past 3-5 days. Patient described the pain as dull and worsening to 7/10 upon movement. Patient denied fever, chills, shortness of breath, and chest pain. Patient’s temperature was 98.6F, pulse 88 beats/min, BP 96/56, and 18 breath/min. Upon physical exam, patient appeared cachectic with distended abdomen, shifting dullness, and diffuse abdominal tenderness. Ascitic fluid revealed absolute PMN of 238 cells/mm³, amylase 2755 IU/L, total protein 3.2, and negative culture results. Liver panel, PT/INR, and platelets were normal. Abdominal CT was consistent with multiple small pancreatic pseudocyst, cirrhotic liver and peripancreating stranding. Patient was kept NPO and treated with IV fluids, while being referred to tertiary care center for endoscopic retrograde cholangiopancreatography (ERCP). ERCP demonstrated fresh blood flowing from the ampulla and contrast was noted to extravasate at the proximal body of the pancreas. Patient was diagnosed with acute hemorrhagic pancreatitis with ductal disruption, and was treated with pancreatic sphincterotomy and stent placement.

Discussion: Pancreatic ascites comprises 1% of all ascites cases. Etiologies include: disruption of main pancreatic duct, rupture of a pseudocyst, pancreatic trauma, or after an acute pancreatitis episode. In patients with history of alcohol abuse, chronic pancreatitis is often the cause, although symptoms of pancreatitis may not be present. Thus, these patients are likely to be misdiagnosed with portal hypertension and liver cirrhosis. Diagnostic criteria for pancreatic ascites includes: ascitic fluid amylase >1000 IU/L, total protein >3, and SAAG <1.1 g/dL. Paracentesis can exclude SBP by absolute PMN count and culture. CT of the abdomen is important to evaluate the presence of pancreatitis or a pseudocyst, while ERCP is useful to visualize ductal disruption and placing a stent to prevent leakages. Although diffuse abdominal tenderness and history of chronic alcohol abuse is typically seen in SBP secondary to liver cirrhosis, we illustrate an uncommon presentation of pancreatic ascites. In addition to its rarity, the symptoms of pancreatic disease were absent, making ascites due to SBP or portal hypertension appear to be more likely. Thus, clinicians should include pancreatic ascites as a differential when GI symptoms are otherwise unexplainable.
Hypercalcemia and Tissue Infiltrative Diseases: A Challenging Clinical Conundrum

First Author: Gwenyth L. Davis BA(1), James Peacock MD(1,2), Ashley Liou DO(2), Dawn Butler MD(1,3), Christina Giacomazzi DO(2), Ryan Woods MD(2), Paul Savage MD(1,2). 1Wake Forest School of Medicine, Departments of Internal Medicine2 and Pathology3, Win

Introduction: Hypercalcemia poses significant diagnostic challenges as both PTH and non-PTH mediated disorders can be causative. Tissue infiltrative diseases such as granulomatous disorders, lymphoma, and malignancy potentiate hypercalcemia via elevations in 1,25-OH vitamin D₃, resulting from increased levels of the activating enzyme 1-a hydroxylase. Ectopic extrarenal production of this enzyme by tissue macrophages is a key feature of hypercalcemia associated with tissue infiltrative diseases.

Case Report: A 66 year-old man with a past history of colon cancer and remote treatment for “tuberculosis” was admitted for evaluation of persistent hypercalcemia. He reported a one-month history of fevers with the recent onset of altered mentation and abdominal distention. His calcium level was 14 mg/dL. Abdominal CT revealed an infiltrative process involving the omentum, mesentery, and extraperitoneum suggestive of malignancy. Angiotensin converting enzyme, PTH, PTHrP, and 25-OH vitamin D were all low, but 1,25-OH vitamin D₃ was elevated at 127 pg/ml. Omental and mesenteric biopsies revealed foamy macrophage infiltration, but no malignancy. The ascitic fluid adenosine deaminase was elevated but cytology, fungal and AFB stains, and PCR for M. tuberculosis were all negative. Bone marrow biopsy demonstrated numerous lipid-laden macrophages forming ring granulomas; macrophages stained positive for CD68, and negative for CD1a and S100. These findings were suggestive of Erdheim Chester Disease (ECD), a systemic, non-Langerhans histiocytosis. Bone scan demonstrated increased uptake in the bilateral hands, shoulders, knees and ankles consistent with bony sclerosis as seen with ECD. Omental biopsy was negative for known associated BRAF mutations. The patient was treated with Interferon alpha and steroids. Two weeks after initiating therapy, his hypercalcemia had resolved.

Discussion: Hypercalcemia in the setting of elevated 1,25-OH vitamin D₃, low PTH, and low PTHrP prompts a differential of sarcoidosis, tuberculosis, systemic fungal disease, and lymphoma. Pulmonary macrophages in sarcoid, malignant lymphocytes in lymphoma, and foamy macrophages in tuberculosis have all been shown to produce excessive 1-a hydroxylase, leading to hypervitaminosis D and aberrant uptake of calcium from the kidney, GI tract, and bone. ECD is a rare, systemic inflammatory condition characterized by macrophage activation and organ infiltration. Diagnosis is based on the unique histopathological characteristics in association with radiographic evidence of bone involvement and “encasement” of the retroperitoneal organs. BRAF V600E mutations may play a role in pathogenesis. Despite the logical mechanistic relationship between this inflammatory macrophage pathology and elevated vitamin D, hypercalcemia is an exceedingly rare presentation of ECD. This case demonstrates the importance of recognizing the broad manifestations of dysregulated macrophage activation and organ infiltration. In patients with vitamin D mediated hypercalcemia, tissue infiltrative diseases should be the primary diagnostic concern. If there is histopathological evidence of organ infiltration with macrophages, rare conditions such as ECD should also be considered in the differential diagnosis.
Unusual Mimic of an Acute Biliary Process - Epiploic Appendagitis

First Author: Marcus Geffre Lucy Ledyard Madhu Reddy, MD

Introduction: Epiploic appendagitis is caused by localized inflammation of lobulated adipose tissue along the taenia coli of the colon that generally occurs in the right or left lower quadrants, but may occur anywhere along the colon. Epiploic appendagitis usually presents as severe, localizable abdominal pain and may mimic more serious intra-abdominal conditions such as acute appendicitis or diverticulitis.

Case Report: A 56 year old female presents with right upper quadrant pain worsening over a weeks time and is initially thought to be an acute biliary process. She had no history of post-prandial pain and has had a cholecystectomy in the past. Physical exam showed moderate tenderness in the right upper quadrant and epigastric regions. All laboratory values were within normal limits. CT imaging showed a 3 x 2 cm fat density with hyperattenuation around the rim that is pathognomonic for epiploic appendagitis. The patient was sent home on non-steroidal anti-inflammatory medications and the symptoms resolved within 7 days, avoiding surgical and antibiotic therapies.

Conclusion: While epiploic appendagitis generally occurs in the right and left lower quadrants, it may present in the right upper quadrant and mimic acute biliary pathology. CT imaging shows a pathognomonic fat density with rim hyperattenuation. Non-steroidal anti-inflammatory medications are the mainstay of therapy and symptoms generally resolve within 10 days. Awareness of this pathology and appropriate testing are imperative to avoid unnecessary therapies.
Heritable Pulmonary Arterial Hypertension: An Under Diagnosed Cause of Idiopathic PAH

First Author: Kaitlin Blatt Jean Elwing, MD (ACP Fellow)

Introduction: Hereditary pulmonary arterial hypertension is an exceedingly rare progressive disease accounting for less than 3% of all cases of PAH (estimated annual incidence of 0.12-0.32/million). We report a case of advanced heritable pulmonary arterial hypertension (HPAH) with at least 6 known family members affected across three generations.

Case Description: A 34 year old male with history of pulmonary hypertension of the newborn and strong family history of PAH presented with progressive dyspnea and 1 episode of syncope. Although the patient required oxygen until age 5, he never received medication for pulmonary hypertension and had normal growth and development including normal physical activity tolerance. On exam, he was normotensive but tachycardic with SpO2 97% on room air. Physical exam demonstrated an accentuated P2 but no right ventricular heave with lungs clear to auscultation bilaterally. Echocardiogram revealed preserved RV size and function. Right heart catheterization indicated pulmonary pressure 118/75 mmHg (mean 95 mmHg), wedge pressure 8 mmHg, transpulmonary gradient 88 mmHg (normal =12mmHg) and pulmonary vascular resistance 16 dyn·s·cm⁻⁵ (normal =3). Given his severe symptoms and markedly elevated PA pressures, he was started on triple therapy with ambrisentan, tadalafil, and IV epoprostenol therapy.

Discussion: Heritable pulmonary arterial hypertension (HPAH) is a severe, progressive proliferative vasculopathy affecting mainly the pulmonary arterioles ultimately leading to right ventricular failure. HPAH is a rare autosomal dominant disease with reduced penetrance with up to 80% of cases associated with mutations in the bone morphogenetic receptor type 2 (BMPR2) gene, though several other genes have also been implicated. The disease has highly variable expressivity, with diagnosis occurring anywhere from infancy to age 70. Recent advances in medical treatment and development of specialized treatment centers has increased estimated 5-year survival from 36% to 65%. Genetic testing with counseling is currently recommended for patients with known HPAH when a molecular defect has been identified in the proband. The risk of inheriting symptomatic disease is 20% in patients with identified BMPR2 mutations. A paucity of evidence exists regarding disease screening in asymptomatic carriers of the BMPR2 mutation, with current guidelines recommending screening echocardiograms every 3-5 years. A thorough family history should be taken for all patients with PAH or in patients with family history of premature death due to right heart failure of unknown origin. Genetic screening to identify carriers and subsequent clinical monitoring is essential for patients with family history of PAH, as patients may be asymptomatic until late stage disease, as was the case in this patient. Early identification of disease is essential as advanced disease is less responsive to treatment.
INTRODUCTION: Branched-chain ketoacid dehydrogenase deficiency (also known as maple syrup urine disease or MSUD) is an inborn error of metabolism that renders a person incapable of breaking down branched chain amino acids: isoleucine, leucine, and valine. The resulting accumulation of ketoacids causes severe metabolic acidosis; hyperleucinemia is particularly problematic because leucine accumulating in the CNS leads to a toxic encephalopathy. Once a fatal disease in infancy, these patients are now leading longer lives due to newborn screening, maintenance with special diets, and aggressive management of metabolic decompensation.

CASE: Two days prior to admission at a tertiary care center, a 38-year-old man with MSUD and intellectual disability was complaining of abdominal pain and had a temperature of 37.9°C. He received bismuth subsalicylate, acetaminophen, and pedialyte at home with modest improvement, but remained lethargic and was taken to a regional hospital. Renal function panel and arterial blood gas revealed severe metabolic acidosis with anion gap of 31: pH 6.76, pCO2 34.5, pO2 99.4, bicarbonate 4.6. Patient was immediately given bicarbonate and IV fluids. In an attempt to find the source of the decompensation, a chest xray and CT abdomen were done. Chest xray was unremarkable, but CT abdomen showed gaseous distention of colon and possible pneumatosis intestinalis in the ascending colon. Once transferred to the tertiary care center, patient was admitted to the MICU where treatment consisted of IV fluids and dextrose, fat emulsion infusion, isoleucine, valine, and a dietary formula to reduce hyperleucinemia by triggering anabolism. After five days, patient’s serum levels of leucine began decreasing and GI pain also resolved without intervention. The patient was discharged home on his usual home formula with instructions for follow up with his outpatient Genetics provider.

DISCUSSION: Individuals with MSUD controlled on a daily basis with nutritional management may experience episodes of metabolic intoxication caused by increased catabolism of endogenous protein that may be induced by intercurrent illness or by exercise, injury, surgery, or fasting. Clinical manifestations include epigastric pain, vomiting, anorexia, and muscle fatigue. Pneumatosis intestinalis is not a known association of MSUD. Clinicians must be able to recognize that a simple cold or GI infection can quickly turn life threatening. MSUD patients are at risk for complications due to their ketoacidosis and for encephalopathy. Treatment consists of IV fluids and dextrose, correction of hyponatremia, and dietary supplementation of fats, isoleucine, and valine. Patients with MSUD have a remarkable ability to recover from metabolic crises and a quick conversion to an anabolic state can make all the difference for these patients.
Introduction: Hemophagocytic Lymphohistiocytosis (HLH) is a rare, life-threatening disease that presents as a febrile illness with multi-organ involvement which can mimic common infections, fever of unknown origin, hepatitis, or encephalitis. It is characterized by an uncontrolled, hyperinflammatory state due to failure of the immune system to effectively eliminate activated macrophages, leading to cytokine release and phagocytosis of hematopoietic cells. As a result, the patient often presents with pancytopenia, organomegaly, and a rash. Prompt initiation of treatment is essential for patient survival. A delay in diagnosis is common due to the rarity of the syndrome and variable clinical presentation, and can result in poor outcomes.

Case Report: A 44 year-old man with no prior medical history presented as a transfer from an outside hospital with fever, thrombocytopenia, pulmonary infiltrates, and elevated ferritin after an extensive week-long workup focused on ruling out infectious, autoimmune, and malignant etiologies. Tests for cytomegalovirus, Lyme disease, HIV, hepatitis C, hepatitis B, syphilis, and Epstein-Barr virus were all negative. Bone marrow aspirate was aspicular. Based on his presentation and a ferritin level of >40,000 ng/mL, HLH was suspected immediately upon transfer, and systemic glucocorticoid therapy was initiated. Fasting triglyceride level was 541 mg/dL, and soluble CD-25 was present in the serum (1394 pg/mL). The bone marrow sample was sent to our facility for further review, which showed rare macrophages with hemophagocytosis. Despite no known history of tick exposure, serologic studies were positive for Ehrlichia chaffeensis IgG antibody, indicating past infection, and doxycycline was initiated. Bone marrow aspirate slides were sent to the CDC for antigen specific immunohistochemistry staining, and are pending further analysis. The patient left the hospital against medical advice and was successfully managed with glucocorticoid and doxycycline therapy as an outpatient. Over the course of the following month, his serum ferritin decreased to 309 ng/mL.

Conclusions: This case illustrates the difficulty of diagnosing HLH, and identifies an example of a rare but previously documented association between HLH and Ehrlichiosis. A 2015 review of Erlichiosis and HLH found 76 cases of HLH between 2003 and 2014 with 5 cases felt to be induced by Erlichiosis. All 5 cases were treated successfully with doxycycline (1). After an extensive workup at an outside hospital, a severely elevated ferritin level led to recognition of HLH and initiation of treatment in our patient.

OHIO POSTER FINALIST - CLINICAL VIGNETTE Megan M Harper

Waldenstrom's Macroglobulinemia Imitating Multiple Cardiogenic Emboli

First Author: Megan M Harper (student member), Laura Wexler, MD, University of Cincinnati Academic Health Center, Cincinnati, Ohio

Case Presentation: A 72 year-old male non-smoker experienced multiple episodes of painful bilateral punctate ischemic lesions, with discolored areas similar to “blue toe syndrome,” of his fingers and toes over the course of 18 months. His PMH was significant for CAD with LV (left ventricular) dysfunction, hypertension, and hyperlipidemia. Three possible sources of emboli were identified on TEE: a mobile vegetation attached to the atrial lead of his ICD in the presence of a PFO (patent foramen ovale), a mural thrombus in his akinetic LV apex, and aortic atheromas. An upper extremity vascular study and CTA of his aorta and great vessels did not suggest large or small vessel vasculitis. He was RPR, ANA, and ANCA negative. His ESR and CRP levels demonstrated significant inflammation, 93mm/hr and 4.5mg/L respectively. He was not hypercoagulable. Therapeutic anticoagulation failed to prevent recurrent episodes. Three fingers were amputated due to necrosis and gangrene.

Closure of the PFO afforded the patient 9 months free of digital ischemic events, however he again developed episodes of cyanotic hands and feet. Cryoglobulinemia was discovered during further assessment for vasculitis, with 6.7% cryocrit containing IgG, IgM, kappa and lambda chains, and C3. Bone marrow biopsy revealed lymphoplasmacytic lymphoma. High levels of circulating monoclonal IgM were consistent with Waldenstrom's Macroglobulinemia (WM). He was started on emergent plasma exchange therapy and his symptoms improved. He subsequently began treatment with rituximab and cyclophosphamide.

Discussion: The etiology of WM is unknown. Like mixed cryoglobulinemias, WM shares a strong correlation with Hepatitis C. Chronic immune stimulation and autoimmunity are also associated, but this relationship is less clear. Our patient did not present with any of these associated findings. The majority of patients with WM present with non-specific symptoms and up to 25% patients may be asymptomatic, making the diagnosis difficult. Only 3% of patients with WM will present with cutaneous findings. Median survival for patients with WM is 6.5 years from the time of diagnosis. Treatment is reserved for symptomatic patients.

Ten percent of patients with WM will experience cryoglobulin precipitation similar to mixed cyroglobulinemia syndrome. This precipitation is not limited to extremes of temperature and can occur at room temperature. Cryoglobulin precipitation at mild temperatures likely led to the cyanosis and tissue necrosis seen in our patient. WM and other cryoglobulinemias should remain on the differential in patients who present with digital necrosis, particularly when cardiovascular and coagulopathic workups are non-diagnostic. Earlier detection and treatment of symptomatic WM may prevent associated complications, such as the digital amputations in this patient.
TAFRO Syndrome Presenting after Admission for Pneumonia in a Healthy Young Man

Thomas Westbrook, LeAnn Coberly, MD FACP, University of Cincinnati Academic Health Center, Cincinnati, Ohio.

Introduction: TAFRO syndrome (Thrombocytopenia, anasarca, myelofibrosis, renal dysfunction and organomegaly) is a subclass of multicentric Castleman disease and a rare lymphoproliferative disorder with significant mortality. Its onset is idiopathic and not associated with HIV, Human Herpesvirus-8 or Epstein-Bar virus infection.

Case Presentation: A previously health 27 year-old male presented with 4 days of fever, SOB and productive cough which failed outpatient antibiotics. His labs on admission were WBC 4.3, Hgb 10.6, platelets 80 and serum creatinine of 2.2 mg/dL. CXR showed bibasilar pleuroparenchymal disease with normal pulmonary vasculature. The patient’s blood counts and kidney function worsened necessitating hemodialysis. He developed a non-obstructive ileus requiring TPN, ascites and splenomegaly. Infectious workup including HIV, HHV-8 and EBV was negative. Bone marrow aspiration was dry x2, while core biopsy was unrevealing. He was transferred to UCMC 3 weeks after admission for management of pancytopenia and acute renal failure. Labs at transfer were WBC 2.5, Hgb 6.1, Plt 7 and serum creatinine of 5.39 mg/dL. Axillary lymph node biopsy revealed Castleman-like lymphadenopathy without evidence of hematolymphoid neoplasm. At the time of diagnosis the patient was in the MICU because of neutropenic fever, seizure activity and massive transfusion requirements. He was started on tocilizumab (anti-interleukin 6), high dose corticosteroids and rasburicase. Blood counts and renal function improved and the patient was discharged on siltuximab (anti-IL6) two weeks after his admission at UCMC. The patient now receives monthly siltuximab infusions and his pancytopenia has resolved and serum creatinine has normalized.

Discussion: There have been 35 cases of TAFRO reported since it was first described in 2010. It typically affects the middle-aged and elderly people with a median age of 56. It is thought that multicentric Castleman disease is caused by hypercytokinaemia, frequently including IL-6, and active research into the underlying cause is ongoing. The 2 year survival of patients with Castleman disease with TAFRO features is around 79%. Some cases are fundamentally more aggressive and refractory to treatment, factors that increase mortality as do late diagnosis and less optimal first-line regimens. Based on a limited number of cases, first-line treatment with anti-interleukin 6 therapy with or without corticosteroids and without cytotoxic agents is most effective in multicentric Castleman’s disease with complete response in around 90%. Corticosteroid monotherapy is significantly less effective with complete response in just 27%. This patient presented with a variety of symptoms and workup at the outside hospital understandably focused on infectious disease and hematolymphoid malignancy testing. The constellation of signs/symptoms and the recognition of lymphadenopathy led to the decisive lymph node biopsy. Early investigation of palpable lymphadenopathy is critical to timely diagnosis of multicentric Castleman disease.
OREGON POSTER FINALIST - CLINICAL VIGNETTE Julia A Armendariz

Utility of CSF Phosphorylated Tau in an Unusual Presentation of Alzheimer’s Disease

Julia Armendariz, MS4 Christopher Fine, MD Sima Desai, MD

LM is a 72 year old woman with Sjogren’s disease, rheumatoid arthritis, hypertension, pacemaker, and bipolar who presented with progressive confusion, inability to care for herself, and visual hallucinations. Her family described a three month decline, noting a recent hospitalization at another facility for similar symptoms without a conclusive diagnosis. Her vital signs were normal and exam demonstrated generalized symmetric weakness without parkinsonism features, orientation only to self, short greater than long term memory loss, and visual hallucinations. A formal cognitive survey was not employed in the setting of presumed delirium. Lab workup revealed normocytic anemia, urine bacteria and leukocyte esterase, low albumin, normal white count, mildly elevated creatinine, and negative blood cultures. Noncontrast head computed tomography was unrevealing and magnetic resonance imaging could not be completed due to pacemaker. The differential included systemic infection, vitamin deficiencies, encephalopathies (autoimmune, paraneoplastic, human immunodeficiency virus, syphilis) and dementias [(Alzheimer’s (AD), Lewy Body, fronto-temporal, and Creutzfeldt-Jakob disease (CJD)]. Lumbar puncture was remarkable for elevated cerebrospinal fluid (CSF) tau and phosphorylated tau protein levels. The patient was treated for a urinary tract infection without significant clinical improvement.

Tau is a normal protein within neurons that aids in assembly and maintenance of microtubules, and becomes released into the CSF after neuronal death. In the setting of AD, these tau proteins become hyper-phosphorylated and undergo conversion into filaments that accumulate within neurons, forming neurofibrillary tangles and disrupting normal microtubule and cellular function. The elevated concentration of phosphorylated tau within the CSF can distinguish AD from normal aging with a sensitivity and specificity of 92% and 80% respectively. It has also been observed that phospho-tau concentrations are highest in AD compared with CJD, Lewy Body and frontotemporal dementias.

In this case, our patient’s dementia symptoms were so subtle that they went undetected by her family until she became profoundly disabled. The elevated CSF tau and phosphorylated tau proteins were helpful evidence for AD in the setting of otherwise negative, but costly, workup.
OREGON POSTER FINALIST - CLINICAL VIGNETTE Josiah Brown

What would the patient have wanted? Ethical Principles of Management in a Socially Complex Patient

First Author: Josiah Brown Joe Chiovaro, MD

Introduction: In socially complex, non-verbal patients who lack capacity, it can be difficult to disentangle the ethical principles of autonomy, beneficence, and non-maleficence. The concept of “best interest” for the patient is a product of multiple factors including surrogacy and medical provider beliefs. Though frequently encountered, these situations can be challenging for providers, patients, families, and healthcare systems.

Case Presentation: An 85-year-old male from rural Oregon with end-stage dementia and metastatic prostate cancer presented with septic shock secondary to infected decubitus ulcers. In the preceding four months he had many similar admissions, often ending in AMA discharges to home by family request. Given concern for his family’s ability to provide care, an Adult Protective Services investigation was initiated and eventually referred to the local police department for evaluation of criminal neglect. The investigation was ongoing at the time of admission.

The family had a great distrust of Western medical care and placed strong emphasis on the ability of naturopathic thyroid medication to “cure” the patient. When high doses of this medication were administered through the patient’s feeding tube, hyperthyroidism, atrial fibrillation, and weight loss resulted. The family firmly believed that other hospitals had abandoned the patient or intentionally caused him harm. They repeatedly refused to de-escalate care or transition to palliative care, stating that the patient would want to continue with his current level of care. After a prolonged hospital course, the patient went into cardiac arrest and passed away despite resuscitation efforts.

Discussion: The issue of surrogacy can be a difficult medico-legal issue in situations such as this when it is unclear if the surrogate is acting in the patient’s best interest. The treatment team had significant discussion surrounding the ability of the surrogate to make decisions about this patient’s care, especially in the setting of questionable competency due to unrealistic expectations of cure and potential intent to harm.

With surrogacy established, ethical dilemmas continued to complicate the hospitalization. In the setting of incurable disease and the impact of family perception, what is the right balance of the core medical-ethical principles of autonomy, beneficence, and non-maleficence? This vignette discusses the application of these principles to this case and provides guidance to clinicians who are likely to face similarly challenging ethical situations in routine practice.
OREGON POSTER FINALIST - CLINICAL VIGNETTE Camellia Dalai

Branch Retinal Artery Occlusion Due to Calcium Embolus from Severely Calcified Aortic Valve.

First Author: Camellia Dalai Second Author: Preetivi Ellis, M.D.

Case: A 38 year-old man with known severe congenital bicuspid aortic stenosis and strong migraine history, presented to the emergency room for 2 days of headache and partial vision loss. He had a history of similar episodes of vision loss associated with migraines that would last about 20 minutes before completely resolving. For personal reasons, the patient also had poor adherence to health care until this year. On physical exam there was a systolic ejection murmur from his known aortic stenosis and right upper nasal quadrantanopia in his right eye only. All other physical exam and laboratory findings were within normal limits. Head MRI was negative, and CT angiogram showed only mild aneurysmal dilation of aortic arch. He was admitted to the medical floor with a neurology and ophthalmology consult. On fundoscopic exam there was whitening along the artery of the inferior arcade in the right eye concluding right eye branch retinal artery occlusion most likely due to calcium embolus secondary to calcified aortic valve. Patient was scheduled to have surgical aortic valve replacement the following week.

Discussion: Retinal artery branch occlusion is a rare but serious complication that should be considered in a patient who presents for vision loss in the setting of valvular disease. There is association between retinal artery embolism and cardiac valve stenosis; however, only few cases have been reported in literature. The affected retinal artery may represent an otherwise asymptomatic calcified aortic valve and occlusion of the retinal artery is symptomatic unlike occlusion of larger arteries that may be silent. Our patient had symptoms of vision loss that led to ophthalmologic consultation and to the correct diagnosis of branch retinal artery occlusion due to calcium embolus from a severely calcified aortic valve. This diagnosis led him have surgery to replace the severely calcified aortic bicuspid valve promptly. Valve replacement is the management to prevent recurrence of emboli.

A 28 year old Caucasian male with no significant past medical history was admitted for bilateral foot erythema, pain, and swelling with associated fevers and chills. Two weeks prior to admission, he noted pruritus and erythema of his bilateral ankles. He also complained of bilateral foot pain that was interfering with his work as an aeronautic mechanic. He had established care with a PCP who diagnosed him with plantar fasciitis. However, during the week preceding admission he developed a fever to 102°F with chills and anorexia. Vital signs on presentation were significant for fever and tachycardia. Physical exam noted tender, warm, and erythematous subcutaneous nodules on bilateral calves; erythematous papules over the anterior knees; macules on the soles of the feet; and swelling and tenderness over bilateral Achilles tendons. He was initially treated with Ceftriaxone for cellulitis. However, further work up revealed an elevated ESR, elevated Ferritin, and a chest X-ray showing bilateral mediastinal hilar lymph adenopathy. Skin biopsy confirmed erythema nodosum of lower extremities. Beryllium proliferation test and infectious disease workup were negative. Patient was diagnosed with Löfgren’s syndrome. The antibiotics were stopped and he was treated with NSAIDs and prednisone. At a post-discharge follow up appointment he reported significant improvement in his symptoms as well as resolution of the bilateral erythema.

Löfgren’s syndrome is rare subtype of acute Sarcoidosis that presents with hilar lymphadenopathy, erythema nodosum, arthralgia or polyarthritis. Early cellulitis can mask an underlying Löfgren’s syndrome since both can present with lower extremity edema, leukocytosis and fever. Therefore, physicians should be mindful of alternative causes of what could appear to be cellulitis that is unresponsive to empiric antibiotic therapy. In this case of Löfgren’s syndrome, certain red flags should increase the index of suspicion. These would include erythema that does not resolve or worsens while on antibiotics, elevated levels of 1,25-(OH)_2 Vitamin D_3, pulmonary complaints, worsening fever/anorexia/arthralgias, and/or certain occupational/environmental exposure. Currently, the etiology of Sarcoidosis is unknown; however, recent studies have suggested that exposure to foreign antigens and inorganic particles through workplace environment can lead to the onset of inflammation and symptoms. With this in mind, and given the patient’s occupational exposure, we wonder if his presentation is associated with his workplace environment and his diagnosis of Sarcoidosis. While correlation does not imply causation and while more research is needed, this case is a prime example of why social history of occupation and environmental exposures should be thoroughly probed when considering a patient with Sarcoidosis. Furthermore, physicians treating patients with a history of exposure to certain metals should not exclude Sarcoidosis from their differential. Similarly, physicians treating patients with Erythema Nodosum should have Löfgren’s syndrome as a diagnosis of exclusion.
Spinal Epidural Abscess Discovered by a Chiropractor in a Patient Receiving Home Hemodialysis

Daniel McLaughlin, Aldis Siltumens, Andrew Matrick

A 68-year-old-female with diabetes and end-stage renal disease on nocturnal home hemodialysis (NHHD) with recent MSSA hemodialysis (HD) catheter infection, presented to her chiropractor with intermittent cervical radiculopathy. She denied fevers, sensory loss, or weakness. Cervical spine MRI with contrast revealed an epidural abscess at C6-7 measuring 6x8x10 mm with discitis and erosion of endplates. After negative blood cultures, she was taken to the OR for debridement, where intraoperative cultures grew MSSA. Cervical instability precluded transeosophageal echocardiogram. Transthoracic echocardiogram showed no vegetations. She was discharged with 6 weeks of IV cefazolin.

Discussion: The rate of spinal epidural abscess (SEA) is increased in HD patients.1-3 These patients are at much greater risk of mortality compared to non-HD patients and are less likely to recover neurological deficits incurred from SEA.3

Many patients are exploring NHHD. The safety of this method has been compared to traditional HD. Though one prospective cohort study found an increase in infectious complications,4 other work has shown no difference in infection rates.5,6 Patients undergoing NHHD with a CVC have a shorter duration to first infection or death than those with permanent access.7 Of HD patients who develop SEA, bacteremia is found in only 60%—most often Staphylococcus aureus.8 In contrast, the bacteremia found in home HD patients is most commonly coagulase-negative Staphylococci.7 The risk of SEA following catheter-associated infection or bacteremia in NHHD patients is unclear. However, this case underscores the imperative to identify patients who may be at risk for complications from dialysis to avoid significant morbidity and mortality.

Learning Objectives
• Alternative forms of hemodialysis, specifically nocturnal home hemodialysis, are thought to be as safe as conventional hemodialysis.
• Hemodialysis, especially when involving an indwelling CVC, predisposes patients to spinal epidural abscess as compared to patients not on dialysis.
• Dialysis-related spinal epidural abscess is a highly morbid condition necessitating aggressive monitoring and treatment.

References:
Hemoptysis or Hematemesis? Delayed recognition of a Pulmonary-Renal Syndrome

First Author: Justin P Rondinelli  Faculty Advisor: Kathleen Eldridge, MD

Introduction: This is the case of a 23-year-old Spanish speaking female who presented with AKI of unknown etiology found to have a pulmonary-renal syndrome. Diagnosis was delayed secondary to confusion of hemoptysis versus hematemesis, illustrating the importance of good communication between healthcare providers and patients despite language barriers.

Case Description: The patient is a 23-year-old Mexican immigrant who presented to the hospital from her PCP's office with a two-week history of nausea, blood-tinged emesis, poor oral intake, diarrhea, and 25-pound weight loss over the past month found to have creatinine 6.2, BUN 54, and hemoglobin 6.5. She had no significant past medical history and no known underlying kidney disease. She was admitted for AKI and anemia and treated with fluid resuscitation and transfusion.

Following admission, she improved clinically with creatinine declining from 6.2 to 4.8. History was concerning for prerenal etiology, however persistently elevated Cr post-fluid resuscitation and laboratory data revealing BUN:Cr ratio <20:1, UNa 81, and urine Protein:Cr ratio >3000mg/g were more consistent with intrinsic renal injury. Additional workup to determine etiology was negative (HIV, Hepatitis, ANA, UPEP, Complement, ASO) with ANCA pending, prompting renal biopsy. Quantiferon-Gold was also collected to assess for tuberculosis.

The patient had a renal biopsy completed on hospital-day #4. Following biopsy, she complained of worsening nausea and hematemesis, prompting gastroenterology evaluation with plan for EGD the following morning. Overnight she was reported to have significant hematemesis and developed a new 2L oxygen requirement. When examined in the morning, however, she was found to be coughing, rather than vomiting, significant blood. She quickly decompensated with worsening tachypnea, tachycardia, and increased oxygen requirement of 6L, and was transferred to the MICU. Additionally, her Quantiferon-Gold returned "low positive." After transfer, she continued to decline requiring intubation.

Differential diagnosis included pulmonary-renal syndrome, Wegener’s vs. Goodpasture, vs. active tuberculosis. Acid-fast Bacilli smear results from bronchoscopy were negative. Kidney biopsy revealed "focal necrotizing and diffuse crescentic glomerulonephritis, with severe activity and moderate-to-severe chronicity...tubular atrophy and interstitial fibrosis, moderate-to-severe...[and]...necrotizing arteritis, focal" concerning for Granulomatosis with Polyangitis vs. Microscopic Polyangitis.

Discussion: The patient’s presenting complaint of prolonged gastrointestinal symptoms, notably hematemesis, and accompanying AKI delayed the medical team's ability to recognize a pulmonary-renal syndrome. While a medical translator was used for all discussions, the language barrier undoubtedly contributed to misunderstanding her bleeding source. Upon speaking with the patient the morning she decompensated, the medical team was finally able to clarify all episodes of vomiting were indeed preceded by coughing fits. Awareness that patients may be unable to differentiate hemoptysis from hematemesis and working to quickly clarify this may have enabled earlier diagnosis and treatment.
Cryptococcal meningoencephalitis is a well-described opportunistic fungal infection associated with cellular immunocompromise. The functional immunocompromise of hepatic cirrhosis can also predispose to this infection. Altered mental status (AMS), a hallmark of this infection, may present an early diagnostic challenge given its clinical overlap - and possible co-occurrence with - hepatic encephalopathy (HE).

A 58-years-old man with a past medical history of HCV/alcohol-induced cirrhosis, currently being treated on Harvoni, was brought to the emergency department for evaluation of AMS, abdominal pain, and headache of two-weeks duration. A clinical diagnosis of decompensated cirrhosis with HE was made based on a previous history of decompensation, moderate ascites, AMS, and mild asterixis. The patient was admitted and started on rifaximin and lactulose. Diagnostic paracentesis was negative for spontaneous bacterial peritonitis. CT triple phase was diagnostic for hepatocellular carcinoma and a questionable pulmonary nodule representing possible metastasis. The patient’s mentation declined over several days despite continued therapy. He remained afebrile; Kernig and Brudzinski’s signs were negative. Blood cultures drawn at admission eventually returned positive for yeast, for which empiric micafungin was administered. An urgent lumbar puncture revealed an elevated opening pressure, neutrophil and macrophage pleocytosis, and encapsulated yeast identified as Cryptococcus neoformans. HIV testing returned negative. The patient began intravenous liposomal amphotericin with flucytosine, to minimal clinical improvement over two weeks. Brain MRI revealed likely cryptococcomas in addition to right-sided pansinusitis, for which Augmentin was administered. Flucytosine was replaced with oral fluconazole per infectious disease. His mental status improved temporarily but then regressed, and kidney injury became evident from prolonged amphotericin treatment. The patient’s family ultimately elected for hospice care given a lack of meaningful clinical improvement and antifungal failure.

The association between cirrhosis and cryptococcal infection has become increasingly clear from several recent epidemiological studies both here in the U.S. and abroad. Defects in cell mediated immunity and complement alterations may contribute to this increased risk. The generally accepted induction therapy for C. neoformans meningoencephalitis is amphotericin B with adjuvant flucytosine, but it is unclear whether this regimen is as effective for cirrhotic patients as compared to other infected populations given the uncharacteristically poor prognosis in the former group. Rapid recognition of this infection is essential yet also difficult due to the overshadowing likelihood of HE. Moreover, this case underscores the clinical challenges in differentiating HE from other causes of AMS in the cirrhotic population and serves as an excellent case example of how reliance upon cognitive heuristics (such as anchoring) early in the diagnostic process can lead one's assessment and management plan astray.
Central America, Diarrhea, and Eosinophilia: Parasites or Worse?

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**Introduction:** A common presentation for gastrointestinal parasitic infection is peripheral eosinophilia. However, inflammatory bowel disease (IBD) can lead to significant and severe complications if left untreated, so physicians should maintain a high index of suspicion of IBD to prevent morbidity and mortality in these patients.

**Case Description:** A 63-year-old female immigrant from Honduras with no significant past medical history was admitted with one month of watery, non-bloody diarrhea occurring multiple times per hour. Symptoms were not associated with food consumption, sick contacts, or recent travel. She experienced temporary relief with ciprofloxacin and metronidazole, but the symptoms returned after completing antibiotics. Nine years prior to presentation, she had experienced similar symptoms, and colonoscopy revealed recto-sigmoid inflammation and eosinophils in the lamina propria. At that time, she was lost to follow-up.

On admission, her vitals were a temperature of 99.2 Fahrenheit, heart rate 113, blood pressure 139/110, respiratory rate 18, and oxygen saturation of 100% on room air. The physical exam revealed diffuse abdominal tenderness to deep palpation. Her labs were significant for a white blood cell count of 9.3 with 8.4% eosinophils. She had negative Clostridium difficile stool antigen, ova and parasites x3, enteric cultures, and Strongyloides IgG antibodies. Her fecal calprotectin was 207, C-reactive protein was >19, and erythrocyte sedimentation rate was 75. CT imaging of the abdomen was consistent with pancolitis.

Despite empiric ivermectin therapy, the patient’s symptoms persisted with intermittent fevers. Colonoscopy showed diffuse inflammation, and biopsies revealed crypt abscesses with neutrophilic infiltration. She was diagnosed with ulcerative colitis and started on daily oral mesalamine. Two months later at her GI clinic follow-up, she reported only one bowel movement per day.

**Discussion:** For a Central American patient presenting with diarrhea and eosinophilia, an infection with a parasitic organism like Strongyloides, Ascaris, or Trichuris was high on our differential, which also included eosinophilic gastroenteritis, malignancy, and gastrointestinal vasculitis. Keeping a broader differential for peripheral eosinophilia was essential to reaching an accurate diagnosis. The pathogenesis of ulcerative colitis (UC) has been attributed to a dysfunctional reaction of the innate and adaptive immune systems against intestinal bacterial flora. Proliferation of eosinophils in the colon may be a contributing factor due to this increased cellular activation. Antibiotics can have a temporary suppressing effect on mucosal flora that is followed by massive proliferation after cessation of therapy, which may be why our patient experienced transient relief with antibiotics. Key learning points from this case included the clinical presentation and workup for IBD, keeping a broad differential for eosinophilia with diarrhea, and the contribution of eosinophils to the pathogenesis of UC.
Introduction: Necrotizing pneumonia is a rare but severe complication of pneumonia, for which there is limited published literature regarding management. We present a case of necrotizing pneumonia from *Pseudomonas aeruginosa* infection.

Discussion: A 61-year-old male with a history of gastric cancer status-post gastrectomy over ten years ago, significant alcohol and tobacco use, and malnourishment presented with subjective fevers, productive cough, dyspnea, and pleuritic chest pain for one week. He recalled a recent binge drinking episode during which he vomited and lost consciousness for a short period of time. He denied night sweats, hemoptysis, sick contacts, and recent travel. On examination, he was hypoxic and had crackles and decreased breath sounds in the left upper lung field. Laboratory studies revealed 27,000 white blood cells/μL, with a normal differential. Computed tomography of the chest revealed an 8x6 cm thick-walled, irregular left upper lobe cavitary mass with surrounding consolidation. Blood and sputum cultures were drawn, and empiric antibiotics (vancomycin, cefepime, and metronidazole) were started. Sputum culture grew *Pseudomonas aeruginosa*, while multiple acid-fast sputum smears were negative. The patient underwent a bronchoscopy for further sampling; bronchoalveolar lavage culture grew *P. aeruginosa* only. The patient was diagnosed with necrotizing pneumonia due to *P. aeruginosa* infection given imaging findings and culture results. He was transitioned to monotherapy with levofloxacin for six weeks. At a follow-up visit, the patient had completed antibiotics and no longer had any respiratory symptoms.

Necrotizing pneumonia is characterized by necrosis and cavity formation in the setting of pulmonary inflammation. Cases due to *Pseudomonas aeruginosa* are notably infrequent per literature review, as the typical implicated microbes are *Streptococcus pneumoniae* and *Staphylococcus aureus*. *Pseudomonas pneumonia* occurs more frequently as a nosocomial infection; however, it has been noted in the community as well. We believe our patient’s risk factor was likely his alcohol use, subsequent loss of consciousness, and vomiting resulting in aspiration pneumonia. Given his poor nutritional status at baseline, he may have been more likely to develop necrosis. Because necrotizing pneumonia is rare, management regimens are ill-defined. Treatment typically includes an extended course of antibiotics with possible surgical intervention as warranted.

Conclusion: This case demonstrates a unique presentation of necrotizing pneumonia, which can have a rapidly progressive disease course and was successfully treated with an extended course of antibiotics. Furthermore, it demonstrates that patients may be infected by *Pseudomonas aeruginosa* without traditional risk factors.
Written in India Ink- A Curious Presentation of Cryptococcal Meningitis

First Author: John R Ogden Second Author: Curtis Mirkes, MD, FACP Third Author: Megan Newman, MD

**Introduction:** Cryptococcal meningitis is traditionally thought of as an opportunistic infection occurring primarily in immunocompromising conditions, such as HIV/AIDS, patients undergoing chemotherapy, or those taking immunosuppressing medications. However, it may also rarely occur in healthy appearing individuals without any risk factors for immunocompromising conditions.

**Case Presentation:** A 65 year old male with no significant PMH was referred to the Pulmonary clinic for evaluation of a chronic cough and a progression of chronic pulmonary nodules that had been previously stable over the prior 10 years. Additionally, over the previous few months he endorsed recurrent headaches, dizziness, and intermittent numbness in his upper extremities. He underwent EBUS bronchoscopy with biopsy and had serology drawn for fungal infections. His biopsy cytology returned unremarkable, however he was found to have a positive serum cryptococcal antigen titer of 1:128. He underwent lumbar puncture, which showed lymphocyte predominant pleocytosis and a cryptococcal antigen titer of 1:256, confirming the diagnosis of disseminated cryptococcal infection. He was admitted for four weeks of therapy with amphotericin B and flucytosine, as well as further work up for his condition. During his hospitalization he was found to have lymphopenia with low CD4 counts. He had no risk factors for immunocompromising conditions, and his HIV, Hepatitis B, Hepatitis C, and malignancy workup were all negative. His symptoms resolved after prolonged antifungal therapy, and he was discharged on oral fluconazole. Subsequent workup showed that he had a decreased absolute CD4 and CD8 cell count in the absence of any infection or malignancy. He was ultimately diagnosed with idiopathic lymphocytopenia and was initiated indefinitely on prophylactic antibiotics and antifungals, according to the HIV CD4 cell count guidelines.

**Discussion:** Cryptococcal meningitis is typically thought of as an opportunistic infection, however it can rarely occur in healthy appearing individuals as well, particularly those with idiopathic lymphocytopenia. Therefore, this should be considered on the differential diagnosis of patients who present with typical opportunistic infections, especially when he or she was previously in good health and/or has little to no risk factors for immunocompromising conditions. Currently, there is no known cause of or effective cure for idiopathic T cell lymphopenia, however most patients do well with prophylactic antibiotics and antifungals given according to the same guidelines used in HIV-infected patients.

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Valproate is a common therapy for seizures and mood disorders with an uncommon adverse effect of inducing hyperammonemic encephalopathy. The encephalopathic effects can be present despite normal valproate levels and mildly elevated ammonia.

A 56-year-old man with a history of polysubstance abuse, bipolar disorder, schizophrenia, untreated HCV, and cardiac disease was found altered for an unknown duration and brought in for bizarre behavior and slurred speech. His only medications were atenolol (50 mg qd) and valproate (500 mg tid). History and physical were limited by altered mental status and unintelligible speech. He was uncooperative with neurologic exam due to distractibility and persistent mumbling, though he was oriented to person and time. No nystagmus nor asterixis was appreciated, and weakness with significant urinary retention was noted. Initial urine drug screen and alcohol levels were negative, but he was found to have hyperammonemia (67 umol/L) and thrombocytopenia (31 x10^3/uL) in the setting of a subtherapeutic valproate level (48.4 ug/mL). BUN was 8 mg/dL, transaminases were within normal limits, and blood and urine cultures had no growth. Abdominal ultrasound revealed decreased echogenicity but no evidence of cirrhosis. Lactulose therapy was initiated, yet his poor mental status continued. On day 3 of admission, his valproate was held after a morning dose due to suspected valproate-induced hyperammonemic encephalopathy with lack of improvement on lactulose. His mental status improved that evening, and on day 4 his speech became intelligible, revealing mild paranoia. At discharge on day 5, he was returned to his baseline mental status with no confusion and reduced paranoia after transition to olanzapine. Chart review demonstrated prior thrombocytopenia with concomitant valproate use. However, the patient was lost to follow-up and subsequently passed away without further evaluation of his cytopenia.

Occasionally the workup for acquired hyperammonemia will extend beyond the liver. Valproate is suspected to interfere with the urea cycle, and while asymptomatic elevations of ammonia are possible, additional insults can contribute to the development of encephalopathy. Valproate has also been implicated in bone marrow suppression. Patients who present with altered mental status, hyperammonemia, or a cytopenia while taking valproate should have the medication discontinued despite drug levels, and alternate therapy should be considered while further evaluating the patient.


A Swollen Leg

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Introduction: Tuberculosis affects approximately one-third of the world’s population; however, musculoskeletal involvement remains rare with most cases consisting of spondylitis, osteomyelitis or arthritis. Tuberculous pyomyositis is an extremely rare clinical manifestation.

Case Description: A 43-year-old woman with rheumatoid arthritis/ mixed connective tissue disorder overlap syndrome and miliary tuberculosis for which she had recently completed 8 months of antituberculous therapy, presented with 2 weeks of swelling in the left lower extremity. She was diagnosed with an autoimmune overlap syndrome a year ago and was started on prednisone and hydroxychloroquine; shortly thereafter, she developed reactivation miliary tuberculosis. She was initially treated with standard RIPE therapy but this was complicated by transaminitis and pneumonia, requiring alteration of treatment regimen. She ultimately received 2 months of Levofloxacin, Rifampin and Ethambutol followed by 6 months of Rifampin and Isoniazid.

On admission, her vitals were within normal limits. Her left thigh and calf were enlarged with palpable fluid collections; however, there was no tenderness to palpation, skin lesions or abrasions, overlying erythema, or warmth. The rest of the physical exam was unremarkable. The patient had a normal leukocyte count and differential. Her creatinine kinase was elevated to 1667 U/L. CT imaging showed fluid collections in the left thigh and incidentally showed fluid collections in her right thigh as well. This finding prompted full body imaging which revealed fluid collections in her latissimus dorsi muscles bilaterally. Drains were placed and the fluid was sent for analysis. Cell count of the fluid showed 42,250 WBCs with 99% neutrophils. At that time, she was empirically started on ceftriaxone and daptomycin for possible bacterial pyomyositis. However, multiple stains and bacterial, mycobacterial and fungal cultures of the purulent fluid showed no organisms. With negative cultures, antibiotic therapy was stopped. Given patient’s history of miliary TB, a sample of the purulent material was sent for MTB PCR which returned positive. She was ultimately diagnosed with tuberculous pyomyositis. Hydroxychloroquine was discontinued and prednisone was tapered from 20mg to 10mg. Patient was restarted on RIPE therapy with close monitoring of her liver function.

Discussion: Tuberculous pyomyositis is rare; a recent retrospective study in Spain reported a rate of 0.26% in patients with tuberculosis. Most patients have systemic symptoms of fever, chills, night sweats, weight loss, and localized pain, erythema and warmth. Our patient had an atypical presentation with only left lower extremity swelling and no systemic symptoms. In addition, she developed tuberculous pyomyositis after completing 8 months of antituberculous treatment. This case highlights the importance of recognizing and including tuberculous pyomyositis in the differential diagnosis in immunocompromised patients with a history of tuberculosis presenting with soft tissue swelling.

Streptococcus Suis is the most common cause of bacterial meningitis in Vietnam and the third most common in Hong Kong. Infections from this zoonotic bacteria are frequently from occupational exposure to pigs or pork consumption. The United States is the second largest producer of pork in the world. Despite this, of the 1584 cases reviewed in a 2014 meta-analysis, only 0.5% of S. suis infections occurred in the Americas. This study also states only 4.4% of all cases appear to relapse despite appropriate antibiotics.

S.S. is a 37 year old female who works on a small pig farm in rural Maine, U.S. In 2015 one of her piglets sustained thoracic trauma from the hoof of a larger pig. While rehabilitating this piglet with milk and honey, the piglet coughed frothy, bloody fluid directly onto S.S.’s orofacial mucous membranes. Shortly thereafter, S.S. presented to a local hospital with hearing loss, diarrhea, fever, headache and nuchal rigidity. Her blood cultures were positive for Streptococcus suis with a ceftriaxone MIC < 0.25. A lumbar puncture (LP) was contraindicated due to thrombocytopenia. Inflamed meninges on CT confirmed meningitis. Dexamethasone relieved symptoms during the admission. She was discharged on day 8 of 12 of ceftriaxone (CTX).

Two days after finishing CTX at home, S.S. re-presented to the hospital with hearing loss, visual changes and balance difficulties. LP showed WBC of 238. Cerebrospinal fluid (CSF) and blood cultures were negative, MRI showed no brain abscess, and transesophageal echocardiogram showed no endocarditis. During this 5-day admission, S.S. received dexamethasone, vancomycin, and CTX. She was discharged on day 6 of 14 of her second course of CTX.

10 days after discharge, S.S. experienced worsening symptoms and experienced two witnessed grand-mal seizures. She was hospitalized for a third time, 31 days after initial presentation with only minor pauses in CTX treatment. CSF WBC decreased to 111. Cultures were negative and imaging again showed no occult focus of infection. A third course of CTX (14 days) was initiated. Dexamethasone provided rapid improvement of symptoms. She was discharged on a prednisone taper. Unfortunately, upon completing the taper, S.S. developed headache, ataxia, and tinnitus. She was hospitalized for a fourth time. LP and MRI showed no re-infection. Chronic prednisone was deemed necessary to control neurologic symptoms. Hearing loss remains.

This case reflects the current discourse surrounding S. suis meningitis including hearing loss, early use of glucocorticoids, and difficulty predicting dosing antibiotics beyond the typical 2-3 weeks. This case adds rare, perhaps the first, documentation of recrudescent S. suis meningitis in the United States.
Introduction: Rheumatoid arthritis (RA) is associated with significant morbidity and mortality. In addition to the altered immune response caused by RA, anti-Tumor Necrosis Factor (TNF) agents that are routinely used to treat RA are also associated with an increased risk of septic arthritis.1,2

Case: A 79-year-old gentleman with a history of RA on adalimumab and methotrexate presented to his rheumatologist with a five-day history of increasing left shoulder swelling. He was sent to the Emergency Department (ED) for further evaluation. In the ED, he was afebrile and denied other associated symptoms or recent trauma. The physical exam was notable for significant swelling anteriorly over the left glenohumeral joint, with modest erythema and minimal warmth. Laboratory studies were notable for an elevated C-reactive protein with a normal white blood cell count and differential. He underwent left shoulder joint arthrocentesis, which revealed turbid straw colored fluid with a neutrophilic pleocytosis. The patient was empirically started on intravenous vancomycin and ceftriaxone for suspected septic arthritis; orthopedics was consulted, and he underwent incision and drainage of the left shoulder joint. Perioperative wound cultures demonstrated Gram-positive rods on Gram stain with weakly beta-hemolytic culture growth on the blood agar plate. Biochemical testing and mass spectrometry confirmed the isolate as Listeria monocytogenes. A more detailed dietary history was obtained, and the patient revealed recent ingestion of foods that have been associated with Listeria infections: “Bar-S” hotdogs, cantaloupe, and other possibly spoiled food. Vancomycin and ceftriaxone were discontinued, and he was transitioned to ampicillin. He underwent repeat incision and drainage on hospital day 3 and was discharged on high-dose oral amoxicillin and trimethoprim/sulfamethoxazole to complete a prolonged course of therapy.

Discussion: This case is an example of the emergence of uncommon opportunistic infections in patients taking biologic therapies.3,4 Although previously known as a rare cause of septic arthritis, there has been an increase in occurrence of Listeria-associated arthritis in patients on TNF-alpha inhibitors.5 While there are many infectious causes of septic arthritis, Staphylococcus aureus being the most common,6 we must now have an even broader differential when diagnosing patients on TNF-alpha inhibitors.

References
The Way to a Man's Heart is Through His Pancreas

Dawn A. Miller, Lillian L. Khor

A 52-year-old man with a history of hypertension, hyperlipidemia, gastroesophageal reflux disease, and schizoaffective disorder with panic attacks presented with a seven-day history of vomiting, abdominal pain and chest pain. His abdominal pain was diffuse and associated with substernal radiation.

On physical exam, he showed tachycardia with otherwise normal vital signs. He was diaphoretic and had dry mucus membranes with ketotic breath. His abdomen was diffusely tender without rebound and he had normal bowel sounds. Cardiovascular and pulmonary exams were normal.

Initial workup revealed leukocytosis with a left shift, pre-renal azotemia, and normal serum lipase. An ECG revealed ST segment elevations in inferolateral leads despite a normal troponin level. Coronary catheterization showed no clinically significant lesions. Interestingly, the ECG normalized over several hours without any post-myocardial infarction Q-wave evolution. Given his leukocytosis and chest pain, an echo was done, which revealed a trivial posterolateral pericardial effusion without any wall motion abnormalities. An abdominal CT showed an acute gallstone pancreatitis.

In summary, this patient presented with a delayed presentation of gallstone pancreatitis with normal serum lipase levels. The radiation of pain to his chest was difficult to differentiate from acute coronary syndrome and an ECG revealed ST-segment elevations concerning for inferolateral ST-elevation Myocardial Infarction (STEMI). On closer analysis, there was also PR depression in inferolateral leads and PR elevation in aVR, which corresponded to a pericarditis. The patient made a full recovery after intravenous fluids, bowel rest, and eventual cholecystectomy.

Several physiologic events can cause ECG changes in the setting of pancreatitis. Inflammation and circulating pancreatic enzymes induce a prothrombotic state, which is then exacerbated by hemoconcentration from dehydration in the setting of pancreatitis. Thrombi may pass through coronary arteries, thus producing ECG changes. Similarly, pancreatic enzymes may produce fat emboli or coronary vasospasm. Fat necrosis of the pericardium may induce pericarditis and local electrolyte changes reflected on the ECG. The pancreas may also release myocardial depressant factor, thus independently causing ECG changes. Additionally, interneurons between gallbladder innervation and coronary innervation may produce a vagal reflex when the biliary tree is inflamed, thus leading to ECG changes in a phenomenon known as the “cardiobiliary reflex”.

In this particular case, fat necrosis from pancreatitis likely induced pericarditis and local electrolyte changes leading to transient ST segment elevations in the region of the pericarditis. Furthermore, the cardiobiliary reflex may have contributed since the patient had gallstone pancreatitis. In conclusion, there are several biochemical and neurologic mechanisms that may induce cardiovascular changes in the setting of pancreatitis. It is important to be cognizant of this possibility, even in the setting of mild pancreatitis. Patients may present with cardiovascular complications before the diagnosis of pancreatitis is established.
An Atypical Presentation of Eosinophilic Granulomatosis with Polyangiitis

CASE PRESENTATION: A 50-year-old woman presented with chest pain, dyspnea at rest, associated fever, chills, night sweats and left periorbital swelling (Figure 1A*). She had a past medical history significant for adult-onset asthma, hay fever, sinusitis, and recurrent nasal polyps. On presentation, transthoracic echocardiogram revealed a significant pericardial effusion with tamponade physiology (Figure 1B*). Urgent pericardiocentesis was performed and 800ml of straw-colored fluid was drained. She recovered well with no residual pericardial effusion after removal of pericardial drain and the patient was subsequently discharged. Ten days later, the patient presented with a syncopal episode. On admission, echocardiogram and chest x-ray showed a recurrent pericardial effusion, and a large pleural effusion. Complete blood count was significant for 45% eosinophilia (Figure 1C, D*). Thoracentesis was performed, and one liter of fluid was removed, which showed 77% eosinophils (Figure 1E*). After this procedure, she had residual chest pain, dyspnea, cough, generalized aches and chills. The patient was referred for video-assisted thoracoscopic surgery (VATS) with pericardial window for drainage of pericardial and pleural effusions, and a lung and bone marrow biopsy for further diagnosis and treatment guidance. (*Note: Figures are available for submission, but could not be uploaded in this portal)

PHYSICAL EXAM: Exam revealed distant heart sounds, and absent breath sounds with dullness to percussion below mid-back bilaterally. Skin demonstrated dermatographia.

LAB RESULTS: Initial WBC was 12.8% with 30% eosinophils. Peripheral blood smear showed significant eosinophilia (Figure 1C, D). CRP was 21, ESR 104. T. cruzi, Strongyloides, ANA, anti-MPO, and ANCA antibodies were negative. Cytology, flow cytometry, and bone marrow aspirate showed no evidence of a hematolymphoid malignancy.

DIFFERENTIAL DIAGNOSIS: Presumed diagnosis was Eosinophilic Granulomatosis with Polyangiitis (EGPA, or Churg-Strauss), based on history of nasal polyps, adult-onset asthma, allergic rhinitis, eosinophilia, and chest pain. Patient met 4/6 criteria for EGPA according to the American College of Rheumatology. Other DDx included Chagas disease (periorbital swelling, Mexico travel), Löeffler's syndrome (pleural effusions), leukemia, Strongyloidiasis or other parasitic infections.

TREATMENT: Patient was started on high-dose prednisone after bone marrow biopsy. Within 1 day of steroid initiation, eosinophilia resolved and the patient showed significant clinical improvement. Cyclophosphamide was added before discharge to help prevent symptom recurrence.

CONCLUSION: EGPA is a rare, necrotizing systemic vasculitis associated with asthma and hypereosinophilia. ANCA positive EGPA frequently presents with peripheral neuropathy and renal manifestations, whereas ANCA negative EGPA often includes cardiac symptoms, perhaps suggesting 2 distinct disease etiologies. Cardiac tamponade and periorbital swelling are two unusual presentations of this disease, according to the literature.

Commensalism to Pathogen: Pseudomonas Endocarditis of the Mitral Valve in an Intravenous Drug User

First Author: Soorya Krishnan Namboodiri  Second Author: Joseph M. Deutsch, M.D.  Contributing Authors: Stephanie Lee M.D., Mumtaheena P. Miah, M.D., Dr. Nicole Harrington, PharmD.

This case highlights an interesting mode of inoculation of Pseudomonas Aeruginosa causing infective endocarditis in an intravenous drug user. Though endocarditis in this population is a widely recognized and studied clinical phenomenon, review of etiology is timely given the dramatic rise in heroin use nationwide. An understanding of the mechanism of infection in this population is described based on history and epidemiological review.

A 38-year-old male, intravenous heroin user initially presented with new onset bilateral pedal edema and hand stiffness. Though non-toxic appearing, physical exam was notable for a left eye Roth spot, a grade II/VI apical systolic murmur, as well as an Osler node on the left third digit. Incidentally, this patient had presented 15 months earlier with concern for endocarditis because of a new murmur and recent admission for left lung abscess. The patient was ultimately discharged with sterile blood cultures though transthoracic echocardiogram showed mild mitral bowing and regurgitation. Given this history, there was again concern for endocarditis. On this admission, the patient was found to be bacteremic in three successive blood cultures with Pseudomonas Aeruginosa. Additionally, transesophageal echocardiogram showed an impressive, 1.5 cm x 1.0 cm vegetation on the mitral valve, and was determined to need replacement due to its size, location and motile component.

Treatment challenges well-documented in the literature were met with Pseudomonal dosing of Cefepime at 2g IV q8h. This was later converted to a 4-hour continuous infusion with double gram negative coverage with Ciprofloxacin 750 mg BID. Persistent bacteremia and worsening of his murmur prompted additional aminoglycoside coverage, added for synergistic effect, sterilizing the blood after one week.

This unique case demonstrates the need to understand source, mode of inoculation, and subsequent evolution. Pseudomonas Aeruginosa as a colonizer of plumbing fixtures is not typically pathogenic. However, when introduced into the bloodstream in tap water, as in the preparation of drugs for injection, vulnerable organs can provide a breeding ground for infection.

This heavy heroin user used tap water to dissolve the drugs and wash his needles. It is likely he had a heavy bacterial burden before the development of the vegetation and subsequent mitral regurgitation. Prior echocardiogram showed mitral valve bowing, a precursor to mitral valve prolapse, which is also a risk factor for infective endocarditis. Valve vulnerability in combination with the bacterial load of an aggressive gram negative organism lead to a potentially deadly infection in this patient. Attention to detail resulted in early recognition and treatment of a rare presentation of endocarditis.
WASHINGTON POSTER FINALIST - CLINICAL VIGNETTE Angela D Primbas

Atypical Pyomyositis in an Immunocompetent Patient

First Author: Angela D Primbas, BA Molly Anderson, MD Robin Stiller, MD Yana Thaker, MD Ashok Reddy, MD

Case: A 56-year-old man presented with five days of fever along with right shoulder and arm pain, swelling and erythema. He had a remote history of intravenous drug use, but denied use in the past 6 months. He also denied any trauma to the area. The area over the biceps brachii was swollen, erythematous, and tender to palpation with no abrasions or palpable bone deformity. The ranges of motion of the glenohumeral and elbow joints were limited due to pain. In the emergency room, his temperature was 37.4°C and WBC count was 14,620. Ultrasound of the right upper extremity demonstrated a complex fluid collection interdigitating the biceps brachii, without signs of subcutaneous thickening, air, and fascial fluid. Blood cultures were drawn prior to empiric treatment with vancomycin and clindamycin. He was admitted, but failed to improve over the next 24 hours. A fine needle aspirate of the bicep fluid was obtained for culture, as initial blood cultures continued to show no growth. Clindamycin was stopped and Piperacillin-Tazobactam was initiated. Over the next day, the erythema and swelling began to subside, but pain remained severe. Aspirate cultures grew parvimonas micra, a peptostreptococcus species. MRI indicated an abscess along the entirety of the biceps brachii, with fluid collection in the glenohumeral joint concerning for septic arthritis. There was also a hyperintense density in the humeral head that suggested a needle tip. The patient underwent drainage surgery, continued to improve on antibiotics and was discharged home two days later.

Discussion: Pyomyositis is a suppurative infection of skeletal muscles that is characterized by abscess formation without contiguous infection and is often caused by hematogenous spread. Risk factors include immunodeficiency and injection drug use. Staphylococcus aureus is the major cause in the U.S. Treatment involves abscess drainage, antibiotics usually for 3-4 weeks and monitoring for bacteremia sequelae. Pyomyositis presents similarly to cellulitis and septic arthritis with fever, focal tenderness, erythema and edema. While history and physical exam arise suspicion for pyomyositis, laboratory values are non-specific and imaging usually is required for diagnosis. MRI is preferred, but ultrasound is a useful initial tool. MRI was crucial in this case as it illustrated the extent of the muscle abscess and the concurrent infection of the glenohumeral joint, which is atypical as pyomyositis usually presents as an isolated infection. Imaging also elucidated the embedded needle tip as a potential source for infection, especially given lack of recent trauma to the area and negative blood cultures. Further, parvimonas micra is oral flora that is a known source of pyomyositis and septic joints. In this case, the bacteria could have been on the needle tip, as “licking” needles is a practice among injection drug users. Given the patient’s vague history, symptoms and presentation, imaging was critical to illustrating pyomyositis with atypical concurrent septic joint and ensuring appropriate intervention.
Psychosis Following Group A Streptococcal Sepsis – An Immune-Mediated Phenomenon?

Allison M. Bock, Paul A. Bergl

**Introduction:** Group A streptococcal (GAS) infections are one of the most well-known causes of post-infectious immune-mediated conditions. We report a case of acute psychosis following invasive GAS infection which responded to aggressive immunotherapy, thereby supporting the diagnosis of a GAS-induced immune-mediated encephalopathy.

**Case:** A 31 year-old woman with past medical history of mild anxiety presented to the emergency department with empyema and sepsis physiology five days after being diagnosed with GAS pharyngitis. She was admitted to the intensive care unit and received chest tube placement and broad-spectrum antibiotics. Hemodynamically, the patient was improving, but on hospital day (HD) 1 she developed visual hallucinations and paranoia. Neurological exam was unremarkable. Extensive diagnostic testing including a urine drug screen, brain magnetic resonance imaging (MRI), electroencephalogram (EEG), and cerebral spinal fluid (CSF) analysis all failed to establish a medical cause of her psychosis. With supportive care, the patient improved to normal mental status. She was transferred to the general medicine floor on HD4 and continued to recover from sepsis.

However, over the next several days, she exhibited increasingly bizarre behavior and progressive psychosis with severe aggression, hyper-sexuality, and hyper-religiosity. She exhibited asymmetric hyperreflexia and tremulousness on neurological exam but otherwise exam was non-focal. Desquamation of her left thumb was noted that progressed to include bilateral fingers, palms, and bilateral toes. She had urinary retention requiring catheterization and an episode of supraventricular tachycardia that were concerning for autonomic dysfunction. Exhaustive laboratory investigations revealed an elevated ESR but again were otherwise unremarkable. Escalating doses of quetiapine and olanzapine failed to substantially improve psychiatric symptoms. Neurology recommended a repeat MRI, EEG (both normal) and lumbar puncture with CSF studies to evaluate for autoimmune and paraneoplastic encephalitis. Given her worsening clinical status, she was treated empirically with high-dose corticosteroids and intravenous immunoglobulin for presumed autoimmune encephalopathy while CSF studies were pending. Ultimately, all CSF studies were negative. Her mental status improved with less agitation and bizarre behavior over the next seven days. She was discharged on HD23. At follow-up three months post-discharge she has no signs of psychosis and residual anxiety is being addressed with sertraline.

**Discussion:** The main diagnostic considerations for this patient’s acute psychosis included primary psychiatric illnesses, immune-mediated disorders, substance abuse, endocrinopathies, and toxic-metabolic encephalopathies. Most of these considerations were effectively ruled out with laboratory testing and imaging. Given her rapid clinical improvement with high-dose corticosteroids and intravenous immunoglobulin, we conclude she suffered from an acute immune-related post-infectious psychosis triggered by GAS infection. GAS infections have been linked to other autoimmune neurologic syndromes, and these syndromes may have overlapping symptoms with psychotic disorders. The limitations in the current understanding of autoimmune mechanisms and diagnostic testing preclude a definite diagnosis in many clinical cases such as ours. A high clinical suspicion in cases of acute onset psychosis is needed in order to prevent morbidity and mortality from a delayed or missed diagnosis.
Vancomycin-Induced Linear IgA Bullous Dermatosis

Case Description: An 86-year-old Caucasian gentleman with a past medical history of dilated cardiomyopathy, aortic insufficiency and left knee osteoarthritis status post total knee arthroplasty complicated by prosthetic joint infection treated with a vancomycin spacer for joint infection who presented with chief complaint of diffuse non-pruritic bullous rash involving skin and oral mucosa. The rash appeared 9 days after vancomycin spacer placement and 5 days after starting IV vancomycin. Rash first appeared as yellow peri-incisional vesicles and progressed to a diffuse polymorphic, erythematous vesicobullous eruption 2 days later. Patient denied systemic symptoms.

Physical Findings: On exam, patient had multiple eruptions including 1-4 cm tense bullae filled with serous and hemorrhagic fluid, superficial erythematous erosions, 0.2-2 cm targetoid macules and papules with perilesional vesicles, some coalescing in a herpetiform distribution. In addition he had a 2 cm oral mucosal ulcer. Lesions were located along the extensor surfaces of his arms, legs, as well as back and palms of hands. He had periorbital erythema as well as conjunctival injection of the left eye.

Lab Data: Laboratory results revealed WBC count of 12,000 cm$^3$, creatinine of 1.5 mg/dl (near baseline) and a vancomycin trough level within normal limits. Other results were unremarkable and included a negative ANA and anti-dsDNA. Dermatology was consulted and biopsy of a lesion over the chest showed a focal subepidermal blister with numerous neutrophils and some eosinophils as well as small collections of neutrophils within the dermal papillae.

Management Description: Prior to admission, Infectious Disease was consulted and empirically switched his antibiotic from vancomycin to daptomycin based on organism susceptibilities and timeline suggesting drug reaction. Orthopedics was consulted and recommended keeping antibiotic spacer to optimize future joint mobility. Ophthalmology was asked to weigh in on patient’s ocular findings and recommended conservative compress therapy. Colchicine therapy was utilized instead of dapsone as patient was anemic. Patient was discharged on colchicine 0.6 mg BID for 14 days to a subacute rehabilitation facility.

Discussion: Linear IgA bullous dermatosis (LABD) is an autoimmune vesiculobullous disease, which is typically idiopathic but can also rarely be caused by medications or infections. Vancomycin is the most common drug associated with LABD. Lesions typically appear 24 hours to 15 days after the first dose of vancomycin. It is best characterized pathologically by subepidermal bullae formation with in situ linear IgA deposition at the dermoeidermal junction. LABD secondary to vancomycin is an uncommon skin disease that may resemble other blistering diseases. Early recognition and management of LABD is important to avert potential serious morbidity associated with this disorder. Future research is needed to better understand the pathophysiology of LABD to create novel therapies.
Clinical Suspicion Aids In Diagnosis Of Brain Tumor On Imaging

Case Presentation: A 55-year-old male presented to the hospital from a subacute rehabilitation facility following a suicide attempt. His past medical history was significant for a bilateral above knee amputations secondary to peripheral artery disease, depression, alcohol abuse and cognitive dysfunction.

The patient was found in his room at the rehabilitation center with his privacy curtain wrapped around his neck. Upon arrival to the hospital he was placed on suicide watch and his neurological exam was limited by lack of patient cooperation. He rarely responded to questions and mostly mumbled incoherently to himself. According to the transferring facility, this was only marginally different from his cognitive baseline. The medical team attributed this altered mental status to his underlying cognitive issues, depression and the recent suicide attempt. His aunt arrived to the hospital and informed the staff that his mental status had actually worsened compared to baseline and that he had developed a minor resting tremor in his right hand that was not present prior to his admission. An MRI of the brain was ordered.

The MRI revealed a large mass, mostly located in the left temporal lobe and partially in the left parietal lobe. The radiology report concluded that these findings were most consistent with a malignant brain tumor such as glioblastoma multiforme or primary brain lymphoma. The mass was 3.98 cm by 5.35 cm, with irregular borders and heterogeneous composition. The mass was causing both a subfalcine and an uncal herniation. Neurosurgery was immediately consulted. Upon further discussion with his HCPOA about the risk and outcome associated with brain cancer, she decided against the operation. SA palliative care plan was put in place.

Discussion: A high index of suspicion for intracranial pathology should be maintained in patients who are unable to provide a reliable history. This includes patients with a history of cognitive impairment, depression, suicide, or mental illness. Limited baseline cognitive function and lack of caregivers who know the patient well can delay recognition of catastrophic illnesses. Studies have shown an association between brain masses and depression and the information provided by his HCPOA was vital. With the rightful ongoing emphasis on high value care, it is important to be aware of situations that should prompt expensive imaging studies outside of strictly evidence based guidelines.

Conclusions: This case helps us to recognize the importance of establishing an accurate mental status baseline in patients with baseline cognitive limitations. In addition, it helps us understand the critical role of obtaining corroborative information from caregivers who know the patient well, especially for patients with multiple transitions through various phases of care.
Rheumatoid Meningitis: A Rare Recurrence

First Author: Stephanie Y Torres Secondary Author: Dr. Pinky Jha

**Introduction:** Central nervous system involvement in rheumatoid arthritis is uncommon. The non-specific neurological findings creates more of a challenge in making the diagnosis.

**Case Description:** A 75 year old African American male with a history of rheumatoid arthritis treated with Leflunomide, and Secondary Sjogren’s presented to the Emergency Department (ED) with confusion and odd behavior witnessed by family. His altered mental state was initially thought to be delirium due to chest x ray findings suggestive of pneumonia, so treatment for community acquired pneumonia was initiated. There were no focal deficits and CT of the head done in the ED showed enlarged lateral ventricles. Upon presentation vital signs were stable and physical exam was normal except for swan neck deformities of the hands and feet with no active synovitis. Patient was also noted to be anemic with bloody stool requiring blood transfusions. Colonoscopy and CT of the abdomen/pelvis were consistent with invasive adenocarcinoma and patient was found to have an ulcerating sigmoid mass with no evidence of metastatic disease.

Throughout the hospital course, the patient was impulsive with fluctuations in orientation and displayed odd behavior. PET scan showed focal hypermetabolic activity within the left frontal lobe cortex, and left greater than right anterior thalami. MRI of brain showed dural enhancement which favored pachymeningitis. Based on these findings, a lumbar puncture was performed and was positive for elevated protein, mildly elevated polysegmented neutrophils, and glucose at the low end of the normal range. Serum ESR and CRP were also elevated. The patient experienced one full body tonic clonic seizure which was treated with Fosphenytoin. Family declined brain biopsy due to anesthesia and procedure risks.

Chart review revealed clinical presentation of altered mental status one year prior which was diagnosed as rheumatoid meningitis. At that time his symptoms greatly improved with high dose glucocorticoids. Given this history, clinical presentation, and work up, a diagnosis of recurrent rheumatoid meningitis was made. Treatment with IV Methylprednisolone 500 mg IV for 3 days and then Prednisone 1 mg/kg with slow taper was started. The patient started to have slow resolution of symptoms by the time of discharge.

**Discussion:** Rheumatoid arthritis is a rare cause of meningitis and can present with a variety of clinical symptoms. It is even more uncommon to have someone present with rheumatoid meningitis twice. In addition to a detailed history and comprehensive physical exam, underlying immunosuppressive diseases should be considered when evaluating for recurrent rheumatoid meningitis. It is important to include rheumatoid meningitis on the list of differential diagnoses in anyone who has a history of rheumatoid arthritis and presents with non specific neurological findings, and behavioral changes.
Medical Students – Research Podium Presentations
Understanding Death and Dying In An In-Patient Hospice Home

First Author: Tiffany Cheung, MS-II Second Author: Sophia Chan, DPT, MS-II Third Author: Marilyn Gugliucci, MA, PhD

Introduction: Encounters with death and dying are prevalent in most medical fields; however, newly qualified doctors feel unprepared to provide quality care for dying patients. Although death and dying issues are covered in all US medical schools since 2000, most of this education is presented in simulated or lecture format and real-life contact is often limited to a single, terminally ill patient. A more comprehensive approach was implemented at The University of New England College of Osteopathic Medicine (UNE-COM).

Methods: Ethnographic/autobiographic research designs were applied to answer the questions: “What is it like for me to live in the Hospice Home?” and “How will I apply what I learned to my future career as a physician?” Two second year medical students (26 y/o female and 31 y/o female) were immersed for 48 hours into an 18 bed in-patient Hospice Home to provide patient care, family care and post mortem care with an inter-professional team. Data were collected as written journals and photos during the three research stages (pre-fieldwork, field work, post-field work). Data were analyzed using thematic content analysis. Common themes between the journals were identified and representative quotes were categorized under each theme.

Results: Common themes included: (1) Control over death and dying; (2) Perceptions of death; (3) Hospice vs. Hospital; (4) Retaining and redirecting hope; (5) Patient respect; and (6) Family. The students reported that living in the Hospice Home was an unexpectedly uplifting experience that offered the comforts of home and provided unparalleled compassionate care for both the patients and their families. Furthermore, this experience influenced their ability to care for terminally ill patients in the future by helping them to: (1) openly discuss the death and dying process (2) be comfortable in presenting the option of hospice care; (3) establish and execute patient directives; (4) educate patients and family members to make well-informed decisions; and (5) mitigate the negative perception surrounding death.

Conclusion: This hospice immersion provided new perspectives regarding the acceptance of death and dying and highlighted the hospice as a supportive environment that emphasizes comfort through pain management and patient autonomy. It established a more profound understanding of the dying process and the hospice culture, thereby preparing the students for the management and care of terminally ill patients that exceeds what is achievable through lectures and simulated experiences.
Background: Pregnant women with underlying heart disease (HD) are at increased risk for adverse maternal outcomes. Neonatal outcomes have not been well characterized.

Methods: Singleton delivery admissions (2000-2014) were from Statewide Planning and Research Cooperative System of New York State. Maternal Major Adverse Cardiac Events (MACE) were defined as death, cardiac arrest, myocardial infarction, heart or respiratory failure, arrhythmia, and embolic events. Neonatal Adverse Clinical Events (NACE) included neonatal death, prematurity, small birth weight, intrauterine growth restriction, respiratory distress syndrome, intracranial hemorrhage, and congenital heart disease. Risk factors for NACE were studied using multiple logistic regression.

Results: We studied 3,871 women with HD and 2,280,173 without; 676 (17%) cardiomyopathy (CDM), 1,528 (40%) valvular HD, 1,367 (35%) congenital HD, 300 (8%) pulmonary hypertension (PH). MACE occurred in 16.12% of women with HD and 0.41% without (p<.0001), with highest rates rates of MACE in the CDM and PH groups. NACE was more common in women with HD, occurring in 18.4% of pregnancies with HD and 7.1% of pregnancies in women without HD (p<.0001). Preeclampsia/Eclampsia (OR 5.11, 95% CI 2.99-8.75) or severe preeclampsia (OR 6.54, 95% CI 4.59-9.31), MACE (OR 2.26, 95% CI 1.77-2.88), and obstetric complications (OR 2.90, 95% CI 1.65-5.09) were independently associated with NACE.

Conclusion: Neonatal complications were higher in pregnant women with HD. Eclampsia/preeclampsia, major adverse cardiac events, and obstetric complications were associated with NACE.
Medical student summer research: current state and path forward

First Author: Yang AT, Gamlin RA, Hau V, Ngo K, Tsevat J, Thompson AM

Background: Although medical student research (MSR) programs for the summer between students’ first and second year are common, medical school MSR programs are not well-characterized and best practice guidelines have not been established. Developing these research opportunities can promote students’ scholarly productivity, residency competitiveness, and pursuit of academic medicine, while helping schools attract more competitive medical students and satisfy LCME accreditation criteria. The purpose of this study was to 1) identify medical students’ MSR expectations and experiences, and 2) characterize the structure of existing MSR programs, in order to 3) inform the creation of a progressive MSR program.

Methods: First, we conducted a needs assessment by surveying medical students and conducting semi-structured phone interviews with medical directors at LCME-accredited medical schools. Students at the University of Cincinnati College of Medicine (UCCOM) completed online surveys before and after their summer experiences. Ten MSR Directors at 9 US medical schools were interviewed about their MSR programs’ structure, funding, and curriculum. The surveyed medical schools were identified through 1) recommendations from the AAMC and key informants, 2) regional proximity, and 3) competitive matriculation of UCCOM applicants. Our UCCOM task force then integrated these findings into a MSR Program Proposal. This study was approved by the UCCOM Institutional Review Board.

Results: Medical students reported difficulty finding funded research opportunities (62%); 19% conducted research without a stipend (n=59). Most students expected to complete scholarly products such as posters (74%) and abstracts (52%). Many would have liked the first-year curriculum to include more on research study design, analysis, and scholarly product preparation. Half of the medical schools in this study were public, and half were private. The average class size was 160 students (range 80-200). Among the MSR Directors interviewed, 70% held an MD degree and 10% held solely a PhD. In addition to their MSR role, 30% reported concomitant appointments in the Office of Medical Education, 20% in the Office of Research, and 20% in Student Affairs. All MSR directors had an established office of MSR. MSR offices averaged 2 FTE faculty; responsibilities included helping students identify interests, mentors, and funding. The average summer research stipend per student was $3,434 (range $2,500-$4,600); funding sources included the school endowment, NIH, and Dean's office. All interviewed schools had curricular research requirements for medical student graduation; 67% had specialized research tracks; and 56% had elective research courses. The task force identified the following critical factors for creating a robust MSR program: setting quality research milestones; providing students an experiential research education for conducting quality research; promoting and recognizing mentorship by faculty; ensuring program funding; tracking program outcomes; and having a centralized Office of Medical Student Research.

Conclusions: Our results provide insight into the summer scholarly experience of medical students at our institution and the current state of medical student research at US medical schools. Key elements of MSR programs include financial support, faculty mentorship, and a formal research curriculum.
Elucidating the role of novel tumor suppressor myomiRs in dedifferentiated liposarcoma

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Background: Sarcomas are malignant heterogeneous tumors of mesenchymal derivation. Dedifferentiated liposarcoma (DDLPS) exhibits aggressive biological behavior with an 80% local recurrence rate and the development of metastasis in approximately 20% of patients. To identify and characterize the molecular alterations that contribute to the development and progression of DDLPS, our laboratory characterized a unique miRNA expression signature associated with human DDLPS tissue compared to paired subjacent normal tissue. We found that several muscle-specific miRNAs (myomiRs), miR-1, -133a, and -206, were significantly underexpressed in liposarcoma tissues. Interestingly, these miRNAs have recently been shown to have tumor suppressor functions in many human cancers. The objective of this study is to characterize the biological and molecular consequences of miR-133a in DDLPS.

Methods: Taqman real-time PCR was used to evaluate expression levels of myomiRs in human DDLPS tissue, normal fat tissue, and available human DDLPS cell lines. To evaluate the effects of miR-133a expression on DDLPS cell line behavior in vitro, cells were stably transduced with miR-133a vector or empty lentiviral vector and the effects on cell cycle, proliferation, apoptosis, and migration were assessed. Agilent Seahorse Bioanalyzer system was used to assess metabolism. We performed an in silico search for predicted targets of miR-133a using target prediction databases and compared these target genes to known genes that are highly expressed in human DDLPS tissue.

Results: The expression levels of myomiRs were significantly decreased in human DDLPS tissue compared to normal human fat as well as in human DDLPS cell lines compared to a human preadipocyte cell lines. Overexpression of miR-133a decreased cell proliferation, decreased glycolysis, and increased spare respiratory capacity. There was no significant effect on cell cycle, apoptosis, or migration. Using in silico target gene analysis, we identified 18 potential targets of miR-133a. These preliminary results suggest that miR-133a regulates metabolism and proliferation, and its dysregulation might contribute to the oncogenic phenotype of DDLPS.

Conclusions: We have demonstrated that enforced expression of miR-133a decreased proliferation and metabolism in human DDLPS cells. We have identified putative gene targets of miR-133a and are currently dissecting the molecular mechanism by which miR-133a may mediate proliferation and metabolism in DDLPS cell lines. Taken together, these data suggest that miR-133a might play a tumor suppressor role in DDLPS, thereby generating new potential targets for therapeutic intervention to alter the course of this disease.
Patient-Centered Outcomes in a Self-Administered Outpatient Parenteral Antimicrobial Therapy Clinic

First Author: Anisha P Ganguly, Haru Yamamoto, MD, Larry Brown, MS, Deepak Agrawal, MD, MPH, and Kavita Bhavan, MD, MHS

Background: Self-administered Outpatient Parenteral Antimicrobial Therapy (s-OPAT) has been proven to be a safe, cost-effective method of treating patients requiring extended courses of intravenous antimicrobial therapy. Parkland Hospital is a large safety-net hospital serving Dallas County, Texas. Since 2009, Parkland has operated an s-OPAT program offering uninsured patients the option to be taught at a 4th grade literacy level to self-administer intravenous (IV) antibiotics by gravity at home with weekly in-clinic follow-up. Previous studies have shown that s-OPAT patients were found to have better clinical outcomes with a 47% lower 30-day readmission rate than patients discharged with traditional OPAT. Our program vastly improved resource utilization with >27,000 hospital bed days saved in the first four years at an estimated cost savings of ~$40 million.

There is little data on patient-reported outcomes when patients choose s-OPAT over hospital admission. It is important to identify these outcomes to help other patients and hospital systems decide if s-OPAT would be a feasible approach to delivering care across settings and justify s-OPAT as a viable treatment option from the patient perspective.

Methods: Patients who received s-OPAT from 2009-2013 were contacted by phone and completed a patient satisfaction survey about their experience and opinions regarding s-OPAT. The responses were graded on a 5-point Likert scale.

Results: Responses were received from 151 patients. Of these, 127/148 (86%) rated the quality of S-OPAT over inpatient care as “good” or “very good,” and 128/147 (87%) stated that they were likely to request s-OPAT again if they needed IV antibiotics in the future. Among the patients who were employed, 61/82 (74%) rated that the amount of time s-OPAT took prior to returning to work as “good” or “very good.” With regards to the clinic training for self-administering IV antibiotics, 132/148 (89%) of patients rated the explanations and instructions for training as “good” or “very good,” and 130/147 (88%) said that clinic staff were sufficiently concerned and responsive to their questions. Responses did not differ significantly based on gender, age, race, or language of patients (p > 0.05).

Conclusion: Satisfaction was generally high among patients who used our s-OPAT clinic, and most patients reported that they would prefer to self-administer IV antibiotics should they need them in future. Our patient satisfaction results compare favorably with the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey that suggests 75% (range 46-90%) patients are overall satisfied with their hospital care. Our program engages and empowers patients to safely and effectively complete IV antibiotic therapy at home and may be applicable in other settings.
Medical Students – Research Poster Finalists
Therapy of Adults affected by idiopathic thrombocytopenic purpura with 3 cycles pulses of high-dose dexamethasone (HD-DXM): a prospective randomized clinical trial (NCT02914054)

First Author: Saeid Rezaei Jouzdani Second Author: Alireza Sadeghi Third Author: Forough Hosseini

Introduction: Idiopathic thrombocytopenic purpura (ITP) is an autoimmune disorder characterized by platelet destruction leading to decreased platelet count and an increased risk of bleeding. The first line treatment of ITP is still corticosteroid therapy. Prednisone (PDN) is the standard corticosteroid therapy in ITP practical guideline. Recent studies suggested pulsed high-dose dexamethasone given at a dose 40 mg/day to a 4-day course treatment as an alternative corticosteroid to reduce the duration and the adverse effect of corticosteroid therapy. In this randomized controlled clinical trial our aim was to compare the efficacy and the relapse free survival time of 3 therapy cycles of HD-DXM versus conventional treatment with PDN for untreated adult patients with ITP.

Method: This was a monocenter, randomized, controlled, clinical trial approved by ethics committee on medical research in Isfahan University of Medical Sciences (IUMS) and also registered in clinical trial.gov (NCT02914054). The eligible patients for this study were aged 18 or older of both genders with newly diagnosed primary ITP according to the international working group (IWG) guideline. Eligible patients were randomly assigned to either enroll conventional Prednisone therapy or pulses of high dose Dexamethasone (HD-DXM) treatment. In HD-DXM arm, DXM was administered intravenously at 40 mg in 500cc normal saline (0.9% saline) during 1 hour for consecutive 4 days and then stopped. This cycle was repeated in 14 days interval to receive 3 cycles of treatment. Patients in PDN arm received PDN orally at 1.0 mg/kg body weight daily for 4 consecutive weeks. After achieving responses the medication tapered gradually to less than 15mg daily or terminated over 4-6 weeks aimed at maintaining platelet count over $30 \times 10^9/L$. Cell blood count was performed every week in the first month of treatment and then each month to 1 one year or until loss of response. Baseline parameters such as platelet count were compared between two arms by Fisher exact test. A logistic regression model was used to evaluate the correlation between response and baseline parameters. All patients entered to study provided written informed consent in accordance with the Declaration of Helsinki.

Results: 36 cases were given high dose Dexamethasone another 36 cases were given prednisone as control group. The following results were obtained: (1) at the end of the 3rd cycle, the overall response rate was higher in the HD-DXM group than in the prednisone group; (2) the relapse rate of the HD-DXM group was lower than the control group after 12 months discontinuation; (3) Adverse effect of corticosteroid therapy was less than the control group (p value<0.05).

Conclusion: Treatment with 3 cycles of HD-DXM pulses is an effective method for untreated ITP patients with less adverse effect of corticosteroid in comparison with conventional prednisone therapy.
Effects of Insulin Resistance on Pulmonary Vascular Stiffness and Right Ventricular Remodeling

First Author: Morgan Whitaker Additional Authors: Nair V, Sinari S, Natarajan B, Trutter L, Dherange P, Brittain EL, Hemnes AR, Austin ED, Patel K, Kadakia A, Yuan JX, Rischard F, Makino A, Bedrick E, Desai AA

There is increasing evidence that diabetes mellitus (DM) negatively impacts survival in patients with pulmonary hypertension, partly due to further reduction of the right ventricle (RV) functions. Systemic arterial stiffening and left ventricular hypertrophy are known associations with DM. We therefore hypothesized that DM may influence pulmonary arterial stiffness and RV remodeling in patients with pulmonary arterial hypertension (PAH) that lead to increased RV afterload and susceptibility to RV dysfunction.

A double-center, retrospective chart review of 234 patients with World Health Organization Group I PAH patients was completed. DM was defined by documented diagnosis or treatment with anti-diabetic medications. DM was present in 27 (16.7%) patients in the University of Arizona (UA) cohort (n = 162) and 20 (27.7%) patients in the Vanderbilt University (VU) cohort (n=72). Threshold effects of both fasting blood sugar (FBS) and glycated hemoglobin (HbA1c) as well as associations with DM were explored to detect any significant differences in PAH-related phenotypes using linear multiple regression models adjusting for gender, age, indexed pulmonary vascular resistance, and use of PAH medications. Survival analysis was conducted for all-cause mortality versus diabetic status using Cox regression analysis. A p<0.05 was considered statistically significant.

In the UA cohort, presence of DM was associated with increased echo-derived RV wall thickness (coefficient 0.169 cm, n = 71, p = 0.027), increased RHC-derived PA elastance (coefficient 0.134 mmHg/mL, n = 143, p = 0.005); and reduced RHC-derived log(PA capacitance) (-29.1%, n = 137, p = 0.003). Rising HbA1c levels were also associated with increasing PA elastance (coefficient 0.143 mmHg/mL, n = 42, p = 0.002) and reduced log(PA capacitance) (-13.8%, n = 42, p = 0.078). Finally, rising FBS levels were associated with increased RV wall thickness (coefficient 0.005 cm, n = 71, p = 0.013), increasing PA elastance (coefficient 0.002 mmHg/mL, n = 142, p = 0.021), and reduced log(PA capacitance) (-0.3%, n = 136, p = 0.069). In the VU cohort, both the presence of DM and rising HbA1c levels demonstrated trends toward association with reduced six-minute walk distance (DM: -106.7 m, n = 33, p = 0.052; HbA1c levels: -58.0 m, n = 33, p = 0.089).

Based on these findings, the presence of DM and markers of hyperglycemia may influence PA stiffness (reduced PA capacitance and increased elastance) and RV remodeling (increased RV hypertrophy) in patients with PAH, providing mechanistic suggestions that link observations of reduced RV function and survival in previously reported data.
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CALIFORNIA POSTER FINALIST - RESEARCH Janet Lee

Analyzing the Effects of a Longitudinal Medical Student Curriculum in Diabetic Patients

First Author: Janet Lee Rasha Ahmed, Michael Couse, Fanglong Dong, Cesar Ochoa, Edward Barnes

With the expanding healthcare burden of chronic disease, it is important to find novel and inexpensive ways to prevent disease and equally important to educate medical students regarding the social determinants of health. An innovative program at our institution pairs first year medical students with diabetic patients from our Western Diabetes Institute (WDI) for the duration of their medical school careers. Students accompany their patients to their appointments and are encouraged to meet with their patients outside of assigned sessions to build meaningful relationships/partnerships. As of 2009, 32 AAMC medical schools had a medical student longitudinal care course however little data exists on its efficacy.

We hypothesized that patients paired with medical students would have improved disease management. This study was a retrospective chart review which examined blood pressure, hemoglobin A1c, and body mass index between the paired and unpaired patients at WDI over 12 months. Both groups had a similar demographic makeup and received comparable medical care often from the same providers. Patients in both groups were expected to follow up every three months for comprehensive diabetes care where we obtained basic vitals and standing A1c values with each office visit.

Our analysis started out with 36 paired patients and 211 unpaired patients. Patients were excluded from the study if they relocated/withdraw from the WDI, became pregnant, had a mental deficit, or became incarcerated. Most patients in both groups were excluded due to poor follow up leading to incomplete data sets. After examining the data over a 12 month period, we had complete data sets for 5 paired vs 6 unpaired patients for A1C taken, 9 vs 17 for BMI checked, and 9 vs 23 for blood pressure. While the rate of attrition in the study is high, that rate is much higher in unpaired patients vs paired patients.

Our data was limited by small sample sizes, yet we found that patients from the paired group had lower BMIs than those from the unpaired group. Conversely, both groups had an overall increase in their hemoglobin A1C and the analysis of blood pressure values yielded no pattern. P values were unable to be assessed due to the sample sizes. As a pilot study for a novel program, this study demonstrated the need for increased patient follow up to better characterize the effect of medical student partners-in-health. Further analysis is needed to not only stratify levels of student involvement but also disease severity. Regardless, this study demonstrates the importance of exploring new ways to manage preventable disease.
CALIFORNIA POSTER FINALIST - RESEARCH Mridula Nadamuni

IMPROVING PATIENT SATISFACTION WITH PRO RE NATA (PRN) MEDICATION EDUCATION

Mridula Nadamuni1, Sachi Patel1, Colin Campbell1, Wendy Lau1, Eric Hsieh MD1,2, Gina Rossetti MD1,2 1. Keck School of Medicine of USC 2. Department of Internal Medicine, LAC+USC Medical Center, Los Angeles, CA

Introduction: In our experience, there is a gap in patient understanding of “as needed” or pro re nata (PRN) medications prescribed for pain, nausea and anxiety, which are typically integral components of care. Prior work on understanding of hospital medications (Cumber et al, J Hosp Med. 2010) found that 60% of adults under age 65 and 88% over 65 were unable to name their PRN medications. Here, we sought to determine if a targeted teach-back approach to PRN medications improved both patient understanding of the care plan and satisfaction.

Methods: Four third-year medical students embedded with general inpatient medicine teams at LAC+USC as part of their core rotations enrolled patients deemed to have capacity between the ages of 18-75. At the time of admission, patients underwent a one-to-one, 15-minute standardized teaching session reviewing prescribed PRN medications. The students also worked with patients to complete an individualized handout. Patient utilization of PRNs was recorded daily. At discharge or on the seventh day of hospitalization, a survey modeled on PSQ III and HHCAPS was administered. Mean Likert-scale responses were compared using a two sample, two tailed t test.

Results: The intervention group totaled twenty-five adults (10 females, 15 males) as did the control group (11 females, 14 males). In response to “I understood what my medications were while I was hospitalized” 64% of the intervention group responded “Strongly Agree,” while only 16% responded “Strongly Agree” among controls. The mean response to the same question for the intervention group was 4.64/5 (± .88) while the control mean was 3.80/5 (± .79), indicating a statistically significant improvement in patient understanding (p-value of .0001, 95% CI 0.42 to 1.19). The intervention group scored 4.6/5 (±.65) compared to 3.9/5 (±.83) in response to the question “My medical team explained my medications to me in a way I could understand.” Interestingly patient responses to the question “I felt my medical team cared about me” did not differ between groups with both reporting 90% satisfaction with the medical team, nor was there a significant difference in overall satisfaction. Finally, student investigators reported that the teaching sessions increased their own understanding of the care plan and helped them build rapport with their patients.

Conclusion: Improving education surrounding inpatient medications, especially PRNs, are important for improving patient satisfaction and understanding of the care plan. Third-year medical students can play a meaningful role in facilitating communication between the care team and the patient through these targeted educational sessions while simultaneously enhancing their own learning.

Background: Improving outcomes for patients with HER2+ CNS metastases remains an unmet clinical need. Lapatinib (L) plus capecitabine (C) yields a 20% objective response rate (ORR) in the CNS in patients with previously treated HER2+ breast cancer brain metastases (Lin N, Clin Cancer Res 2009). Everolimus (E), an oral inhibitor of the mammalian target of rapamycin (mTOR), penetrates into the CNS in murine xenograft models (Meikle L, J Neurosci 2008). TRIO-US B09 is an investigator-initiated trial evaluating the safety and clinical activity of the novel combination of L+C+E for the treatment of patients with HER2+ breast cancer brain metastases.

Methods: Patients with trastuzumab-pretreated, HER2+ metastatic breast cancer (MBC) with progression of disease (PD) in the brain and a measurable brain lesion participated. Patients were excluded if they had a prior mTOR inhibitor or an ECOG PS>2. Prior L and/or C, and prior surgery and/or radiation to the brain were allowed. The primary endpoint was CNS ORR at 12 weeks using RECIST 1.1. Secondary endpoints included safety, progression-free survival, overall survival and extra-CNS ORR. To test the safety of the combination of L+C+E, a 3+3 dose escalation phase was conducted (starting doses: L 1000 mg QD, E 5 mg QD, C: 750 mg/m2 BID d1-14). Treatment was given Q21 days. Patients were evaluated for dose limiting toxicities during C1. Tumor imaging was conducted every 3 cycles. MRI of the brain was performed every 6 wks through cycle 6 and then every 9 wks. Neurological symptom assessment was conducted on day 1 of every cycle. Study participants continued to receive treatment until PD, unacceptable toxicity or withdrawal of consent for 12 mos.

Results: Nineteen patients were enrolled at 11 sites in the US and treated with at least one dose of study drug. Of 18 patients with data available, median age was 58.5 (45-68), median number of systemic therapies for MBC was 2 (0-6), and 94.4% had prior radiation and/or surgical resection of brain metastases. 10 patients participated in the dose escalation phase of the study. The maximum tolerated doses were determined to be L 1000 mg QD, E 10 mg QD + C 1000 mg/m2 BID days 1-14; however, given tolerability concerns, dose expansion proceeded with Cohort 2 dose for C (750 mg/m2 BID d1-14). Of 17 eligible patients with imaging results available to date, 2 (12%) had a partial response in the CNS at week 12. One patient continues on study (currently in cycle 13), the other patient came off treatment (PD) during cycle 12. Stable disease was observed in 7 patients. The most common grade 3/4 adverse events (AE) (CTCAE v4.0) related to E and/or L in 18 treated patients were anorexia (5.5%), dehydration (5.5%), diarrhea (17%), fatigue (5.5%), fever (5.5%) hyperglycemia (5.5%), hypokalemia (11%), and oral mucositis (17%).

Conclusions: This is the first report of this regimen for patients with HER2+ MBC to the brain. This regimen is generally well-tolerated and shows promising activity in the CNS of heavily pretreated patients. Final efficacy and toxicity analyses for all 19 patients will be presented.
COLORADO POSTER FINALIST - RESEARCH Alexander Steinberg

The Voice of the Patient

First Author: Alex Steinberg MS4 CUSOM Second Author: Tyler Miller M.D. DVAMC

Introduction: Patient satisfaction is a pillar of quality healthcare defined by the Institute of Medicine, and is commonly a key domain used to define and measure quality. The “Hospital Consumer Assessment of Healthcare Providers and Systems” (HCAHPS) survey is a widespread and validated tool to assess patient satisfaction, but is limited, failing to give provider-specific or qualitative details regarding patient experience. Voice of Consumer (VoC) is a widely used method in commercial product design to collect formative information about customer experience. We aim to investigate physician behaviors affecting patient satisfaction scores by integrating VoC methods with HCAHPS style data.

Methods: Face-to-face interviews were conducted with patients admitted to the Hospital Medicine Service at DVAMC. Interviewers were entirely uninvolved in patient care. Interviews focused on the patient’s experience with physicians during their current hospitalization. Following the HCAHPS format, patients were asked to rate the team in a variety of domains including skill, empathy, and communication. Open-ended questions followed this rating score in the VoC model to elucidate patient experience and complaints. Qualitative patient responses were analyzed in several domains using a 5-point Likert scale ranging from “very negative” to “very positive”.

Results: Twenty veterans, aged 47 to 87 (average 60.1 years old), selected from the Hospital Medicine Services were interviewed. Patients were excluded in the first 48 hours after admission, and for a diagnosis of schizophrenia, dementia, delirium, or encephalopathy. Seventy-five percent reported a generally positive experience. Average scores were as follows: for Physician skill; 4.3 (SD 0.806), Physician empathy; 4.3 (SD 1.031), Physician-Patient communication; 3.95 (SD 1.356), and Patient’s preparedness to manage their own care on discharge; 2.3 (SD 1.506). Patients most commonly commented on their team’s hard work, their concern demonstrated through listening, and their clear explanations. Negative comments focused on feeling ignored or disregarded by physicians, the use of medical jargon, and poor communication between provider teams. For example, one patient expressed feeling ignored, saying “Don’t walk out the door talking about me.” Patients also voiced concerns about future readmission for the same medical problem.

Conclusion: Our results suggest that poor physician-patient communication and patient preparation for discharge may contribute to low patient satisfaction. Using the VoC approach identified a number of specific factors that contribute to patient dissatisfaction, which could not have been elucidated with HCAHPS. These included patients feeling disregarded and unheard when their team appeared to talk about them rather than to them, and when inconsistent communication between teams led to patient confusion. This approach provides actionable formative feedback from a small number of interviews and can be used to improve patient experience and satisfaction.
Influence of Medical Insurance Under the Affordable Care Act on Access to Pain Management of the Trauma Patient

Theodore Zaki, B.S., Daniel H. Wiznia, M.D., Julianna Maisanoa, Chang-Yeon Kim, B.S., M.S., Thomas M. Halaszynski, D.M.D., M.D., M.B.A., Michael P. Leslie, D.O. aDepartment of Orthopedics and Rehabilitation, Yale University School of Medicine, 800 H

Importance: The Affordable Care Act intended to “extend affordable coverage” and “ensure access” for vulnerable patient populations. Therefore, this investigation examined whether the type of insurance (Medicaid, Medicare, BlueCross, cash pay) carried by trauma patients influences access to pain management specialty care.

Objective: The study was designed to identify barriers that patients experience as well as determine if Medicaid reimbursement rates are responsible for the decreased likelihood of Medicaid patients from securing office visits. The hypothesis was that patients with Medicaid insurance coverage would have reduced access to medical care by pain management specialists, even despite the passage of the PPACA.

Design and Methods: Investigators phoned 443 randomly selected board certified pain specialists, securing office visits with 235 pain physicians from eight different states: four with expanded Medicaid eligibility, and four without expanded Medicaid eligibility. Appointments for pain management were for a fictitious patient that sustained an ankle fracture requiring surgery and experiencing difficulty weaning off opioids. Offices enrolled were phoned four times assessing responses to the four different payment methodologies.

Results: 53% of pain specialists contacted (235 of 443) were willing to see new patients to manage pain medication. Within the 53% of positive responses, 7.2% of physicians scheduled appointments for Medicaid patients, compared to 26.8% for cash paying patients, 39.6% for those with Medicare, and 41.3% with BlueCross (p < 0.0001). There were no differences in appointment access between states that had expanded Medicaid eligibility for low-income adults versus states that had not expanded Medicaid eligibility. Neither Medicaid nor Medicare reimbursement levels for new patient visits correlated with ability to schedule an appointment or influenced wait times.

Conclusions and Relevance: Access to pain specialists for management of pain medication in the postoperative trauma patient proved challenging. Despite the Affordable Care Act, Medicaid patients still experienced curtailed access to pain specialists and confronted the highest incidence of barriers to receiving appointments.
Transcatheter Aortic Valve Replacement Improves Right Ventricular Hemodynamics in High Surgical Risk Patients with Aortic Stenosis

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Introduction
Aortic stenosis (AS) affects between 323% of elderly adults and is a major cause of morbidity and mortality. While surgical aortic valve replacement at prohibitive risk for many of these patients, transcatheter aortic valve replacement (TAVR) represents an emerging alternative approach. The hemodynamic efficacy of TAVR has been demonstrated in clinical trials; however, less is known in real-world practice. Specifically, AS worsening RV hemodynamics may be associated with adverse outcomes. The goal of this study was to assess whether TAVR results in improvement of RV hemodynamics as measured by echocardiography.

Methods
We reviewed 62 patients referred for TAVR to an urban academic medical center from 2014-2016. Transthoracic echocardiography (TTE) was performed before and after TAVR according to American Society of Echocardiography guidelines. Pre-TAVR and post-TAVR TTE were reviewed at blinded separate sessions. RV function was assessed by tricuspid annular plane systolic excursion (TAPSE), fractional area change (FAC), and tissue Doppler-derived tricuspid lateral annular systolic velocity (S’). RV size was quantified as the basal diameter in the apical four-chamber view. Pulmonary artery pressure was derived using tricuspid regurgitation velocity + right atrial pressure, with pulmonary artery hypertension defined as > 40 mm Hg. Left heart hemodynamics were also assessed using standard measures.

Results
The study included 29 patients with fully retrievable TTE imaging available for review. Mean age was 79 ± 9.2 years (range 63-94), 70% were men, and all were at high surgical risk (STS Score 7.1 ± 5.3, 33% hostile chest). Of the 29, 9 (31%) had mild to moderate chronic lung disease. RV size and FAC were similar pre and post TAVR. Significantly, TAVR resulted in improvement in pulmonary pressure in 14 patients (48% p=0.03), and RV function by TAPSE in 9 patients (p=0.03) and S’ in 9 patients (p=0.02). 27/29 (93%) of patients demonstrated no or trace aortic insufficiency after TAVR. Regarding the left heart, TAVR also significantly improved left ventricular ejection Fraction in 21 patients (72%; p=0.004), aortic valve peak velocity in all 29 patients (p<0.001) and aortic valve mean gradient in all 29 patients (p <0.001).

Conclusion
In this real-world cohort, TAVR resulted in improvement in pulmonary hypertension and RV function. As pulmonary hypertension RV function has been associated with worse outcomes, our data suggests that further studies are needed to determine whether these improvements observed are predictive of better long-term outcomes.
The Prevalence of Opiate and Laxative Use Among Older High-Risk Hospitalized Patients

First Author: Oliver Acosta Second Author: Evan Garrod, MD Third Author: Gabriella Engstrom, PhD Fourth Author: Joseph Ouslander, MD

Opioid-induced constipation is a major problem among patients taking prescription opiates for long-term management of chronic pain. The prevalence of opioid-induced constipation has been estimated at 40%. Prescription of laxatives simultaneously with opiates is recommended to prevent potentially serious complications, and is a quality measure for palliative care. The aim of this study is to understand the prevalence of both prescription opiates and laxatives among older high-risk hospitalized patients and to compare the rates upon entry and upon discharge from the hospital. It was hypothesized that 5-10% of patients will have opiate prescriptions with no greater than 25% also having laxative prescriptions.

We collected data on a convenience sample of patients that qualified for the STAR program, a quality improvement program designed to improve patient quality and safety of care for older high-risk hospitalized adults age 75 and older, admitted to Boca Raton Hospital between October and December of 2015. Prescription opiate and laxative use for patients were determined based on medication reconciliation reports upon entry and upon discharge. Presence of an opiate and/or laxative prescription was determined based on preexisting prescriptions upon entry and at discharge, and new prescriptions given while at the hospital.

119 patients were enrolled on the basis of having a prescription opiate either upon entry or at discharge, with 59% female and 41% male patients. The overall prevalence of prescription opiates was 16% and 24.4% upon entry and upon discharge, respectively. Of those patients with a prescription opiate upon entry, 79% had a PRN prescription and 21% had a routine prescription. Of those patients with a prescription opiate upon discharge, 83% had PRN prescription and 17% had a routine prescription. With respect to laxative use, among patients with a prescription opiate, 47% of patients had a laxative prescription upon entry, and 52% had a laxative prescription upon discharge. Among patients without a prescription opiate (100 patients) the prevalence of laxative prescriptions was 13% and 14.4% upon entry and upon discharge respectively. Of all the patients with an opiate prescription, the most common laxative was docusate sodium, at 77% upon entry and 71% upon discharge.

A higher proportion of patients were found to have opiates than were predicted, suggesting greater use in general among high-risk hospitalized patients. In addition, a significantly higher proportion of patients with opiates than were predicted were found to also have prescription laxatives, but only about half had a prescription. Of importance is that of all prescriptions for laxatives, more than 70% were for docusate sodium, a laxative that has not been shown to be clinically effective in treating opioid-induced constipation. These data suggest there is still much needed improvement for effectively addressing opioid-induced constipation in high risk older hospitalized patients.
Communication in the emergency department is important for the acute and prolonged health of patients. The lack of understanding on the essence of follow ups generally results in minimal visits to the primary care physician. These visits are crucial as they help the patient maintain proper medical care with their physician and minimize remittance to the emergency department. Minimizing remittance is not only important for the patient’s health but also helps financially for the patient and the hospital. The purpose of this project is to look into additional methods that will enhance efficiency of patients visiting their physician once they leave the emergency department. Sending patients reminders in the form of emails, text messages, or phone calls, containing their follow up instructions should be considered due to the ease of access people have for personal computers, phones and tablets. From these methods of reminders, we should see increased rates of follow up rates with primary care physicians following discharge from the emergency department.

This meta-analysis looks into methods that will enhance efficiency of patients visiting their physician once they leave the emergency department. The project explores a minimum of six articles in establishing a vivid conclusion on the correlation between sending reminders and absenteeism rate. My project aims to use articles using the following study designs; observation and intervention study design, randomized clinical trials, randomized control trial, case series, cohort trials and clinical studies.

In addition to exploring the importance of communication in health sector, the project will give future direction on the research topic, the most appropriate method of communication used and concluded based on the analysis of various articles used. Methods used to come up with this project was explained in the methodology part, the inclusive and exclusive criteria used, literature review and the various strategies used to come up with this paper. Evidence table was created at the end of the project as an explanation to the steps that my project entailed to complete this research in addition to references of the articles and other works that aided in construction of this research study.
Chapter Winning Abstract

Rebecca Feistritzer, Sue Song, MPH, Brittany Eddy, MPH, Tana McCoull, RN/MSN

Introduction: The Institute for Healthcare Improvement (IHI) Emory Chapter partnered with the Clarkston Community Health Center (CCHC) in March 2016 to improve clinic processes and patient experiences. The CCHC is a volunteer clinic and was founded in 2013 to serve as a patient-centered medical home providing primary/preventive healthcare to the uninsured refugee and indigent population of the Clarkston community and surrounding areas.

Methods: After two weeks of initial observations of current processes, the IHI Quality Improvement (QI) Team identified patient flow processes as a core area of potential improvement. With support from CCHC, the IHI QI Team used the Plan-Do-Study-Act (PDSA) approach to implement multiple PDSA cycles to improve patient flow. Process flow maps and spaghetti diagrams were also utilized to better understand clinic flow. The team moved the physical location of the check-in desk and the waiting room to allow volunteers to better monitor the flow of patients. Signs and arrows were strategically placed to better communicate with new patients where to check-in at the clinic. Finally, a checklist sticker was designed and implemented to follow patient files and efficiently communicate patient statuses to providers. Average total clinic time, time spent at each step of a clinic visit, number of patients checking in and out, and CCHC staff/volunteer surveys were used to measure the impact of each intervention.

Results: Average total clinic time decreased by nine minutes after the implementation of the new waiting room. However, the time patients spent waiting to see providers increased. This was mostly due to space limitations and the fact that providers can only see patients as the exam rooms become available. The volunteers subjectively perceived a less hectic clinic overall. An unintended consequence of splitting the check-in/checkout process was that patients left the clinic without checking out. A checklist sticker was placed on patient charts to better keep track of patient status during their visit. The number of patients that did not checkout decreased by seven with the implementation of the checklist, and CCHC staff and volunteers perceived the checklist positively. Of the CCHC staff members surveyed, the majority (78%) believed that the checklist stickers on the patient forms improved the process of managing charts. Those surveyed noticed improvements in communication, a faster process, and better, more organized flow of patients after the patient flow project.

Conclusion: Each suggested change succeeded through the rapid feedback obtained via the PDSA cycles as well as engagement with the key stakeholders at CCHC. Future directions for the IHI QI Team at CCHC include further optimization of the checklist sticker, assessing the material and equipment available in the clinic, and optimizing the exam room spaces to better adapt to where bottlenecks form throughout the clinic day.
Prognostic Value of 18F-FDG PET/CT in Patients with Oropharyngeal Squamous Cell Carcinoma

First Author: Leo Jia Contributing Authors: Joyce Hsu, BS, Darko Pucar, MD, PhD, Eran Rotem, MD, MPH, Waleed Mourad, MD, Stephen Scott, Jim Rawson, MD

**Background:** Oropharyngeal squamous cell carcinoma (OPSCC) are prevalent, difficult-to-locate cancers of the head and neck that are typically diagnosed with positron emission tomography/computed tomography (PET/CT) imaging and quantified using Standardized Uptake Value measurements (SUV). However, metabolic tumor volume (MTV) and total lesional glycolysis (TLG) have recently been proposed as potential prognostic markers for patient outcome of OPSCC tumors. The objective of this study was to determine in univariate analysis which metabolic and clinical parameters obtained with 18F-FDG PET/CT can predict overall survival (OS) in patients with oropharyngeal squamous cell carcinoma (OPSCCA) treated with radiation (RT) or chemoradiation (CRT).

**Methods:** 31 (90.3% male, 62±1.6 years old, 77.4% smoker) patients with non-metastatic OPSCC who underwent 18F-FDG PET/CT prior to RT or CRT were retrospectively identified at Georgia Regents University between 2006 and 2013. The primary tumor and regional nodes were contoured using a threshold of 40% of maximum Standardized Uptake Volume (SUVmax) using the Mimvista software. Univariate Cox Proportion Hazards regression model was used to determine the hazard ratio for each imaging and clinical variable.

**Results:** The mean SUVmean, SUVmax, MTV and TLG of the primary tumor were 7.6±0.5, 12.6±0.8, 18.3±3.5, 148.9±27.6, respectively. The mean SUVmean, SUVmax, MTV and TLG of the most active lymph node was 5.2±0.6, 8.1±0.9, 8.5±1.9, 54.2±12.9, respectively. Clinical American Joint Commission on Cancer (AJCC) tumor stage and SUVmax of the most active lymph node were determined to be significant predictors of OS.

**Conclusion:** The standard parameters, SUVmax of the most active lymph node and clinical AJCC tumor stage were significant variables in predicting OS in OPSCC, while advanced imaging parameters, MTV and TLG, were not significant predictors of OS.
HAWAII POSTER FINALIST - RESEARCH Trudy Hong

AUGMENTED REALITY PRESENTATION OF ANATOMICAL VARIATIONS: EXAMPLE WITH ABERRANT RIGHT SUBCLAVIAN ARTERIES

Trudy Hong, BA, Jesse Thompson, BA, Beth K. Lozanoff, BS, Steven Labrash, CFSP, Takashi Matsui, MD, PhD, Scott Lozanoff, PhD, John A. Burns School of Medicine, Honolulu, Hawaii.

INTRODUCTION: Recognition of anatomical variations is critical for proper diagnosis and management. Although the literature provides detailed descriptions and images, structures and mechanisms are still often difficult to conceptualize. Augmented reality (AR) is a novel visualization tool that could enable effective understanding of variations. Here we use AR to present aberrant right subclavian arteries (ARSA), and assess its usefulness within the context of anatomy education within the medical school curriculum.

METHODS: Two ARSA’s were identified during routine dissections and quantitative characterization was performed. A plastinated heart was created and subjected to photogrammetry. Utilizing quantitative features of dissected specimens, ARSA was modeled and viewed within 3D space. An animation of its embryological mechanism was also created. The goal of this study was to assess the usefulness of this animation and AR for learning ARSA. First year medical students (N=61) participated in the online activity (including pre- and post-tests) utilizing text, images and a 3D SketchFab (www.sketchfab.com) model to learn ARSA, and either text or narrated animation for its embryological mechanism. Students then completed a quiz and perception survey based on traditional resources alone or after visualization of the ARSA hologram as well. Comparisons were analyzed using paired sample t-tests with p <.05 as the level of statistical significance.

RESULTS: Groups performed similarly on the typical structures quiz (79.8% and 77.8%) and ARSA pre-test (48.6% and 44.2%). Post-test scores improved overall, and although the group with animation scored better, difference was not statistically significant (82.4%, compared to 75.0% (text), (NS). Students found the SketchFab model to be helpful for learning ARSA, rating it as 4.4/5 (1: Not helpful; 5: Very helpful). For the embryological mechanism, 89% found the narrated animation more helpful than text. Regarding AR, both groups scored similarly, 71.6% (no AR) and 82.0% (with AR) (NS). Students viewed AR favorably, rating its helpfulness as 4.02/5 and ranked resources for learning ARSA from most to least helpful as follows (most common): 1) AR tool, 2) QuickTime, 3) SketchFab model, 4) Text.

CONCLUSION: Augmented reality, alongside traditional resources, is promising as a tool that could facilitate better understanding and retention of anatomical variations. In the classroom, AR could also be used for teaching complex anatomy concepts, and in clinical practice, for patient education and procedural planning. Work is currently being directed at developing models from actual medical scans for AR viewing and at developing tools to further assess usefulness of AR.
ILLINOIS POSTER FINALIST - RESEARCH Gregory L Damhorst

Micro- and Nanotechnology-powered diagnostics for healthcare innovation

First Author: Gregory L Damhorst, PhD Umer Hassan, PhD Bobby Reddy, Jr., PhD Anurup Ganguli Akid Ornob Rashid Bashir, PhD

Introduction: Approaches to disease management are heavily influenced by the diagnostic technologies available to guide decision making. For example, viral load is essential to HIV care but the restriction of technologies for performing these measurements to centralized laboratories takes chronic disease management out of the patient’s hands. In contrast, point-of-care blood glucose testing can empower the patient to play a crucial role in their own care. In another scenario, timely clinical decision-making may be limited when less common labs not performed on-site at a healthcare facility are restricted by long turnaround times. Rapid, low-cost, point-of-care diagnostics have potential to shift paradigms in clinical medicine. This presentation highlights our group’s recent efforts in development of innovative diagnostic technologies for various healthcare applications.

Methods: Our group integrates micro- and nanotechnology elements in lab-on-a-chip platforms toward novel diagnostic technologies with the potential to be low-cost, rapid, and require only small volumes of blood. We use standard microfabrication techniques to prototype microfluidic platforms and perform proof-of-concept measurements with small volumes (<10 µl) of whole human blood samples from patients and volunteers. We perform blood cell analysis with electrical impedance cytometry and immune-affinity capture in a microfluidic channel. Virus quantification is achieved in whole blood with Reverse-Transcriptase Loop-Mediated Isothermal Amplification (RT-LAMP) and detected using a consumer smartphone.

Results: Our group has previously published results showing quantification of CD4+ T lymphocytes on a microfluidic platform in the range of 40 to 1000 cells/µl from HIV-positive individuals and detection of viral load in whole blood with a lower-limit of detection fewer than 10 viruses per reaction. Meanwhile, we have demonstrated three-part differential white blood cell counts on a similar platform. Not yet published work includes detection of Zika virus in whole blood and quantification of neutrophil CD64 expression as a marker of inflammation with a potential role in identification of sepsis.

Conclusion: This presentation aims to present to a community of clinicians the potential role of micro- and nanotechnology in enabling innovative diagnostic technologies with paradigm-shifting clinical applications. We do not focus solely on a single application but review both our previously published results as well as recent, not yet published results in order to spark a discussion about the potential roles point-of-care technologies can play in innovating clinical care at the bedside, in the clinic, and at home.
ILLINOIS POSTER FINALIST - RESEARCH Rushil D Desai

Sleepless in the Hospital: Prevalence and Significance of Insomnia and Sleep Loss in Hospitalized Adults

First Author: Rushil D Desai, MS Samantha Anderson Kristen Knutson PhD, MA Babak Mokhlesi MD, MSc Valerie Press MD, MPH David O Meltzer, MD, PhD Vineet M Arora, MD, MAPP

BACKGROUND: Although 1 in 10 people suffer from insomnia, the prevalence is likely higher in hospitalized patients. The prevalence of undiagnosed insomnia or how insomnia affects hospital sleep objectively is unknown. Our aim is to assess the prevalence of insomnia among hospitalized adults and examine the associations between severity of insomnia and in-hospital sleep duration and efficiency.

METHODS: We conducted a prospective cohort study of general medicine inpatients age 50 and older. We excluded patients who had preexisting sleep disorders, were unable to walk, or had an ICU stay. Sleep duration and efficiency were measured by wristwatch actigraphy. Patients answered the 7-item Insomnia Severity Index (score < 7 no insomnia, 8-14 subthreshold insomnia, 15-21 moderate insomnia, 22-28 severe insomnia). Random effects linear regression models clustered by subject and controlling for patient demographics were used to test the association between insomnia severity and objective sleep metrics.

RESULTS: From June 2010 to August 2015, 446 patients were enrolled (mean age 65; 55% female; 75% African American). Average inpatient sleep duration and efficiency were 315 min (SD=139) and 70% (95% CI 69, 71), respectively. Roughly 1 in 4 patients (23%) screened positive for insomnia; 112 (25%) had subthreshold insomnia, 58 (13%) had moderate insomnia, and 46 (10%) had severe insomnia. Compared to patients without insomnia, patients with moderate insomnia obtained ~1h less sleep (57.4 min [-90.8, -24.0], p=0.001), and those with severe insomnia obtained 70 minutes less sleep (95% CI [-114.6, -25.8], p=0.002). Insomnia patients were younger (62 vs. 67 years, p=0.001), more likely to have COPD or asthma (30% vs. 19%, p=0.005), and had higher Charlson scores (17% vs. 7%, p=0.02) than non-insomniacs. Patients with worse insomnia were more likely to receive pharmacologic sleep aids (5% vs. 14%, p<0.001) and more likely to report noise disruptions (48% vs. 65%, p=0.03), and more likely to have a ER visits after discharge (27% vs. 17%, p=0.03). Although not statistically significant, patients with severe insomnia reported more readmissions after discharge (38% vs. 22%, p=0.07).

CONCLUSIONS: One in four hospitalized adults without known sleep disorders have insomnia. Patients with insomnia had shorter in-hospital sleep duration, lower sleep efficiency, reported more disruptions from noise, and were more likely to have an ER visit after discharge. Given this high prevalence of insomnia, it is important to train hospital staff to recognize, screen, and treat patients for insomnia, particularly younger sicker patients and those with COPD or asthma.
**ILLINOIS POSTER FINALIST - RESEARCH Hanna Erickson**

**IQGAP1-mTORC1 interaction regulates lipid metabolism**

First Author: Hanna Erickson, Karen Wendt, Sayeepriyadarshini Anakk

**Introduction:** Dysregulation of lipid metabolism in the liver is associated with a number of diseases including obesity, insulin resistance, non-alcoholic fatty liver disease, and cancer. The mechanistic target of rapamycin (mTOR) complex 1 (mTORC1) is a kinase signaling complex that regulates fed state metabolism and has been implicated in a number of these conditions. Multiple components of mTORC1 bind to IQ motif-containing GTPase Activating Protein 1 (IQGAP1), a multifunctional scaffolding protein. However, the metabolic impact of IQGAP1 is yet to be elucidated. The objective of this study is to identify the role for the scaffolding protein IQGAP1 in regulating lipid metabolism.

**Methods:** Adult male 129/SVJ wild-type and *Iqgap1*^−/−^ mice were either fed normal chow *ad libitum*, or fasted 24 hours with access to water, or fed a ketogenic diet (calories from fat – 90.5%, protein – 9.1%, and carbohydrates – 0.4%) for 4 weeks. Liver, gonadal white adipose tissue (gWAT), and serum were collected from these animals for analysis using a variety of techniques including qPCR, western blot, histology, and biochemical serum assays.

**Results:** Hepatic IQGAP1 expression was induced by a 24 hour fast, suggesting that IQGAP1 may participate in the fasting response. However, fasting-mediated ketogenic genes and serum ketone body levels did not differ between *Iqgap1*^−/−^ and WT mice. Since mTORC1 is active in the fed state, we next assessed the activation of mTORC1 in fed WT and *Iqgap1*^−/−^ mice. Excitingly, phosphorylation of the bona fide mTORC1 target S6K1 was dramatically reduced in *Iqgap1*^−/−^ mice, which indicates that IQGAP1 is important for mTORC1 activity. Notably, mTORC1 activation was restored by ectopic overexpression of IQGAP1 in the livers of *Iqgap1*^−/−^ mice. mTORC1 regulates fatty acid synthesis by increasing the activity of the nuclear receptor SREBP1c. In line with the decreased mTORC1 activity, hepatic gene expression of Srebp1c and its target Fasn were decreased in *Iqgap1*^−/−^ mice. Furthermore, *Iqgap1*^−/−^ mice have lower serum triglycerides and 20% smaller gWAT depots. This phenotype is exacerbated under ketogenic diet conditions, where *Iqgap1*^−/−^ mice accumulate 30% less gWAT compared to the WT animals. Interestingly, ketogenic diet resulted in higher hepatic triglyceride content but reduced levels of serum ketone bodies in *Iqgap1*^−/−^ mice, which reflect improper lipid storage along with a defective ketogenesis in the liver. It is known that elevated mTORC1 activation inhibits ketogenesis, so we examined the level of mTORC1 activity under ketogenic conditions and found it elevated in *Iqgap1*^−/−^ mice compared to WT. This result is in contrary to the reduced mTORC1 levels observed in the fed state in *Iqgap1*^−/−^ mice suggesting that the nutrient state drives the IQGAP1-mTORC1 interactions.

**Conclusions:** Scaffolding protein IQGAP1 is required for proper regulation of lipid metabolism by mTORC1 under both fed and ketogenic nutritional states.
The Quick Induction of Remission with Rectal Administration of 5-aminosalicylic Acid in Ulcerative Colitis

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Introduction: The standard therapy for inducing remission of mild to moderate active distal ulcerative colitis (UC) is the combination therapy of oral and rectal 5-Aminosalicylicy acids (5-ASA). In fact, rectal therapy are underused and frequently stopped partly because according to a previous systematic review, rectal 5-ASA were no more effective than oral 5-ASA at 8 weeks although it is hard for patients to use rectal administration. My research question was that rectal 5-ASA were likely to induce earlier remission than oral 5-ASA because rectal suppositories affect directly to distal colon. This systematic review compared the time course of the effectiveness and side effects of rectal 5-ASA with oral 5-ASA

Methods (Search methods): Electronic searches (inception to February 2016) of the MEDLINE, the Cochrane Library.

Selection criteria: Randomized trials, 5-Aminosalicylic Acid Derivative as the pharmacologic category, a distal margin which was less than 60 cm from the anal verge or distal to the splenic flexure were eligible for inclusion. Outcome was remission

Data collection and analysis: Risk ratio (RR) for the clinical remission was calculated using an intention to treat principle. Heterogeneity was assessed using the chi-squared test. Fixed-effect model (P > 0.10 for I²) or a random-effects model (P < 0.10 for I²) was used.

Results: Three studies (174 patients) fitted the inclusion criteria. Two studies contained low risk of bias, and one study contained high risk of bias due to single-blind style. Follow-up ranged at week 2, 4, 6, and 8 weeks. Rectal 5-ASA was significantly superior to oral 5-ASA for induction of remission with RR of 2.99 at week 2 (2 trials; 95 patients; 95% confidence interval (CI), 1.42 to 6.30; I²= 0%; P= 0.004), but was not after two weeks. The RR of rectal 5-ASA at week 2 to 4, at week 4 to 6, and at 4 to 8 , and for severe adverse events or withdrawal were 1.56 (3 studies; 95% CI 0.84 to 2.88; I²= 79%; P= 0.16), 1.45(3 trials; 95% CI 0.87 to 2.41; I²= 61%; P= 0.15), and 1.24(3 trials; 95% CI 0.59 to 2.62; I²= 79%; P= 0.57), and 0.49 (3 studies; 95% CI 0.05 to 3.59; I²= 1%; P = 0.36), respectively.

Conclusions: The rectal 5-ASA provides quicker remission than oral therapy within two weeks, but it is not superior to oral 5-ASA after two weeks. Both drugs were well tolerated. This study did not assess the effectiveness of the combination of oral and topical 5-ASA.
Background: Myocardial infarction produces a loss of contractile units, which leads to left ventricular dysfunction and eventual heart failure. Because the capacity to regenerate new myocytes is almost nonexistent, curing heart failure is not a viable goal. Cell therapy, or injection of healthy cardiac mesenchymal cells (CMCs), has shown promise in attenuating cardiac dysfunction. The primary issue hindering most preclinical cell therapy studies is the exclusive use of healthy CMCs from naïve mice. This contrasts with the clinical setting where cell therapy occurs via autologous transfer from heart failure patients themselves. Unfortunately, there are no phenotypic comparisons between CMCs derived from sham hearts (CMC\text{sham}) and failing hearts (CMC\text{HF}).

Objective: We compared the phenotypes of CMC\text{sham} with CMC\text{HF}.

Methods: Mice were subject to MI (or sham surgery) via a coronary artery occlusion, then allowed to reperfuse for three weeks. Cardiac function was assessed via echocardiography prior to euthanasia, then CMCs were isolated, grown in standard medium, and characterized by flow cytometry. Protein and RNA were also isolated from CMCs for immunoblots.

Results: CMCs were isolated from mice with significantly depressed cardiac function. The immunophenotype of CMC\text{HF} differed little from CMC\text{sham}; however, CD73 and MHCI positivity was somewhat lower in CMC\text{HF}. In addition, expression of matrix-processing enzymes (i.e. HYAL-2) was significantly suppressed in CMC\text{HF}. Current efforts are focused on determining the reparative competence of CMC\text{HF}.

Conclusions: This is the first study to investigate the impact of heart failure on reparative cells. The initial observations of altered immunophenotype and expression of matricellular enzymes suggests a significantly different functional phenotype in CMC\text{HF}. If ongoing, in vivo proof-of-concept studies indicate inferiority of CMC\text{HF}, such findings could alter the course of future clinical trials of cardiac cell therapy.
**KENTUCKY POSTER FINALIST - RESEARCH Tara Shrout**

**CARP Plays a Key Role in Cardiomyocyte Growth Under Hypertrophic Stimuli**

First Author: Tara Shrout BA Chee Lim, PhD; Julian Hillyer, PhD

**Introduction:** Cardiac hypertrophy is a common consequence of hypertension that can lead to heart failure and death. Hypertrophy is characterized by increased size of individual myocytes and overall cardiac muscle mass. The process disrupts contractile units of—sarcomeres—and results in gene expression and structural protein alterations.

Cardiac-restricted ankyrin repeat protein (CARP) functions at the gene transcription and structural sarcomeric level. Due in part to this dual nature and studies that link CARP mutations with cardiomyopathies, we hypothesize that CARP’s role is crucial for sarcomeric maintenance under hypertrophic conditions. Additionally, GATA4 is a cardiomyocyte protein that regulates CARP gene expression and is activated during hypertrophy. We hypothesize that GATA4 is crucial for hypertrophy.

**Materials & Methods:** Neonatal Rat Ventricular Myocytes (NRVMs) for each sample were harvested from Wistar rats and cultured for three days to 80% confluence. Hypertrophic stimuli were then added (100mM phenylephrine in 1% fetal bovine serum (FBS) or 7% FBS alone). **Ethics Statement:** This study was in compliance the NIH's Care and Use of Laboratory Animals Guide.

**Immunofluorescence:** CARP siRNA was transfected into NRVMs with lipofectamine, fixed with paraformaldehyde, washed and permeabilized. NRVMs were incubated with anti-myomesin and goat anti-mouse antibodies and mounted on a cover slip. NRVMs were harvested at 0, 1, 6, 24, and 48hr after hypertrophic stimulation. Visualized for measurement and images was accomplished via an Olympus IX81 inverted fluorescent microscope. Size determined by space between striations, accepted as 2um.

**Immunoblotting:** Standard western blot procedures were carried out for total GATA4 and phosphorylated active GATA4. Densitometry of scanned blots was performed using Odyssey 3.0 software.

**Results:** In this study, NRVMs without hypertrophic stimuli experienced no significant cell growth and CARP siRNA addition did not affect NRVM size. However, with PE or 7% FBS stimuli, hypertrophy resulted. This size increase was significantly blunted when NRVMs were co-treated with CARP siRNA. Presence of pGATA4 served as a positive control to confirm induction from hypertrophic stimulation. The degree of activation over time was quantified through densitometry analysis of immunoblots. Results depict a high level of activation at time of stimuli administration with levels trending towards a decrease over time that was statistically insignificant. Additionally, CARP expression was not significantly different at different harvest time points with no clear trend.

**Conclusions:** CARP played a crucial role in mediating cardiomyocyte growth and sarcomeric structure under hypertrophic stimuli and thus may serve as a potential therapeutic target in certain patient populations. These hypotheses had not previously been investigated and this study catalyzes further research to elucidate the roles of CARP and GATA4 in cardiac hypertrophy.
Harnessing Bone Morphogenetic Protein Signaling to Regulate Epithelial to Mesenchymal Transition: A Novel Therapeutic Approach for the Treatment of Metastatic Cancer

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One in eight women will develop breast cancer in their lifetime. Metastatic disease carries a poor prognosis with a five-year survival rate of 26%. In advanced disease, there is a population of dormant micrometastases disseminated in distant secondary tissue sites that are resistant to standard chemotherapy. These cells are called cancer stem cells (CSCs) and are the driving force behind metastasis and recurrence, leading to poor patient prognosis. CSCs and their chemoresistant properties emerge through the induction of Epithelial to Mesenchymal Transition process (EMT). Dedifferentiation of CSCs to an epithelial phenotype by reversing the EMT process may recover chemo-sensitivity. Harnessing the Bone Morphogenetic Protein (BMP) pathway to carry out this novel therapeutic approach may be a viable drug development strategy for treatment of cancers which have previously been so devastating.

Targeting CSCs therapeutically is likely to be challenging, since both bulk tumor cells and CSCs must be eliminated. Previously, we have shown that Peptide123 (P123), a novel peptide designed from BMP-7 structure, inhibited bulk tumor cell growth by binding type I (ALK3) and type II BMP receptors, activating SMAD1/5/8 signaling, and controlling the cell cycle pathway. Furthermore, P123 was shown to block TGF-β induced EMT in primary cancer cells, a critical step for tumor progression and metastasis. Recently, we investigated the effects of P123 on human breast cancer stem cell (BCSC) growth (self-renewal), differentiation (reversal of EMT), and apoptosis (chemoresistance). Treatment of BCSCs with P123 or BMP-7 caused a marked inhibition of tumorsphere formation, suggesting that P123 and BMP-7 both have the ability to inhibit self-renewal of CSCs. FACS analysis of BCSCs treated with P123 or BMP-7 resulted in a profound decrease in CD44⁺ (stem cell marker) cells and an associated gain in E-cadherin⁺ (epithelial marker) cells.

Similarly, immunofluorescent microscopy of BCSCs treated with P123 or BMP-7 showed a marked decrease in CD44⁺ expression and an upregulation of plasma membrane β-catenin (epithelial marker) expression. Together, these results suggest that both P123 and BMP-7 may reverse EMT in CSCs by inducing a loss of stem cell phenotype and promoting epithelial differentiation. Furthermore, FACS analysis of BCSCs co-treated with paclitaxel and P123 showed an increase in Annexin V⁺ (apoptosis marker) cells compared to BCSCs treated with paclitaxel alone, suggesting P123 may potentiate chemotherapy induced apoptosis in CSCs.

In conclusion, P123, a novel peptide agonist of BMP signaling, has the potential to suppress tumor growth and block EMT in primary cancer cells. Moreover, we have now demonstrated P123 ability to inhibit self-renewal, reverse EMT, and increase chemo-sensitivity in CSCs. Overall, by utilizing the BMP signaling pathway, it may be possible to eliminate bulk tumor, prevent metastasis, and maintain a cell phenotype that can be treated by standard chemotherapy available today.
RHODE ISLAND POSTER FINALIST - RESEARCH Rachel Dunlap

Under the Shadow of the Shield: Assessing the Allegations Against the Mirena IUD

Rachel R Dunlap MST; Eli Y Adashi MD, MS, Institutional affiliations for Dr. Adashi: The Warren Alpert Medical School of Brown University, Fellow of the American Congress of Obstetricians and Gynecologists

Concentration: Women’s Reproductive Health

Introduction: Over the past several years, it has been difficult to miss the legal claims against Mirena, the most popular intrauterine device (IUD) marketed and sold in the United States. Law firm advertisements have saturated television programming and social media sites, alleging that Bayer Healthcare Pharmaceuticals failed to warn consumers about the risks associated with Mirena and willingly sold a defective product. These alarming claims are juxtaposed against a contraceptive landscape in which IUDs, and Mirena in particular, are gaining a significant role in preventing unwanted pregnancy. Significantly, a historical precedent for legal action against IUDs exists in the 1970s class action lawsuit against the injurious Dalkon Shield IUD. This project aims to describe the tenor of the Mirena lawsuits, review the published literature on IUD perforation rates, explore the adverse events data reported to the Food and Drug Administration (FDA), examine Mirena’s labeling, and discuss the potential influential factors that provoked the lawsuits.

Methods: The legal claims against Bayer were examined through close reading of court documents. A literature review was conducted to investigate the safety profile of Mirena, particularly regarding perforation rates of Mirena and other IUDs that are on the market. Additionally, the adverse events reported to the FDA were acquired through a Freedom of Information Act request and were analyzed.

Results: While the lawsuits include a broad list of allegations, ranging from defective design, fraudulent misrepresentation, and failure to warn, the cases center around uterine perforation and migration of the IUD. The complaint hinges on the allegation that Bayer failed to adequately warn patients about the risk of the device migrating outside of the uterus during a period of time after IUD insertion. Bayer’s labeling warns both patients and physicians of the possibility of perforation during insertion. The published literature on uterine perforation from IUDs has indicated that the perforation rate is 1 perforation per 1000 insertions, a figure that was recently supported in a large European study with over 60,000 subjects that showed a perforation rate of 1.4% for levonorgestrel IUDs[1]. The adverse event data revealed that the FDA received 1,300 reports of uterine perforation made between the years of 2000-2013, which is a smaller figure than expected, given that over 2 million women in the United States use Mirena. Finally, the Adverse Events include an extensive list of symptoms, including anxiety, breast cancer, hypertension, headaches, and fatigue. These symptoms are also listed in advertisements recruiting lawsuit plaintiffs, but do not appear in filed court documents.

Conclusions: The lawsuits against Mirena appear to have little to do with a higher than expected rate of perforation, and rather embody a perceived discrepancy in Bayer’s labeling surrounding the timing of perforation. Mirena does not pose a significantly increased risk of perforation compared to other IUDs on the market. Additionally, plaintiff recruitment ads list many detrimental symptoms that are not addressed by the lawsuits, leading patients to perceive Mirena as unsafe. We advise physicians to carefully discuss the known benefits and risks of Mirena with patients while addressing their concerns about the lawsuits.

Crushing and Injecting Opioids On Our Watch

First Author: Joseph M Banno

**Background:** Patient tampering with opioid medications is an emerging epidemic with a trivial google search revealing millions of results instructing users on how to crush and inject oral opioids. An estimated 2.1 million people in the US abuse prescription opioids. Abusers who crush and inject opioids have twice the risk of dying or developing major complications.

**Index Case:** A 28-year-old female with a past medical history of end stage renal disease on hemodialysis and drug abuse was admitted for treatment of proximal deep vein thrombosis. She was receiving oral hydromorphone. It was observed by the healthcare staff that she hid the tablet in her mouth, later crushed it in a medication cup and injected it in her ash catheter using an old needle she had. This would be the first reported case of crushing and injecting oral opioids to happen in an inpatient setting.

**Methods:** Pubmed, EBSCO, and Google Scholar were reviewed and 23 cases of crushed opioid injection abuse were identified and data was analyzed.

**Results:** Age range was 16-55, median age was 29. Data showed male predominance at 82.5%. Most of the cases were from the USA but cases from France, Australia were reported. The substances abused most was buprenorphine and the rest of the cases involved oxymorphone, methadone, naltrexone, oxycodone/acetaminophen, ketobemidone, hydromorphone, and codeine. 22% of the cases were dead by the time medical contact was initiated. 52% of cases were injected intravenously, 35% intra-arterial, 13% subcutaneously. Most common complications included soft tissue infection/ischemia but vision loss, bilateral hearing loss, pulmonary embolism, rhabdomyolysis, pulmonary granulomatosis were also reported.

**Discussion:** The complications associated with this risky pattern of abuse is underreported in the literature. Abusing opioids orally is most common across all ages. Injecting crushed opioids is more prevalent in 21-29 age group which is reflected by our median age. Males were substantially more likely to crush and inject opioids. Injecting intravenously is the most common route, however, accidental intra-arterial injections have also been reported. 80% of the patients who were dead on presentation had pulmonary involvement, making it the most lethal complication.

**Conclusion:** The literature shows clear evidence that opioid abusers start with oral use for medical reasons, then abuse due to dependence, and resorting to injecting to achieve the psychotropic effects quicker. A multidisciplinary approach needs to be implemented to identify people at risk and intervene early to prevent bad outcomes and reduce the burden on our healthcare system.
MICHIGAN POSTER FINALIST - RESEARCH Megan Cheslock

Older adult perspectives on their role in a community-based health profession education project

First Author: Megan Cheslock, MS-3, Class of 2018 Oakland University William Beaumont School of Medicine
Second Author: Tracy Wunderlich, M.A. Research Training, OUWB Third Author: Nelia Afonso, M.D., Biomedical Sciences, OUWB; Beaumont Health Systems

Introduction

Although 18.7 million adults ages 65 and older volunteer for their communities each year, it is unclear which factors motivate them to participate in community-based education programs, such as the Oakland University William Beaumont School of Medicine’s Partners in Care (PIC) program. PIC pairs medical, physical therapy, and nursing students together to conduct home care visits with older adults. This project seeks to understand why older adults volunteer for such programs and obtain feedback for program improvement.

Methods

This mixed-methods study employed a survey measuring attitudes about volunteering and an optional focus group. The research team developed the survey tool, which included 25 Likert scale items and two open-ended questions sent to all members in the PIC volunteer pool. Alpha-factor analysis was performed on the survey data. In addition, a focus group was held with 13 randomly selected PIC volunteers. The discussion was recorded, transcribed, and analyzed using thematic analysis.

Results

A total of 101 surveys were sent with a response rate of 62%. The ages of the respondents ranged from 65 to 86+ years of age. Analysis of the survey and focus group data revealed seven themes for why older adults volunteer: altruism, personal development, feeling part of a larger community, education of students, uniqueness of program, enjoying being with students, and sharing unique health experiences as older adults. Feedback on the program and suggestions for improving recruitment was also collected.

Conclusion

PIC provides students an opportunity to engage older adults and gain insight into interprofessional teamwork. By understanding why older adults are motivated to volunteer, we hope to expand the program and improve volunteer satisfaction. Additionally, understanding the motivation behind older adults’ volunteering behavior may help the healthcare community learn how to better encourage this population to become more involved in their own healthcare decisions and prepare future health professionals to more effectively communicate and empathize with older adults.
**MICHIGAN POSTER FINALIST - RESEARCH Tolulope O Ifabiyi**

Prognostic Implications of Genomic Aberrations in Patients with Chronic Lymphocytic Leukemia at the Beaumont Hospital Cancer Center

First Author: Tolulope Ifabiyi

**Introduction:** Chronic lymphocytic leukemia (CLL) is the most common adult leukemia in western countries, with a highly variable clinical course. It is characterized by uncontrolled proliferation and accumulation of lymphocytic cells, which have acquired genomic aberrations such as chromosomal deletions or additions and genetic mutations. Specific genetic abnormalities, such as 17p deletions, have been shown to play a crucial role in clinical presentation and disease progression in patients with CLL. This study aims to assess the incidence of chromosomal abnormalities along with the associated outcomes in patients with CLL treated at Beaumont Health. Studying these chromosomal aberrations to better elucidate their prognostic value could assist with therapeutic decision-making and overall management of CLL.

**Methods:** A retrospective review of all patients diagnosed with CLL between 2010 and 2015 at the Rose Cancer Treatment Center was conducted, with a total of 151 patients identified. Demographic variables and the incidence of CLL among the patients diagnosed and types of cytogenetic abnormalities were documented. SPSS 21 was used for data analysis and a Kaplan-Meier curve was plotted for survival. Log rank (Mantel-Cox) was used to compare the curves. 12-month and 36-month overall survival rates were analyzed by actuarial methods and genomic aberration distribution was determined using statistical analysis.

**Results:** The median age at diagnosis was 74 years, of which 59.6% (90) were male and 40.4% (61) female. 82.1% (124) of patients were white, 4.0% (6) African American, 1.3% (2) Asians and 12.6% (19) declined to identify their race. The cytogenetic distribution of those assessed showed that 7.3% (11) of patients had a sole 13q deletion, 5.3% (8) had both 13q and 11q deletions, 2.6% (4) of patients had a 13q deletion plus trisomy 12 aberration. Patients with a 13q deletion only, had the highest 12 and 36-month survival, with a 90.9% survival for both time periods. Conversely, Patients with a 17p deletion had the worst survival rate with 0% survival at 36 months.

**Conclusion:** The results support the hypothesis that patients with a 17p deletion have the worst prognosis, while those with a sole 13q deletion have the best prognosis. Additionally, the existence of a 13q deletion in combination with a 11q deletion or trisomy 12 appears to reduce their poor prognostic effects.
Using an Interprofessional Treatment Summary Assessment to Improve Diabetes Education and Compliance

First Author: Nathan T Nartker* Second Author: Jennifer Mendez Ph.D.* *Wayne State University School of Medicine

Introduction: The Diabetes Education and Wellness (DEW) Clinic team of Wayne State University students and faculty from Medicine, Pharmacy, Physical Therapy, Occupational Therapy, Social Work, Clinical Laboratory Sciences, and Nutrition and Dietetics programs volunteer to provide diabetic patient education. The DEW Clinic is operated out of two Detroit area, student-run clinics and the majority of patients are Caucasian and African American adults with type 2 diabetes. Despite streamlining program-specific assessments, lengthy appointments continued. We hypothesized that a lack of patient compliance was due to disconnects between discipline knowledge shared with patients. The purpose of this project was to investigate how beneficial creating and reviewing an interprofessional Treatment Summary Assessment (iTSA) with each patient was for their diabetes management, along with its apparent effect on the efficiency of the clinic and communication between disciplines.

Methods: An iTSA is included in each patient’s chart and disciplines are instructed to complete it with a summary of their observations, physical findings, test results, recommendations and any pertinent information to be addressed in follow-up visits. At the end of each appointment, a designated discipline (ex: Medicine) reviews the completed iTSA with the patient while checking for comprehension and a copy is given to the patient. During follow-up visits, a questionnaire is completed by patients to determine the iTSA’s impact on patient understanding and compliance. Observation during clinic debriefs permitted assessment of the iTSA’s influence on clinic operations.

Results: All patients participating in the DEW Clinic were included in this study. Questionnaire results revealed that 91.7% of patients found reviewing the ITSA at the end of their appointment along with taking the iTSA home for reference between visits to the DEW Clinic was “Helpful – Very Helpful” in improving their understanding of their diabetes treatment plan. Additionally, 75% of patients felt that being able to take the iTSA home “Definitely” impacted their compliance with clinic recommendations. While not specifically measured, clinic efficiency vastly improved with observably faster clinic appointment times and better patient flow between teams being most notable. Clinic volunteer debriefs provide evidence of improved interprofessional communication.

Conclusions: Implementation of the iTSA for all patients improved overall patient-reported compliance and comprehension of educational interventions. In addition, its use directly enhanced clinic efficiency and interprofessional communication. This iTSA can be replicated at other interprofessional clinics.
INTRODUCTION: Carotid atherosclerosis is a disease process characterized by hardening and narrowing of arteries due to fatty plaque formation on vascular endothelial cell walls. Chronic inflammation may cause the plaques to rupture, which increases the risk for embolic cerebrovascular events leading to stroke. The molecular mechanisms between the host immune system and plaque instability in atherosclerosis patients remain unclear. Specific peripheral blood biomarkers that can indicate whether or not a patient may be at risk for plaque instability would serve as a quick and cost-effective screening tool to determine the urgency of invasive vascular surgical interventions.

METHODS: Relative protein expression of pro-inflammatory and anti-inflammatory immune mediators were assessed in carotid arterial plaques from asymptomatic and symptomatic patients using immunofluorescence staining of paraffin-embedded sections. Plaque samples were previously collected from consented patients by vascular surgeon, Dr. Charles Shanley, in an IRB-approved study. Commercially available anti-human monoclonal antibodies were used to detect IRAK3, GSK3a, STAT1, STAT6, TGFß, CXCL12, and CXCR4. Relative fluorescent marker expression will be normalized to the nuclear marker, DAPI, prior to applying an unpaired t-test to determine statistical significance between asymptomatic and symptomatic groups. Statistical significance will be accepted at a p value of <0.05.

RESULTS: Immunofluorescence staining and raw data collection for each respective antigen has been completed. The data are currently being analyzed and we predict there will be differences in pro-inflammatory and anti-inflammatory mediator expression between symptomatic and asymptomatic groups, which may suggest an unstable plaque phenotype.

CONCLUSION: Previous studies have evaluated gene expression profiles in plaques from transient ischemic attack and stroke patients after onset of symptoms. However, the immunological mechanisms that occur in plaques prior to symptom onset remain poorly understood. Specifically, little is known about the differential gene expression of soluble immune mediators in plaques as it correlates with plaque instability. We hypothesize that plaques from asymptomatic patients will have different immune biomarker expression profiles compared to symptomatic patients. If this proves to be true, it would allow for the development of novel prognostic tools to identify carotid atherosclerosis patients who are at risk for plaque instability and stroke.
Assessing knowledge of Sickle cell trait/disease inheritance in Metro Detroit area

First Author: Felix O Orelaru Second Author: Ishmael Jaiyesimi, M.D.

**Introduction:** Sickle cell disease (SCD) is an autosomal recessive disease associated with life threatening complications. It is genetically inherited and not specific to one race. Increase frequency of migration to the U.S. and interracial marriages in the U.S. could enhance sickle cell trait distribution in the population overtime. This study aims to assess knowledge about the inheritance pattern of sickle cell trait/disease among college students in Metro Detroit area.

**Methods:** An electronic survey was administered to undergraduate students at Oakland University, and first year through fourth year medical students at Oakland University William Beaumont (OUWB) School of medicine. The primary analysis compared knowledge of sickle cell disease inheritance pattern between different demographic categories (i.e. gender, education and age). Each of the knowledge questions was categorized as yes/no. Categorical variables were compared using Chi-square tests and/or Fishers Exact test. Continuous variables were analyzed with a two-sample t-test. Descriptive statistics such as means, standard deviations, and 95% confidence intervals were also applied.

**Results:** A total of 146 people responded to the survey- Oakland University undergraduate students (27.4%) and Oakland University William Beaumont (OUWB) School of medicine (72.6%). The average age of the respondents (N=142 answered this question) was 24.27±4.09. In regards to sex and race, majority were females (61%) and white (72.6%). 21.4% of the sample population identified as immigrants. In total, three (3) participants - 1 white, 1 Asian and 1 African American, reported knowing that they have sickle cell disease/trait. In addition, one (1) white female participant reported having an infant carrying the sickle cell trait. Most respondents (95.9%) know that sickle cell disease/trait is genetically inherited, but a majority believe that it is a disease associated only with African-Americans (67.8%). Also, participants who are college graduates were more likely to correctly identify SCD inheritance pattern (98% compared to 61% of the undergraduates; p=0.002) and less likely to correctly answer the question “who gets the disease?” (24% compared to 63%; p<0.001). Lastly, most participants (75%) think people should know if they have sickle cell trait/disease before marriage.

**Conclusion:** The result shows that most participants believe sickle cell disease is specific to African-Americans. However, because all races are equally likely to inherit this disease, knowing one’s status could help prevent sickle cell-related deaths during rigorous exercises and enable individuals of reproductive age to make informed marriage decisions in order to decrease sickle cell disease prevalence, and it’s associated financial and psychosocial burdens.
MICHIGAN POSTER FINALIST - RESEARCH Rachel Wilson

INFLUENCE OF RCAT SCORE AND INSPIRATORY LOOP FLATTENING ON PERCEIVED ASTHMA CONTROL

First Author: Rachel Wilson, MS, Central Michigan University College of Medicine, Mt. Pleasant, MI Second Author: Matthew Greenhawt MD, MBA, MSc; Assistant Professor Pediatrics, Allergy Section; Children’s Hospital Colorado; University of Colorado School

Purpose: This study aims to assess the relationship between the presence of inspiratory flattening on flow-volume loop and the performance of the ACT and RCAT in known asthmatic patients.

Background: The ACT and RCAT are valid, reliable evaluations of symptom control in asthma and rhinitis, two closely correlated disease processes. Co-morbid rhinitis is common in asthma, and rhinitis control influences asthma control. In some asthmatics, cough can result from post-nasal drip, an extra-thoracic trigger that can mimic poorly controlled asthma. The presence of inspiratory loop flattening on pulmonary function testing may help differentiate intra-thoracic from extra-thoracic cough.

Methods: 228 adult and pediatric patient records from March through July 2015 in a suburban tertiary care center. Records were retrospectively reviewed for the provider clinical impression, patient medication use, presenting symptoms, asthma history, PFT’s, RCAT/ACT scores, allergic sensitization, and patient co-morbidities. Data were analyzed for descriptive statistics of the population as well as by inferential trends by student t-test and multiple logistic/linear regression.

Results: Total RCAT and ACT scores were significantly correlated (p<0.001). Two childhood ACT domains (daytime symptoms, p=0.04; and symptoms with playing, p=0.02) and multiple adult ACT domains (rescue inhaler use, p<0.001; nocturnal symptoms, p<0.001; SOB, p<0.001; and productivity, p<0.001) were significantly correlated with RCAT score. With regards to specific populations, age >21 years was significantly associated with lower odds of inspiratory loop flattening (p<0.001), and with good ACT control (p=0.02). The odds of ACT control were associated with RCAT control (p<0.001), adjusted for inspiratory loop flattening. There were no significant differences in individual RCAT or ACT item mean scores when these were stratified by the presence of inspiratory loop flattening. High ACT score was associated with higher predicted RCAT score, adjusted for PFT parameters, age, and inspiratory loop flattening (p<0.001). No individual ACT items were predictive of inspiratory loop flattening, although odds of inspiratory loop flattening were associated with two RCAT domains. Neither ACT nor RCAT score was associated with inspiratory loop flattening, and inspiratory loop flattening was not associated with clinical impression of asthma control or medication use.

Conclusion: In this sample, we found no significant relationship between a flattened inspiratory flow-volume loop pattern and ACT/RCAT scoring, suggesting limited utility in the significance of inspiratory flattening in differentiating sources of cough in asthmatic patients. ACT and RCAT scores were correlated, indicating that symptom control in one disease has influence on the other. Though inspiratory loop flattening implies an extra-thoracic component to airway obstruction, its presence did not influence or predict any ACT or RCAT domains, nor influenced medical management. These findings may help interpretation of ACT/RCAT scores of asthmatic patients with variable inspiratory obstruction on flow-volume loop.
MINNESOTA POSTER FINALIST - RESEARCH Lauren N Ward

Analysis of the intracellular niche of a phagosomal pathogen in the context of Salmonella enterica infection in mice

Lauren Ward (1); Michael F. Goldberg, Ph.D. (2), Marc K. Jenkins, Ph.D. (2) (1) University of Minnesota School of Medicine; (2) Department of Microbiology and Immunology, University of Minnesota

Introduction: Salmonella enterica (Se) is an intracellular pathogen that persists within phagosomes of host antigen presenting cells. Se infection stimulates a strong CD4+ T cell response that activates microbicidal mechanisms within the infected phagocyte. Despite robust immune pressure Se persists in the mesenteric lymph nodes (MLNs) throughout the lifetime of the host. We hypothesize that during Se infection, bacteria reside within mononuclear phagocytes in the MLN that localize to areas rich in circulatory and lymphatic vessels.

Methods: In order to identify infected cells, a reporter strain of Se serovar Typhimurium SL1344 was developed that expresses the red fluorescent protein dTomato in the Salmonella chromosome behind the endogenous PhoN gene (Se-dTomato). 129x1/svJ mice were inoculated intragastrically with a solution containing 10^8 CFU of either Se-WT or Se-dTomato and were analyzed at D14 and D30 after infection. Single cell suspensions from MLNs of Se-WT and Se-dTomato infected mice were stained with fluorescent antibodies against myeloid cell markers, including CD11b, Siglec F, Ly6G, CD64, CD11c, and MHCII, and were analyzed by flow cytometry. Sections of fixed/frozen MLN from Se-WT and Se-dTomato infected mice were stained with antibodies against a variety of cellular and anatomical markers, including B220, CD11c, CD11c, CD169, CXCL9, CXCL10, LYVE-1, F4/80, Siglec F, Ly6G, and iNOS. Images were acquired on an epifluorescent microscope.

Results: Flow cytometry analysis revealed that 77% of Se-dTomato infected cells stained positive for the canonical monocyte/macrophage marker CD64 with the remainder found predominantly in Ly6G+ neutrophils. Further in situ experiments confirmed our flow cytometry-based findings about the identity of infected cell types. Myeloid markers frequently overlapped with Se-dTomato, further demonstrating the active infection of these cells, particularly macrophages, in vivo. We reproducibly found Se-bacteria within or near CD169+ macrophages in the subcapsular sinus and in close proximity to B-cell follicles. Se bacteria also overlapped with cells expressing inducible nitric oxide synthase (iNOS), a marker for an active Th1 response.

Conclusion: Our Se-dTomato strain was successfully used to identify and track infected cells in mice, and were predominantly found in monocytes and macrophages, localized near the subcapsular sinus of the MLN and towards the periphery of B-cell follicles, following intragastric infection of resistant mice. Se-dTomato was also seen within positive staining for an active Th1 response, consistent with infection control.
**Mortality-to-incidence ratio for colorectal, breast, and cervical cancer in the Delta and non-Delta areas in Arkansas and Mississippi**

Mark Lelli, Carter Milner, MD, John Henegan, MD.

**Introduction:** Differences in the mortality-to-incidence ratio (MIR) between different areas or health care systems can serve as a marker for disparities in care. Areas in the Delta in both Arkansas and Mississippi have higher than average poverty rates—a condition associated with disparities in healthcare outcomes. This study seeks to determine if the MIR for three screenable cancers (i.e., breast, colorectal, and cervical cancer) is significantly different for counties in the Delta compared to counties in the non-Delta for Arkansas and Mississippi.

**Methods:** To determine if differences were present we used online, publicly available databases from the Arkansas and Mississippi cancer registries to query the age-adjusted incidence and mortality rates for breast, colorectal, and cervical cancer, by county, from 2003-2011. Each cancer’s MIR for each county was calculated by dividing the county’s age-adjusted mortality rate by its age-adjusted incidence rate for the specified time period. The MIR of each cancer in the defined Arkansas Delta counties and Mississippi Delta counties was compared to the MIR of each cancer in the non-Delta counties in Arkansas and Mississippi, respectively, by the two-sided t-test. To determine if any detected difference could be confounded by rurality, the MIR of Delta counties were also compared to non-Delta counties classified as "rural" by the Mississippi Cancer Registry and the Arkansas Cancer Registry.

**Results:** 26 counties were classified as Delta counties, 122 as Non-Delta, and 18 as buffer counties in the two states. 85 counties in the two states were classified as rural non-Delta counties.

The 2003-2011 MIR for breast cancer in Delta counties (mean: 0.26) was statistically significantly higher than the MIR for non-Delta counties (0.23) (p=0.01). The MIR for breast cancer for Delta counties (0.26) was also significantly higher than the MIR for rural non-Delta counties (0.23) (p=0.03).

The 2003-2011 MIR for colorectal cancer in Delta counties (0.46) was statistically significantly higher than the MIR for non-Delta counties (0.39) (p=0.0003). The MIR for colorectal cancer for Delta counties (0.46) was also significantly higher than the MIR for rural non-Delta counties (0.39) (p=0.0003).

The 2003-2011 MIR for cervical cancer was not statistically significantly different between Delta counties (0.518) and non-Delta counties (0.377) (p=0.164) or between Delta counties and rural non-Delta counties (0.386) (p=0.342).

**Conclusion:** There is a statistically significant increase in the MIR for both breast and colorectal cancer in Delta counties when compared to and non-Delta counties. When Delta counties were compared to only rural counties in these two states, the statistically significant difference persisted. This difference highlights the need for research into disease biology and access to care in the Delta for these two screenable malignancies.
Pharmacological control of oxidative stress-mediated effects on endocannabinoid signaling pathways

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Introduction: Endocannabinoid signaling is mediated by a group of receptor proteins that bind endogenous lipid mediators and exogenous compounds, producing changes in cellular activity throughout the body. Although cannabinoids such as delta-9-tetrahydrocannabinol are known for their psychoactive effects, they also have potential therapeutic benefits for treating diseases such as multiple sclerosis, glaucoma, neurodegenerative disorders, and anorexia. Cannabinoids produced endogenously are upregulated in response to ischemia and physical trauma, which suggests a neuroprotective role for these lipid mediators. One endocannabinoid, palmitoylethanolamide (NAE 16:0), directly protects neurons against oxidative stress, but may also do so through competitive inhibition of the enzyme fatty acid amide hydrolase (FAAH1), resulting in attenuated hydrolysis and therefore longer availability of endocannabinoids. The goal of this study was to determine effects of NAE 16:0 on expression levels and subcellular localization of proteins involved in endocannabinoid signaling.

Methods: Rat cortical neurons were pretreated with NAE 16:0 and exposed to the oxidant tert-butyl hydroperoxide to model neuronal injury secondary to oxidative stress. Cell viability assays using the fluorescent indicator dye calcein-AM were conducted to assess the extent of neuroprotection. Using the immortalized mouse hippocampal cell line HT-22, immunoblotting and immunocytochemistry assays were performed subsequent to NAE 16:0 treatment to analyze changes in the expression levels and subcellular distribution of receptors and enzymes involved in endocannabinoid signaling. Cannabinoid receptor types 1 and 2 (CB1 and CB2), FAAH1, N-acylethanolamine-hydrolyzing acid amidase (NAAA), and N-acylphosphatidylethanolamine-specific phospholipase D (NAPE-PLD) were examined.

Results: Cortical neurons treated with NAE 16:0 exhibited an increase in viability compared to untreated cells. Treatment of HT-22 cells with NAE 16:0 had no effect on expression levels of FAAH1. However, NAE 16:0 treatment increased co-localization of FAAH1 with calnexin, an endoplasmic reticulum marker protein, indicating increased localization of FAAH1 to the endoplasmic reticulum.

Conclusion: The endocannabinoid NAE 16:0 exhibited neuroprotective effects and induced translocation of FAAH1 to the endoplasmic reticulum. The latter indicates indirect effects of NAE 16:0 on endocannabinoid signaling that are not mediated by classical endocannabinoid receptors. Further research is required to determine the effects of NAE 16:0 on expression levels and localization of CB1, CB2, NAAA, and NAPE-PLD.
MISSOURI POSTER FINALIST - RESEARCH Rohit Gummi

Impact of Medications on Myasthenia Gravis Patient Population at University Hospital

First Author: Rohit Gummi Second Author: Natalie Kukulka Third Author: Raghav Govindarajan, MD

Background:

Myasthenia Gravis (MG), a neuromuscular junction disorder is often treated alongside many concurrent diseases. Certain medications are contraindicated in patients with MG due to risk of exacerbation of symptoms, but are routinely prescribed thus putting patients at risk of exacerbation.

Method:

A retrospective chart review of MG patients at the University of Missouri Hospital was performed. This included 127 patients seen from 2011 to 2016. The demographics of the patients and causes of flare-ups were recorded. The total number of flare-ups for every patient that was prescribed a contraindicated medication after diagnosis with MG was compared to the total flare-ups for each MG patient that was not prescribed any of the contraindicated medications. Two sided t test was performed.

Results:

Average age was 61.9 years and average disease duration was 8.8 years. The patients had experienced 212 total flare-ups, with 106 requiring visits to the emergency room, and 141 requiring admission with an average duration of 6.2 days. Of the flare-ups, contraindicated medications played a part at 19%. Patients that were prescribed contraindicated medications also had a significantly higher number of flare-ups, with an average of 2.1, than patients not prescribed contraindicated medications, who had an average of .79 (p<0.01). Beta-blockers, specifically, were found to have a significant association with a higher number of flare-ups (p<0.01).

Conclusion:

Certain medications (some more than others) are common triggers of MG flare up. It is important to increase awareness among patients and physicians about these medications and subsequent risk for patients.
Using an Automated Telemonitoring System to Prevent and Identify Surgical Site Infections

First Authors: Chris Chermside-Scabbo, Keylin Lu, Nikolas Marino Co-Authors: Donald Zhang, Angela Concepcion, Thea Paar, Terri St. John PI: John Clohisy

Introduction: Despite efforts to improve outcomes, surgical site infections (SSI) remain a significant cause for readmission post-operatively. Additionally, late identification of an SSI leads to increased costs and poorer patient outcomes. While studies have shown that adherence to a decolonization procedure may reduce SSI rates, compliance remains low. The automated telemonitoring systems EpxDecol and EpxWound were designed to increase patient adherence to their prescribed decolonization protocol and to inquire about patient wound symptoms post-operatively to identify signs of infection, respectively. An algorithm was created to alert providers if patients were not adherent to their decolonization protocol or if patients responded with signs of a SSI.

Methods: In order to evaluate response rates and satisfaction with the automated systems, a cohort of 771 and 841 patients undergoing joint replacement surgery were enrolled in EpxDecol and EpxWound over a 12-month period, respectively. Patients enrolled in EpxDecol were sent daily reminders for five days prior to surgery, while patients enrolled in EpxWound were sent daily text messages inquiring about infectious symptoms for two weeks post-operatively. Two weeks after participation in the study, automated surveys using a 1-9 response scale were delivered to the patient to assess the care delivered by the provider, their satisfaction with number of messages they received, and whether EpxDecol and EpxWound improved communication with their physician.

Results: Over the total period, EpxDecol and EpxWound elicited an 88.1% and 76.3% response rate. During the two-week span each patient was enrolled in EpxWound, normalized patient response rates were 77.7% and 75.0% at week 1 and 2 respectively. Median survey values (n=543) were 9 for care and 8 for improved communication, with the median value 5 (best possible) for number of messages received.

Conclusion: This proof of concept study demonstrates that patients are willing to engage with an automated telemonitoring system. Both EpxDecol and EpxWound had high response rates and positive reception from patients. Another study is evaluating whether this increased patient involvement in their own healthcare improved decolonization protocol compliance and SSI identification. These high response and satisfaction rates suggest that this automated telemonitoring system could be an effective tool for supporting adherence to prescribed protocols through reminders, monitoring symptoms for potential red flags, and increasing patient engagement in healthcare. While numerous applications for this technology span various medical fields, primary care could perhaps benefit most from increased patient engagement, strengthened physician-patient communication, and long-term support for patient adherence and symptom monitoring.
MISSOURI POSTER FINALIST - RESEARCH Kunjan Patel

EpxHeartFailure detects decompensations and improves symptom stability for patients with Heart Failure: A community implementation

First Author: Patel, Kunjan, Sink, Eric, Javaherian, Kavon, Aung, Wint, Groenendyk, Jacob, Dodds, Kelly, Eward, Gregory M.D.

Introduction: Heart Failure (HF) is the most common source of hospital readmissions for individuals above sixty-five years of age. Outpatient management of HF is complicated by patients’ poor understanding of their disease and limited patient-provider communication. We designed and implemented a SMS text message-based telemedicine intervention to monitor patients for early signs of decompensation events and to improve long-term management.

Methods: Our HF system was designed based on collaborative interviews with academic and community physicians, nurses, and patients at Washington University School of Medicine. The system prompts patients to self-report via SMS messages both vital signs (weight, blood pressure) and associated symptoms (dyspnea, orthopnea, edema, and paroxysmal nocturnal dyspnea). Changes in vital signs or worsening of symptoms beyond set thresholds triggered an alert (via text or call) to a patient’s provider. Providers then had the opportunity to contact the patient and initiate appropriate follow up care. The intervention systematically modified message frequency to parallel each patient’s symptom stability.

We hypothesized that patients receiving the intervention would experience improved symptom stability and thus fewer acute decompensations due to increased patient-provider communication. We conducted a 40 patient, three-month implementation at an outpatient HF clinic to assess patient engagement, changes in symptom stability, and the system’s ability to detect acute decompensations. All participating patients had New York Heart Association Class III or IV HF and received messages three times per week.

Results: The HF system conducted 1333 total vital sign and symptom assessments over the study period. On average, 69% of patients responded to messages each week. Symptom stability was defined as the percentage of patients self-reporting “same” or “better” symptom status for four consecutive weeks. After four weeks, 40% of patients had exclusively reported same or better symptomatology. The symptom stability increased to 60% at eight weeks, and remained 60% until the end of implementation. Patients on average reported 5 clinically significant symptom or weight changes. At least 50% of patients received follow up care from their provider resulting in a medication titration.

Conclusion: Our system leverages ubiquitous SMS-messaging technology to provide a novel way to monitor patients remotely and potentially improve outcomes without the use of specialized, expensive equipment. By combining active monitoring with frequent provider feedback, it is likely that we are improving symptom stability by detecting decompensation events early enough to prevent hospital admissions. After iterative changes based on the implementation results, a 600-person randomized-controlled trial will begin January 2017 to assess the intervention’s impact on hospitalizations and morbidity.
Phosphorylation of Calcium-Activated Chloride Channels in Pulmonary Artery Smooth Muscle; A Novel Application in Pulmonary Hypertension

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Ca\(^{2+}\)-activated Cl\(^-\) channels (CaCCs) encoded by the gene \textit{Tmem16a} or \textit{Anoctamin1} (ANO1) produce membrane depolarization and contraction of vascular smooth muscle cells (VSMCs) when stimulated by endogenous vasoconstrictors acting on \(G_{q}\)-protein coupled receptors. Treprostinil (TPL) is one of several prostacyclin analogs clinically used to treat patients diagnosed with pulmonary arterial hypertension (PAH).

TPL reduces pulmonary arterial tone in PAH patients by binding to the IP prostanoid receptor. Activation of this \(G_{q}\)-coupled receptor leads to elevation in cAMP levels causing vasorelaxation by reducing intracellular [Ca\(^{2+}\)]. In this study, we examined whether TPL could exert vasorelaxation of mouse pulmonary arteries (mPA) by inhibiting, at least in part, ANO1-encoded CaCCs. TPL dose-dependently inhibited the contraction of mPA elicited by 10 mM 5-HT (\(IC_{50} \approx 500\) nM). The specific ANO1 inhibitor T16A\(_\text{inh}\)-A01 also dose-dependently inhibited the 5-HT-induced contraction of mPA but had no effect on the KCl-induced contraction (85.4 mM) at concentrations £ 10 mM. 200 nM TPL produced a rightward shift of the dose-response curve to T16A\(_\text{inh}\)-A01, suggesting that TPL may inhibit CaCCs.

Consistent with this hypothesis, Ca\(^{2+}\)-activated Cl\(^-\) currents (elicited by 1 mM free Ca\(^{2+}\) in the pipette solution) recorded in HEK-293 cells transfected with mouse ANO1 were significantly reduced by TPL (1 mM), or the adenylate cyclase activator Forskolin (10 mM). These preliminary results suggest that elevation of cAMP levels (perhaps through a phosphorylation step involving Protein Kinase A) may down-regulate ANO1-encoded CaCCs and attenuate the depolarization and vasoconstriction triggered by 5-HT. Our findings also suggest that part of the beneficial effects of TPL in PAH patients might be attributable to an interaction with ANO1 channels.

Presenting author: Student of Medicine (3rd year)

Sources Cited:


Text:

**NEVADA POSTER FINALIST - RESEARCH Vincent Pan**

A Qualitative Survey of Awareness of Health Risks Associated with ALDH2 Deficient Individuals and Alcohol Consumption

Vincent Pan, OMS-II, Jocelyn Nguyen, OMS-II; Laura Yavitz, Ph.D. (c)

Approximately 560 million East Asians have a mutation that results in the impaired activity of aldehyde dehydrogenase 2 (ALDH2), an important enzyme in alcohol metabolism. When alcohol is consumed, this ALDH2 deficiency causes acetaldehyde to accumulate to toxic levels in the body, resulting in a flushing reaction commonly known as Asian Flush Syndrome. More importantly, the toxic levels of acetaldehyde result in increased co-morbidities, including an 11-fold increased risk of esophageal cancer, 10-fold increase of oropharyngeal and laryngeal cancer, 2.4-fold increase of colon cancer, 9-fold decrease of nitroglycerin effectiveness, faster alcohol intoxication, diabetic complications, osteoporosis, and cardiovascular disease.

In addition, there are many misconceptions about treatments for Asian Flush Syndrome, including eating before drinking, pacing out drinks, and anti-inflammatory agents such as Pepcid AC and Pepcid Complete. While these treatments can help reduce the flushing response, acetaldehyde levels still remain elevated and continue to cause additional health risks. There is also a cultural stigma against ALDH2 deficient individuals, for they are mocked at their inability to handle alcohol and are singled out for their physically glaring reaction to alcohol.

Although research consistently shows that consumption of alcohol with the ALDH2 deficiency leads to increased health risks, the levels of awareness of the co-morbidities is unknown. The purpose of this inquiry is to measure and improve awareness of ALDH2 deficiency, the associated co-morbidities, and common misconceptions regarding frequently recommended treatments in both Asians and non-Asians.

A non-scientific, random online pre- and post- questionnaire was distributed to approximately 5,800 Asian and non-Asian individuals in Nevada and other states. The project design included an interventional educational segment, consisting of a one-page handout after the initial survey. Following this, survey participants’ understanding and awareness of Asian Flush Syndrome were tested.

In the pre-educational survey, only a small percentage of respondents were able to correctly identify just one of the co-morbidities, while only 1 individual correctly identified the top three co-morbidities. The majority of respondents also confirmed the prevailing medical and non-medical treatment misconceptions mentioned above. The post-survey showed that individuals actually have an incorrect and misconstrued perception about their knowledge of Asian Flush Syndrome. The respondent levels of awareness of the co-morbidities and the misconceptions increased tremendously after the educational segment. In addition, these pre- and post- survey trends were similar in both Asian and non-Asian survey subpopulations.

The results suggest the need for increased education on the implications of ALDH2 deficiency. Physicians may want to consider using a two question inquiry to identify Asian patients who likely have the ALDH2 deficiency. Physicians can also monitor for esophageal cancer, coronary artery disease, and osteoporosis, which are the most highly associated co-morbidities. Additionally, physicians should educate their Asian patients in regards to this deficiency and the repercussions with consuming alcohol. In addition, the results suggest the need for reform in current American alcohol education in schools and higher education to include information for the subpopulation with Asian Flush Syndrome.
**NEW MEXICO POSTER FINALIST - RESEARCH Christian Garcia**

**Good Intentions**: A novel Peer-to-Peer tutoring program designed to reduce block failure rates.

Christian Mateo Garcia MSIII, UNM SOM Amanda Bustamante-Provencio MSIII, UNM SOM Justin-James Roesch M.D., FACP Department of Hospital Medicine, UNM SOM

**Introduction**: The cost of failure and repeating a single year of medical education can be upwards of $100,000. There can be additional psychological ramifications for students, and ancillary costs incurred by the institution. Peer-to-peer tutoring is a highly effective means of augmenting learning and possibly preventing course failure in undergraduate medical education. Peer-to-peer learning can reduce perceived power differentials and create a lower-stakes learning environment, while augmenting learning of tutor and tutee. Here we review pilot data from an all-volunteer, novel peer-to-peer tutoring program created to reduce block failure rates at a state medical school.

**Methods**: A total of 31 students were tutees, 10 from the class of 2018 (MS2018), 15 from the class of 2019 (MS2019) and 6 from the class of 2020 (MS2020). Students required assistance or remediation in multiple different blocks across the curriculum. New peer-to-peer pairings were made for every course. Volunteer tutors were verified to be achieving 85% or higher in their tutoring course and self-identified following email solicitation. Tutees self-identified interest in the program and then self-selected tutors by picking their top three choices, with the majority of students receiving their first choice. Once selected, the pair was connected via email and met at a time and duration that best suited their schedules. Tutees studying over the winter holiday break for remedial examinations were paired with two to three tutors to ensure tutor availability.

**Results**: Neuroscience MS 2019, had 4/4 tutees pass, 100%. Cardiovascular/Pulmonary/Renal MS 2019 had 5/6 pass, 83%. MS2018 and MS 2019 Infectious Disease had 5/6 and 1/1 pass, or 83% and 100% respectively. GINME and ID remediation exams MS2018 had 3/4 pass, 75%. HSR remediation exam for MS2019 had 1/1 or 100% pass rate. The total program pass rate (for students originally identified as being at risk of failing) is 82.8% to date.

**Discussion**: We consider these rates to be highly successful based on the minimal costs and the high success rate. The program was run without monetary support from the SOM, and was felt to enhance the learning of both tutors and tutees. While data is limited by a small N value in terms of success rates, we believe this pilot model could serve as a highly effective prophylactic remediation effort for students to avoid the effects of having to remediate a block or year, as well as incur the financial and psychosocial impact of block failure. We hope that based on the initial success of this program, this program might be more widely adopted across the school of medicine curriculum as a means of promoting self-efficacy in learning and improving block passage rates during the first two years of medical school.
**NEW MEXICO POSTER FINALIST - RESEARCH Ingrid Lindquist**

**A Vaccine-based strategy for lowering Cardiovascular Disease Risk Factors**

First Author: Ingrid Lindquist1, Erin Crossey1, Marcelo Amar2, Alan T Remaley2, Bryce Chackerian1 1 University of New Mexico School of Medicine 2 National Heart Lung and Blood Institute

**Introduction:** Elevated levels of serum LDL-cholesterol and triglycerides have independently been found to confer increased risk of early cardiovascular disease (CVD). Naturally occurring loss-of-function mutations in two host proteins that are involved in lipid metabolism, PSCK9 and ApoC3, have been associated with lower serum lipids and reduced rates of CVD without any evident medical complications.

We generated vaccines targeting PCSK9 and ApoC3 using a flexible virus-like particle (VLP)-based vaccine platform technology. Display of antigens at high valency on the surface of VLPs is an effective technique for enhancing the immunogenicity of antigens, even self-antigens such as PSCK9 and ApoC3. In preclinical studies, we demonstrated that vaccination against PSCK9 lowers serum lipids in mice and non-human primates and against ApoC3 lowers serum triglyceride levels in mice.

**Methods:** VLPs displaying peptides derived from PCSK9 or ApoC3 were displayed on bacteriophage VLPs. Animals were immunized with VLPs and antibodies against PCSK9 or ApoC3 and plasma lipid levels were measured. In macaques, we assessed the effectiveness of vaccination in conjunction with statin therapy to evaluate synergistic effects.

**Results:** Vaccines targeting PCSK9 and ApoC3 induced high titer antibody responses against the targets. Mice immunized against PCSK9 had significantly lower total cholesterol (28% reduction) and triglycerides (51% reduction) vs controls. Immunized macaques that also received a statin had 30-40% decrease in LDL-cholesterol, whereas LDL-C levels decreased only 5% in macaques that only received a statin. Mice immunized against ApoC3 had 30-40% reduction in triglyceride levels relative to pre-vaccination levels.

**Discussion:** These data demonstrate that host-immunity to PCSK9 or ApoC3 and concomitant reduction in serum lipid levels can be achieved using VLP-based vaccines. A vaccine-based approach may be a compelling alternative to monoclonal-based therapeutics.
Hadiyah Y. Audil; Tessa M. Simone; Craig E. Higgins; Paul J. Higgins

Purpose: Squamous cell carcinoma (SCC) and hyper-healed cutaneous wounds (HHCWs), such as keloids and hypertrophic scars, together affect over seven million in the U.S. yet lack efficacious treatments. SCC and HHCWs show elevated expression of plasminogen activator inhibitor-1 (PAI-1), which drives the excessive cellular proliferation characteristic of both pathologies. Histone deacetylase inhibitors (HDACi) are a class of drugs recently shown to induce PAI-1-dependent growth arrest in ras-transformed renal epithelial cells; HDACi are particularly valuable agents for skin conditions due to their availability as topical formulations. We hypothesize that HDACi modulate PAI-1 expression to inhibit skin cell migration and proliferation, and that HDACi are thus suitable agents for abrogation of SCC invasiveness and resolution of HHCWs.

Methods: HaCaT keratinocyte skin cells were stimulated with growth factors (transforming growth factor-ß1, epidermal growth factor) to replicate in vivo induction of PAI-1 in vitro. Stimulated cells were treated with HDACi for six hours, then analyzed by cellular phenotype assays, Western blots for protein content, and immunofluorescence for protein identification. Cells were additionally transfected with anti-PAI-1-siRNA for PAI-1 knockdown and analyzed by Western blot.

Results: HDACi treatment augmented intracellular PAI-1 levels while paradoxically mitigating cellular migration and proliferation; extracellular PAI-1 levels were unaffected. Exogenous application of PAI-1 was not sufficient to induce the same phenotypic changes. HDACi-induced PAI-1 reduced activation of signal transducer and activator of transcription-3 (STAT3), a key migratory molecule that remains unstudied in association with PAI-1. Western blotting revealed both amplified STAT3 expression and activation following PAI-1 knockdown. Cells transfected with dominant-negative STAT3 for constitutive STAT3 deactivation showed unaltered PAI-1 levels. Discussion: Cumulatively, we show that HDACi abrogate cellular invasiveness in in vitro models of SCC and HHCWs in a PAI-1-dependent manner. We propose a novel mechanism in which PAI-1 inhibits STAT3, and suggest a greater role for intracellular PAI-1 localization than is currently assumed. Future studies will elucidate the PAI-1/STAT3 axis and determine HDACi translational applicability through in vivo murine models.

Conclusions: These results demonstrate the potential of HDACi as novel agents for amelioration of squamous cell carcinoma (SCC) and hyper-healed cutaneous wounds (HHCWs). Utilization of HDACi for resolution of SCC and HHCWs could shift treatment options towards more feasible and efficacious therapies than those currently recommended; indeed, topical application of HDACi could attenuate, and possibly even reverse, skin cell proliferation and lesion growth in both SCC and HHCWs.
Harnessing Bone Morphogenetic Protein Signaling to Regulate Epithelial to Mesenchymal Transition: A Novel Therapeutic Approach for the Treatment of Metastatic Cancer

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One in eight women will develop breast cancer in their lifetime. Metastatic disease carries a poor prognosis with a five-year survival rate of 26%. In advanced disease, there is a population of dormant micrometastases disseminated in distant secondary tissue sites that are resistant to standard chemotherapy. These cells are called cancer stem cells (CSCs) and are the driving force behind metastasis and recurrence, leading to poor patient prognosis. CSCs and their chemo-resistant properties emerge through the induction of Epithelial to Mesenchymal Transition process (EMT). Dedifferentiation of CSCs to an epithelial phenotype by reversing the EMT process may recover chemo-sensitivity. Harnessing the Bone Morphogenetic Protein (BMP) pathway to carry out this novel therapeutic approach may be a viable drug development strategy for treatment of cancers which have previously been so devastating.

Targeting CSCs therapeutically is likely to be challenging, since both bulk tumor cells and CSCs must be eliminated. Previously, we have shown that Peptide123 (P123), a novel peptide designed from BMP-7 structure, inhibited bulk tumor cell growth by binding type I (ALK3) and type II BMP receptors, activating SMAD1/5/8 signaling, and controlling the cell cycle pathway. Furthermore, P123 was shown to block TGF-ß induced EMT in primary cancer cells, a critical step for tumor progression and metastasis. Recently, we investigated the effects of P123 on human breast cancer stem cell (BCSC) growth (self-renewal), differentiation (reversal of EMT), and apoptosis (chemo-sensitivity). Treatment of BCSCs with P123 or BMP-7 caused a marked inhibition of tumorsphere formation, suggesting that P123 and BMP-7 both have the ability to inhibit self-renewal of CSCs. FACS analysis of BCSCs treated with P123 or BMP-7 resulted in a profound decrease in CD44+ (stem cell marker) cells and an associated gain in E-cadherin+ (epithelial marker) cells. Similarly, immunofluorescent microscopy of BCSCs treated with P123 or BMP-7 showed a marked decrease in CD44+ expression and an upregulation of plasma membrane β-catenin (epithelial marker) expression. Together, these results suggest that both P123 and BMP-7 may reverse EMT in CSCs by inducing a loss of stem cell phenotype and promoting epithelial differentiation. Furthermore, FACS analysis of BCSCs co-treated with paclitaxel and P123 showed an increase in Annexin V+ (apoptosis marker) cells compared to BCSCs treated with paclitaxel alone, suggesting P123 may potentiate chemotherapy induced apoptosis in CSCs.

In conclusion, P123, a novel peptide agonist of BMP signaling, has the potential to suppress tumor growth and block EMT in primary cancer cells. Moreover, we have now demonstrated P123 ability to inhibit self-renewal, reverse EMT, and increase chemo-sensitivity in CSCs. Overall, by utilizing the BMP signaling pathway, it may be possible to eliminate bulk tumor, prevent metastasis, and maintain a cell phenotype that can be treated by standard chemotherapy available today.
**NEW YORK POSTER FINALIST - RESEARCH Anisha Lashkari**

Assessing and Improving Team Dynamics in the Emergency Department

First Author: Anisha Lashkari

**Introduction:** It is without a doubt that team dynamics are an integral part of patient care, especially in high acuity settings like caring for victims of trauma or cardiac arrest. While Advanced Trauma Life Support (ATLS) and Advanced Cardiovascular life support (ACLS) remain the standard protocol for trauma and cardiac arrest education, there is little emphasis on teamwork skills and leadership. Self-assessment of team leaders during a trauma or cardiac arrest is a fundamental component of professional competence but often overlooked and discordant with actual leadership skills. Therefore, the objective of this project is to compare Emergency department (ED) trauma and cardiac arrest team leaders’ self-assessed performances to that of a supervising attending physician to elucidate deficiencies in leadership skills at a large, diverse, level 1 trauma center. It is hypothesized that discrepancy exists between the self-assessment of the team leader from that of the attending.

**Methods:** Surveys were collected from pairs of resident physicians and attending physicians, shortly after a trauma or cardiac arrest. Both residents and attending physicians received the same surveys; while residents answered regarding their own self performance, attendings evaluated the residents’ performance. All survey data was collected at an urban level 1 trauma center. Survey questions consisted of assessing various leadership qualities such as the use of closed loop communication and delegation of tasks. The responses were scored on a Likert-like scale of 1-6 with 1 signifying poor performance and 6 signifying excellent performance.

**Results:** Surveys were collected from 39 pairs of residents and attending physicians. A two sample T-test was conducted utilizing a p value less than 0.05 to depict significance. Resident team leader scores were higher in every category listed on the leadership survey, and resident scores were statistically higher than those of the attendings, in categories such as delegating tasks, the use of closed loop communication and effective interpersonal communication.

**Discussion:** These results depict that team leaders demonstrated discordant perceptions of their abilities during a cardiac arrest or trauma compared to the assessment of their performance by attending physicians. Several case studies in a surgical setting have referenced that medical professionals tend to rate themselves higher than they actually perform. If this is the case in the ED as well, it is imperative that future intervention are conducted to help assess these discrepancies. The ED serves as the frontline to immediate, urgent care especially in patients sustaining life-threatening illnesses. It is therefore crucial to minimize such discrepancies in order to improve a trainee’s ability to self-assess and improve their overall medical leadership skills. Interventions such as the use of medical simulation, debriefing and video debriefing may be key tools in minimizing the gap between self-performance vs. actual leadership skills.
With rising incidence of Clostridium difficile infection despite improved antibiotic therapy, we hypothesize that improvements in medical care have led to alterations in management patterns. The impact of practice patterns on incidence and recurrence of hospital readmissions remains unknown.

A total of 291,163 patients hospitalized for *C. difficile* colitis were identified from 1995 to 2014 from the New York Statewide Planning and Research Cooperative System (SPARCS) database. Chi-square test and Welch’s t-test were used to compare categorical and continuous variables. Multivariable logistic regression analysis was performed to evaluate factors related to readmission after adjusting for other possible confounding factors.

From 1995 to 2014, the number of newly diagnosed patients with *C. difficile* colitis rose from 9,584 to 15,997, an increase of 40% (RR 1.05, p < 0.0001). Of the patients identified, 231,086 (79%) required one admission, 41,658 (14%) required 2 admissions, and 18,419 (6%) required > 2 admissions. Risk factors for readmission included: age 55-74, government insurance, hypertension, diabetes, anemia, hypothyroidism, chronic pulmonary disease, rheumatoid arthritis, renal failure, peripheral vascular disease, and depression (all p values < 0.05). In total, 1,830 (0.63%) patients with *C. difficile* colitis underwent surgery. During this time period there was no significant linear trend in the percentage of patients receiving surgery (p > 0.05). In addition, there was no significant linear trend in the percentage of elective versus emergent surgeries over this time frame (p > 0.05).

The incidence of hospitalizations for *C. difficile* colitis has increased 40% within the last 20 years while the percentage of these patients receiving surgery has remained relatively stable. These trends may be secondary to improved diagnostic capabilities and evolving antibiotic regimens. Over 20% of hospitalized patients had at least one readmission. Numerous risk factors for these patients have been identified.
Closing the Specialty Referral Loop: Are Referrals from Primary Care to Specialists Actually Completed?

Malhar Patel*, BSPH, Duke University School of Medicine Colin O’Leary*, BA, Duke University School of Medicine Priscille Schettini*, BS, Duke University School of Medicine John Anderson, MD, MPH, CMO of Duke Primary Care Kevin Shah, MD, MBA, Duke Primary

Introduction: A critical function of large primary care practices is connecting patients with specialists. Consistently closing the loop on all patient referrals is a patient safety imperative as identified by The Joint Commission and Centers for Medicare and Medicaid Services. Our project sought to identify referral completion rates, gaps in referral documentation, and how wait times of referrals affect completion rates.

Methods: From a large academic primary care practice, we analyzed specialty referrals (N=106,885) in FY2016 across 22 high volume medical and surgical subspecialties, excluding procedural (e.g. colonoscopies) and ancillary service referrals (e.g. home health). For referrals with appointment scheduling data, we characterized appointment completion, cancellation rates, and wait times, using days between referral scheduling date and appointment date as a proxy for wait time. We stratified these referrals into three categories of wait times (<30 days, 31-60 days, and >60 days) and analyzed each category’s appointment completion rates.

Results: For 93,584 referrals, a total of 106,885 appointment scheduling attempts were made in FY2016. Some unique referrals had multiple scheduling attempts due to cancellations and patient no shows. Of the 106,885 appointment scheduling attempts, 63,360 (59.3%) had known appointment dates, while 43,525 (40.7%) referrals had no recorded appointment date. Of the referrals without appointment dates, 40.3% were indicated as scheduled (although no date was provided) and 59.7% were not scheduled for reasons including patient self-scheduling or declining. We restricted our analysis further to the 63,360 appointments with documented appointment dates. Of these, 56.9% resulted in completed appointments, 29.3% in cancelled appointments, 7.3% in appointments scheduled after FY2016, and 6.5% in patient no shows. Of canceled referrals, 53.6% were rescheduled, while 46.4% were not. Almost a third of referrals (30.9%) had wait times longer than 30 days. Average wait times for each specialty ranged from 10.6 to 84.7 days. Referrals in wait time categories <30 days, 31-60 days, and >60 days had appointment completion rates of 65.8%, 43.3%, and 29.3%, p<.001, respectively. Sub-analyses of 3 specialties (endocrinology, nephrology, and urology) demonstrated that, while wait times varied by specialty, the rate of appointment completion consistently decreased as wait times increased.

Conclusions: Our analysis of specialty referrals in a large academic primary care practice demonstrates opportunities to close the loop on specialty referrals. Specifically, we found numerous referrals that were not scheduled, did not have appointment dates, or did not have documented completion. Our analysis showed a correlation between increasing wait time and decreasing referral completion rate, as well as wait time variability by specialty. These analyses are likely generalizable to primary care practices making a large number of referrals. This study underscores the need for methods to track patients and ensure the loop is closed between primary and specialty care.
Introduction: Autologous cell therapy for the treatment of hematological malignancies and primary immunodeficiencies has been limited by the inability to yield functional human hematopoietic stem cells (HSCs) from induced pluripotent stem cells (iPSCs) in vitro. Although previous approaches have produced immortalized cells with HSC-like morphology and cell surface markers, they have failed to demonstrate murine engraftment in secondary recipients. Recent protocols from Keller and Slukvin have generated hemogenic endothelium (HE), the fetal precursors to HSCs, from iPSCs. Here, we identify five transcription factors (RUNX1, ERG, LCOR, HOXA9, HOXA5) that enable further conversion to HSC-like cells with lymphoid potential in vitro and multilineage engraftment capacity in vivo. Building on this discovery and focusing on therapeutic applications, we now set out to characterize and enhance the capacity of HES to produce more terminally differentiated lymphocytes, for the ultimate aim of B and T cell replacement in immunocompromised hosts.

Methods: Following embryoid body formation, human iPSCs derived from bone marrow mesenchymal stem cells were transduced with polycistronic lentiviral vectors on day 3 of endothelial-hematopoietic transition (EHT) induction. A candidate screen of 17 cytokines, epigenetic modifiers and small molecules aimed at inducing HE proliferation was conducted during EHT induction in a RUNX1c gene reporter assay. Flow cytometry of HES cocultured with MS5 or OP9-DL1 stromal cells was performed weekly for 6 weeks after initiating lymphoid differentiation.

Results: In the candidate screen, IFN-γ enhanced RUNX1c reporter 2.4-fold during EHT, which was confirmed by flow cytometry showing increased hematopoietic progenitor cells (CD34⁺CD45⁻). After 1 week of lymphoid directed differentiation, the cell population was characterized by the predominance of myeloid progenitors (CD38⁺CD45⁺CD45RA⁻) with roughly 5% of progenitors characterized as common lymphoid progenitors (CD10⁺CD34⁺CD45RA⁻). At 3 weeks, CD19⁺IgM⁺ B cell progenitors as well as mature IgM⁺ B cells emerged, which were comparable to human cord blood (CB) controls; CD3⁺CD4⁺CD8⁻ T cells were also identified at this time.

Conclusion: We determined that transient exposure to IFN-γ greatly improved the EHT of HES, which may bolster the typically low engraftment efficiency of iPSC-derived HSCs. In our lymphoid differentiation assay, HES were comparable to CB in the formation of mature and immature B/T cells. This finding suggests that our approach to creating engraftable HSCs holds significant potential for modeling hematopoietic disease, both in animal models and as a “disease-on-a-dish,” and for developing therapeutic strategies in genetic blood disorders.
**NORTH CAROLINA POSTER FINALIST - RESEARCH Jerry Lee**

Duke Hotspotting Initiative (DHSI): Integrating Medical Education with Community-Based Care Coordination

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**Introduction:** Amid challenges of rising costs, increasing fragmentation of care, and ongoing epidemics of preventable chronic illnesses, undergraduate medical educators recognize the tremendous need to prepare the next generation of doctors to practice cost-effective and coordinated preventive medicine. While most teaching strategies approach these topics through didactic instruction, medical students consistently attribute the difficulty in integrating these concepts into clinical care to the lack of practical training. In 2015, Duke Hotspotting Initiative (DHSI) was developed as a new curriculum to confront these challenges. Based on “hotspotting,” which provides comprehensive care management to the highest utilizing, medically-complex patients to reduce ED/hospital visits and improve care quality, DHSI incorporates medical students directly into care management services by having students work in pairs to improve the health of a high-utilizing patient. Over a 6-month period and under the supervision of an interprofessional team, students elicit SMART self-care goals from their patients through motivational interviewing, supplemented with care coordination responsibilities and didactic instruction.

**Methods:** We enrolled a pilot group of 8 students primarily for program evaluation in 2015. As part of a “phased adoption” strategy, the program commenced the following year, with an initial enrollment of 20 students out of 36 applicants. The overall curriculum and learning objectives were evaluated through a mixed methods approach, composed of analyses of student written reflections, and pre- and post-participation surveys assessing the acquisition of core competencies.

**Results:** Content analysis of written reflections indicated that participants felt more comfortable referring patients for social services and pain and/or drug rehabilitation, as well as obtaining a history, performing a physical examination, and communicating treatment plan options to at-risk populations than their peers, with high endorsement of the program over traditional didactic approaches. Core competencies reflecting the AAMC’s Core Entrustable Professional Activities for Entering Residency were specifically examined in targeted questionnaires, and results reflected an increase in competency domains such as patient-centered care, interpersonal and communication skills, professionalism, systems-based practice, and interprofessional collaboration. These preliminary results indicate high student satisfaction, improvement in quality measures, and an increase in students’ self-assessment of their knowledge in the biopsychosocial determinants of health, prevention strategies, and skills in motivational interviewing. Additionally, several patient care factors are currently being evaluated, including SMART goal adherence 6-months post-participation; improvement in Patient Activation Measure ® (PAM) scores pre- and post-participation; and decreases in ED utilization and admission rates at 6-months and 1-year post-participation.

**Conclusion:** Medical students gain a deeper understanding of the biopsychosocial determinants of health and learn about critical local health resources. While not otherwise taught in a traditional medical school curriculum, such knowledge is essential for physicians to make authentic, sustainable improvements in their patient’s well-being. Concomitantly, patients receive support to meet a self-determined health goal integral to their wellbeing and assistance coordinating care for complex health needs. Ultimately, this program is a low-cost mechanism to simultaneously train future physicians and improve the health of the system’s most vulnerable members.
Obesity is a very costly illness, often co-presenting with metabolic diseases. Body-mass index (BMI) values, the most commonly used metric for measuring obesity, can be misleading or inaccurate in terms of predicting metabolic health and quantifying obesity. More accurate shape quantifiers of metabolic disease are being sought. Three-dimensional body scanners can be used to obtain volume and surface area measurements of patients, including primary body shape ratios. Primary body shape ratios will more strongly correlate to metabolic diseases compared to BMI. Retrospective review of scanner data from 110 preoperative bariatric male patients were analyzed along with their comorbidities. Primary body shape, BMI, and total volume over surface area values were calculated. P values < .05 were considered significant. Primary body shape values showed the strongest correlation with metabolic disease compared to other values obtained. Primary body shape values closer to .5 are more correlated to metabolic disease than measurements closer to 1. The data supports the hypothesis that primary body shape will correlate with metabolic disease. Using a three-dimensional scanner to obtain body volume values from patients may be more accurate in terms of predicating metabolic health.
Elucidating the role of novel tumor suppressor myomiRs in dedifferentiated liposarcoma

Yu PY, Bill KJ, Prudner B, Chen JL, Fenger JM, Strohecker AM, Pollock RE, Iwenofu OH, Guttridge DC

Background: Sarcomas are malignant heterogeneous tumors of mesenchymal derivation. Dedifferentiated liposarcoma (DDLPS) exhibits aggressive biological behavior with an 80% local recurrence rate and the development of metastasis in approximately 20% of patients. To identify and characterize the molecular alterations that contribute to the development and progression of DDLPS, our laboratory characterized a unique miRNA expression signature associated with human DDLPS tissue compared to paired subjacent normal tissue. We found that several muscle-specific miRNAs (myomiRs), miR-1, -133a, and -206, were significantly underexpressed in liposarcoma tissues. Interestingly, these miRNAs have recently been shown to have tumor suppressor functions in many human cancers. The objective of this study is to characterize the biological and molecular consequences of miR-133a in DDLPS.

Methods: Taqman real-time PCR was used to evaluate expression levels of myomiRs in human DDLPS tissue, normal fat tissue, and available human DDLPS cell lines. To evaluate the effects of miR-133a expression on DDLPS cell line behavior in vitro, cells were stably transduced with miR-133a vector or empty lentiviral vector and the effects on cell cycle, proliferation, apoptosis, and migration were assessed. Agilent Seahorse Bioanalyzer system was used to assess metabolism. We performed an in silico search for predicted targets of miR-133a using target prediction databases and compared these target genes to known genes that are highly expressed in human DDLPS tissue.

Results: The expression levels of myomiRs were significantly decreased in human DDLPS tissue compared to normal human fat as well as in human DDLPS cell lines compared to a human preadipocyte cell lines. Overexpression of miR-133a decreased cell proliferation, decreased glycolysis, and increased spare respiratory capacity. There was no significant effect on cell cycle, apoptosis, or migration. Using in silico target gene analysis, we identified 18 potential targets of miR-133a. These preliminary results suggest that miR-133a regulates metabolism and proliferation, and its dysregulation might contribute to the oncogenic phenotype of DDLPS.

Conclusions: We have demonstrated that enforced expression of miR-133a decreased proliferation and metabolism in human DDLPS cells. We have identified putative gene targets of miR-133a and are currently dissecting the molecular mechanism by which miR-133a may mediate proliferation and metabolism in DDLPS cell lines. Taken together, these data suggest that miR-133a might play a tumor suppressor role in DDLPS, thereby generating new potential targets for therapeutic intervention to alter the course of this disease.
C-X-C Motif Chemokine 10 and Chemokine (C-X-C Motif) Receptor 3 are Elevated in Synovial Fluid of Psoriatic Arthritis Patients

First Author: Anastasiya Muntyanu Fatima Abji, Remy Pollock, Kun Liang, Vinod Chandran, Dafna Gladman

Objectives: Psoriatic arthritis (PsA), an immune-mediated musculoskeletal disease, develops in approximately thirty percent of patients with psoriasis. Previously C-X-C motif chemokine 10 (CXCL10) was identified as a predictive biomarker of PsA in patients with psoriasis. This study explores the expression of CXCL10 in synovial fluid (SF) and serum of patients with PsA.

Methods: SF was obtained from patients with PsA, osteoarthritis (OA), rheumatoid arthritis (RA) and gout undergoing routine joint aspirations. RNA was extracted from whole blood and SF cells and CXCL10, CXCR3 and IL-17A mRNA expression was measured by real-time PCR. The protein levels of CXCL10, IL-17A and IFN? were quantified using a multiplex Luminex assay. Statistical differences were determined by parametric or non-parametric tests for un-paired and paired samples where appropriate (p<0.05 was accepted as significant).

Results: Gene expression of CXCL10 in SF cells was 10-fold greater (p=0.007) in 40 PsA patients as compared to 14 OA patients and 36.2-fold greater (p=2.6x10^-6) than in 8 gout patients. CXCR3 gene expression was 5.3-fold greater (p=0.011) in PsA patients than in OA patients, 32.3-fold greater (p=1.2x10^-6) than in gout patients, and 3.93-fold greater (p=0.02) than in RA patients. Gene expression of IL-17A was found to be 37.5-fold greater (p=1.5x10^-5) in PsA patients than in OA and 19.8-fold greater (p=1.7x10^-4) than in gout. Similar results were obtained for protein expression of CXCL10 and IL-17A. No significant differences between PsA and RA patients were found for CXCL10 and IL-17A levels. IFN? levels were substantially elevated in PsA (median 6.44 pg/ml, interquartile range [IQR] 3.20-14.35 pg/ml) compared to OA SF (median 3.20 pg/ml, IQR 2.83-4.49 pg/ml; p=0.015). In 11 patients with paired SF and serum samples, CXCL10 expression was significantly increased in SF (median 7283.9 pg/ml, IQR 1330-10362 pg/ml) compared to serum (median 282.06; IQR 180.7-395.8 pg/ml; p=0.001) while IFN? was significantly reduced (SF median 6.03 pg/ml, IQR 4.47-8.94 pg/ml vs. serum median 23.70 pg/ml, IQR 3.2-104.6 pg/ml; p=0.001).

Conclusion: In SF, CXCL10 and IL-17A levels are higher in PsA patients than OA or gout patients and similar to RA patients. Additionally, CXCL10 expression is significantly elevated in SF compared to peripheral circulation of PsA patients. These results indicate that CXCL10 could be important in the pathogenesis of PsA in an analogous mechanism to RA and may distinguish individuals with PsA from patients with OA and gout.
OREGON POSTER FINALIST - RESEARCH Vahid Azimi

Automated Calculation of Tumor Purity from Histopathology Samples using Supervised Machine Learning

First Author: Vahid Azimi Guillaume Thibault, PhD, Jaclyn Smith, MS, Christopher Corless, MD, PhD, Young Hwan Chang, PhD

Introduction: The presence of infiltrating non-cancerous cells in tumor specimens can confound the results of genomic sequencing studies, complicating cancer genetic biomarker discovery and reducing the clinical validity and utility of clinical sequencing. To correct for this confounding effect, statistical methods have been developed to estimate the fraction of cancerous cells, or tumor purity (TP), of tumor specimens from genomic data; however, these methods often do not account for the presence of subclonal populations, and can only be used with specific sequencing methods. Yuan and colleagues were the first to propose an image-based method for quantifying TP based on whole-slide images of H&E-stained tumor specimens; their TP calculations correlated well with pathologist-estimated TP scores, and moreover, they demonstrated that TP-corrected genomic data performed better than raw genomic data at predicting cancer survival. However, while image analysis is a promising modality for tumor purity calculation, it presents with many challenges, including but not limited to biological heterogeneity, high redundancy in the feature representation, technical variations, reliable image segmentation, and accurate cell classification; these challenges can ultimately affect the accuracy of image-based TP calculation.

In this study, we have implemented an automated image-analysis pipeline towards the ultimate goal of quantitative histological tissue image analysis.

Methods: We used an existing graphical-user interface called Cytomine that allowed pathologists to annotate cancerous and noncancerous cells on whole-slide images of H&E-stained tumor specimens. Next, we extracted 381 shape, color, and texture features from 9,662 annotated cells, and used those features to train a supervised machine learning classifier, which was then used to categorize unlabeled cells into cancerous and noncancerous classes. TP was calculated for 9 whole-slide images using the equation: \((\text{cancerous cells})/\text{cancerous + noncancerous cells})\).

Results: 10-fold cross-validation based on our testing set (90:10 training:testing set ratio) yielded an accuracy of 98.6% for our classifier. Comparison between our TP calculations and pathologist’s estimates for 9 whole-slide images yielded a Pearson correlation coefficient of 0.79.

Conclusion: We have implemented a fully-automated, high-throughput image analysis pipeline that classifies cells with a high level of accuracy. Moreover, our pipeline’s calculated TP scores are correlated with pathologists’ estimates; in order to go beyond a correlation comparison, we introduce a simple but effective way to provide a systematic comparison between pathologists’ scores and our TP estimation. We found that our estimation shows a slight overestimation of TP compared to pathologists’ scores; future work will consist of applying our image analysis pipeline on a larger data set in order to determine why this discrepancy exists, towards the goal of further optimizing our image analysis pipeline for increased accuracy of TP calculation.
OREGON POSTER FINALIST - RESEARCH Molly R Rabinowitz

Gender Disparities in Small Group Verbal Participation among 1st Year Medical Students

Sylvia Peterson-Perry, Molly Rabinowitz, Mary Clare Bohnett, Mariah Peterson, and Meg DeVoe, MD

BACKGROUND: Gender disparities exist for female clinicians today, from limits on upward mobility to unequal pay and more. In non-medical education, it has been shown that in-class verbal participation correlates with academic success. Research is lacking on whether verbal participation disparities exist during preclinical medical education, and if they do, what the significance of this may be for female trainees and the educational climate.

OBJECTIVE: This descriptive cohort study explores the extent to which gender disparities exist at the level of preclinical medical education, using the proxy metric of verbal participation in class. We aimed to (1) quantify any gender disparities in verbal participation in medical school small work groups, and (2) to examine whether factors such as facilitator gender or facilitation style impact female verbal participation.

METHODS: We collected covert observational data over a 4-week period during a 1st year basic science course. Ten small work group sessions were observed and unique verbal participation events were counted by gender. Facilitator gender, gender composition of group, and inclusionary comments by facilitator were also recorded.

RESULTS: Descriptive statistics analysis revealed an imbalance in average verbal participation events between males and females of >2:1, even when adjusted for group composition and facilitator gender. At least one instance of inclusive facilitation per session increased female participation, but did not close this gap.

CONCLUSIONS: Participation disparities exist. More research is needed to explore implications, as well as interventions by which gender equality can be promoted in the small work group microcosm and beyond.

IRB Statement: The OHSU IRB determined that this project was not research involving human subjects. IRB review and approval was therefore not required. The project does not involve the collection, use, or disclosure of Protected Health Information (PHI), so consent was not required from subjects.

Message to the Oregon ACP: This project was developed exclusively by medical students for the purpose of describing the difficult-to-quantify problem of gender inequality in the medical profession, at the level of undergraduate medical education. With your support, we hope to share our results with the larger medical community, and to help drive institutional quality improvement efforts surrounding this phenomenon.
**OREGON POSTER FINALIST - RESEARCH Sarah E Shangraw**

Dispensing our Bias: A Pilot Quality Improvement Study on Recreational Cannabis

First Author: Sarah E Shangraw, BS  
Second Author: Avital O’Glasser, MD  
Additional Authors: Kathleen F Shangraw, BS; Nikolaus O Matsler, BS

**Introduction:** The recent legalization of recreational marijuana in Oregon has caused dramatic economic and cultural shifts in the state. This booming industry has fueled increasingly potent strains of cannabis and new paraphernalia that fundamentally changes the way cannabis is consumed in our community. Among providers, while generally accepted that cannabis can negatively impact human health, it is less clear if healthcare professionals have kept abreast of these rapid changes post-legalization of recreational cannabis. The purpose of this study is to evaluate attitudes and knowledge about cannabis and behaviors taking cannabis history.

**Methods:** This study included medical students, Internal, and Emergency Medicine providers from Oregon Health and Science University. Participants completed a 15-question online survey about behaviors taking a cannabis history, as well as a quiz to evaluate objective knowledge.

**Results:** The survey was completed by a total of 322 participants: 65 percent medical students (23 percent MS1, 28 percent MS2, 23 percent MS3, and 26 percent MS4), 23 percent Internal Medicine, and 12 percent Emergency Medicine. Of the physician group, 36 percent were residents and 64 percent were attendings. Seventy-six percent of participants were in the 22-34 age range. The results of the survey showed that 81 percent of physicians and medical students perceived taking a cannabis history as important. Over half of medical students and physicians reported taking a cannabis history on all or nearly every patient. Of those who took a history, frequency and duration of use was the most gathered information (85, 67 percent of students; 95, 62 percent of physicians, respectively). Medical students were more likely than physicians to ask about cannabis storage (4.3 compared to 1.8 percent) and use of paraphernalia (19 compared to 9.6 percent). Objectively, scores on the quiz were similar: pre-clinical medical students scored 50, clinical medical students scored 55, IM physicians scored 56, and EM physicians scored 58 percent. Over half of respondents overestimated cannabis potency. Sixty-one percent of pre-clinical medical students believed respiratory expression and bradycardia to be symptoms of acute cannabis intoxication, verses 36 percent of clinical medical students, 28 percent of IM physicians, and 41 percent of EM physicians.

**Discussion:** These results suggest that providers and medical students believe taking a cannabis history is important but tend to ask questions about quantity of use. This is similar to taking a tobacco history, yet no evidence suggests cannabis-related illness is caused by or correlated to quantity of consumption. Rather, acute intoxication and contamination of marijuana are reported in the literature as causing human illness: such as hyperemesis, aspergillosis, hypersensitivity pneumonitis, and acute psychosis. In summary, OHSU medical students and providers are inquiring about patient cannabis use, though not yet integrating this information into illness scripts.
Core needle biopsy prior to breast cancer surgery in northeast Pennsylvania: prevalence and barriers to uniform application

Background: Core needle biopsy (CNB) techniques have enabled breast cancer diagnosis without invasive surgery. CNB is critical for planning treatment (lumpectomy, mastectomy, chemotherapy, etc.), minimizing the number of surgeries and improving outcomes. In 2003, the NCCN identified CNB as the preferred method for breast diagnosis. Currently, the National Accreditation Program for Breast Centers includes CNB as one of 19 clinical management standards, and the American College of Surgeons (ACoS) has set 80% as the reference standard for CNB.

Objectives: To assess the prevalence of CNB prior to breast cancer surgery and factors associated with this procedure at one community hospital in northeast Pennsylvania.

Methods: Cancer registry records for all patients treated for incident breast cancer at one large acute care hospital in Scranton during 2014 were examined. Of 106 records, five were excluded (diagnoses not confirmed or initial therapy received elsewhere). Data [patient characteristics, tumor characteristics, surgery, margin status, whether a CNB was performed, and surgeon identifier] for the remaining 101 patients were examined. Additionally, an attempted biopsy was considered as a completed biopsy. The prevalence of CNB (95% confidence interval) was calculated. Differences in proportions were assessed using the chi-square or Fisher’s exact test, as appropriate.

Results: All cases were female, their mean age was 62.6 years, 97% were white, 2% were black, and one unknown race. All stages were included: most prevalent was stage IA (44.6%). The majority of cases were ductal histology (57.4%). A CNB was completed (n=78) or attempted (n=4) for 81.2% (95% CI, 73.6% - 88.8%) of the cases, which is not significantly different from ACoS Commission on Cancer accredited programs’ average (87.6%) or the Middle Atlantic Region average (85.3%), but was different from all hospitals in Pennsylvania (91%). Reasons for not obtaining a biopsy included: patient preference (n=8), contraindication (inability to cooperate, n=4), not medically indicated (n=3), palpable lesion (n=3), and patient expired (n=1). The prevalence of CNB was higher among patients with non-palpable tumors (81.9%) than palpable tumors (56.5%) (p = 0.023), among those with private health insurance (83.3%) v. other insurance types (65.7%) (p = 0.046). Prevalence varied by surgeon (range: 56% - 92.9%).

Conclusions: The prevalence of CNB in 2014 at this hospital (81.2%) met the current ACoS standard for breast cancer care (80%). However, there is room for improvement. Failure to obtain CNB may subject the patient to additional staging procedures. Prevalence varied substantially by surgeon (range 56% to > 90%), and several barriers to CNB (presence of a palpable mass, type of health insurance) were identified. This variation (by surgeon, physician-patient factors) should be investigated further.
The Incidence of Positive Sputum Cultures in Patients with Extrapulmonary Tuberculosis

First Author: Samuel A Rauch, MA Andrew Ancharski, MSPH MPH David Schlossberg, MD

**Intro:** Extrapulmonary TB (EPTB) currently accounts for one-fifth of all TB cases in the United States, a proportion that has grown in the last decade. The incidence of positive sputum cultures in EPTB has varied in different reports. Evaluation of the incidence of positive sputum cultures in EPTB patients in a large urban setting has implications for the assessment of infectiousness of EPTB patients and for resource allocation for sputum cultures and contact investigations.

**Methods:** The study population included all 568 adult (18+) cases of confirmed active tuberculosis managed by the Philadelphia Department of Public Health from 2009 to 2015. A chart review assessed EPTB patient status and disease location among the Philadelphia cohort. The outcomes of interest included the number of sputum smears or cultures and their results. Demographic factors, HIV and other immunosuppressive status and presence of diabetes were noted along with any specific CXR findings or respiratory symptoms. Analysis was performed using SAS version 9.3.

**Results:** From the 568 cases of active TB in Philadelphia between 2009-2015, 144 cases of EPTB (25.4% of all TB cases) were identified, 125 of which were non-pleural EPTB. Of 125 confirmed cases of non-pleural EPTB, the most common sites of disease were lymph nodes (54 cases, 43%) and CNS (11 patients, 8.8%). 2 patients (1.6%) with non-pleural EPTB, clear CXR, and no respiratory symptoms demonstrated positive sputum culture, while 4 other such cases (3.4%) showed a positive sputum smear. Of the non-pleural EPTB patients with abnormal CXR (34, 24%), none had a positive sputum culture and 1 had a positive sputum smear (2.9%). Of the 19 pleural cases, only 1 (5.3%) had a positive smear. 17 of the 19 pleural cases had a sputum culture performed, of which none was positive.

**Conclusions:** Patients with non-pleural EPTB and patients with pleural TB were unlikely to demonstrate pulmonary involvement by sputum smears or cultures. This finding may help allocate limited resources with regard to sputum culture and contact investigation in EPTB.
Interventions to Promote Coping for Parents of Hospitalized Children: A Systematic Review and Narrative Synthesis

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Background: Parents of hospitalized children often experience psychological distress related to the difficulties of caring for their child while balancing other life responsibilities. Distressed families can negatively affect their children’s hospital outcomes, resulting in longer hospital stays and more frequent hospital and emergency department re-visits. Several studies have shown that when families receive emotionally supportive interventions, family members participate more willingly in their children’s physical and emotional care during a hospitalization, resulting in better hospital outcomes. Due to the acute and distressing nature of illness and the need for short term coping strategies, interventions for family members of hospitalized children are important and likely to have positive effects.

Objective: To conduct a scoping review of the literature to determine the effect of psychological interventions for parents of hospitalized children on parent mental health and functional outcomes.

Methods: We organized our search strategy around PRISMA guidelines. We searched relevant online databases using key concepts: “hospitalization,” “pediatric,” “parents,” and “coping support intervention.” Two independent reviewers analyzed titles and abstracts of studies retrieved in literature searches. Eligibility criteria for inclusion in the full review included: (1) study of a psychological intervention for parents of acutely hospitalized children (<21 years), including acute hospitalizations in the context of a chronic illness; and (2) written or available in English. We extracted data for synthesis and evaluated study methods using the Downs and Black checklist.

Results: Initial database searches yielded 1826 abstracts for possible inclusion. Title and abstract review yielded 43 studies for full text review, and ultimately, 25 studies from around the world were found meeting inclusion criteria. More than half (n=14) of the studies involved coping support interventions for parents of infants hospitalized in a neonatal intensive care unit. Of the 25 studies, 13 involved mothers only. Interventions addressed the following domains: problem-focused coping/educational, emotion-focused coping/relaxation, collaborative care, emotional expression, social support, empathetic listening, and problem solving. The modes of the intervention included audio recordings, scrapbooks, workbooks, one-on-one interviews, phone calls, and websites. The interventions also ranged considerably in how intensive they were for either parents or staff. Heterogeneity of the effect between studies was high (I² > 50%), which may reflect the diverse study populations.

Conclusions & Relevance: Coping support interventions had a statistically significant (p=0.001) effect on decreasing parent anxiety symptoms. This review may inform strategic planning of hospital clinical care models to support parents and inform clinical care teams of programs to aid in parents’ coping during a child’s hospitalization. In addition, this work could be further extrapolated to evaluate the influence of family coping support interventions on staff stress. Lastly, the benefits of such interventions are unlikely to be limited to the families of hospitalized children. We should assess interventions for families of adult patients with various disease processes as well.
A clinical audit on the management of patients with alcohol use disorders

Introduction Alcohol dependence and detoxification are commonly seen in Singapore’s tertiary hospital settings. A study done in trending alcohol consumption in Singapore from 1992 to 2004 showed that alcohol consumption has increased over the years (Lim, 2007). Neuropsychiatric complications of alcohol dependence include withdrawal syndrome, seizures, delirium tremens, anxiety, hallucinosis, cognitive impairment and Wernicke's encephalopathy, which are debilitating or even life threatening. While optimizing management for alcohol detoxification is a clinical imperative, prior studies have highlighted gaps in service provision for such patients when they are admitted to the general hospital. This study is the first audit done in Singapore to evaluate the management of patients with alcohol use disorders.

Methods: Case notes of 50 patients with alcohol use who are admitted to a general hospital and thereafter referred to psychiatrists are reviewed retrospectively. An audit tool was first developed, based on existing international guidelines and audit tools in other known treatment centres. The tool was then used to audit the case notes, focusing on the actions undertaken by the primary team and the on-call psychiatric team.

Results: Numerous gaps in the primary teams' detoxification and subsequent management of patients with alcohol use disorders are detected. These include monitoring of withdrawal symptoms, prescription of Benzodiazepines and Thiamine, completion of alcoholic detoxification, oral Vitamin B prescription and providing outpatient follow-up advice. Withholding carbohydrates before thiamine infusion is consistently left out. However, areas that have been consistently carried out by referring teams include diagnosis of alcoholic dependence, Magnesium replacement and prescribing IV Thiamine as a slow infusion.

For the on-call psychiatric team, gaps highlighted include monitoring of withdrawing symptoms, prescription of Benzodiazepines and IV Thiamine. Withholding carbohydrates before Thiamine infusion is also consistently left out. Of note, monitoring of withdrawal symptoms has not been consistently carried out even with advice from the on-call psychiatric team.

Discussion: There is significant variance in the management regimes of patients with alcohol use disorder. This study underscores the need for standardisation of care for these patients. To achieve this, local guidelines should be established to better provide clinicians with a rubric to address existing gaps in clinical service.
Follow the Money: The Financial Implications of the USMLE Step 1

First Author: Paul Inclan Nimesh A Patel, David P Miller, Adam S Hyde, Michael Hulme, Jeff E Carter

Background: Previous cross-sectional (survey based) analysis demonstrate that lifestyle and income are the two largest factors affecting specialty choice by fourth year medical students. However, such data rely solely on self-reported opinions and fail to describe how changes in reimbursement may impact the “quality” of applicants for a given specialty. Thus, this study seeks to determine the career net present value (NPV) for each specialty represented in The Match, allowing for increased understanding of the relationship between applicant’s Step 1 score and future career value.

Methods: Positive and negative cashflows for each specialty in The Match were calculated, accounting for resident salary, private practice salary, federal income tax, and educational indebtedness. Then, these cashflows were discounted to present day at 5% to yield NPV. Next, specialty NPV was plotted against 2016 USMLE Step 1 score for each specialty. Finally, a line of best fit was determined, with the slope representing price elasticity of supply for each given variable.

Results: NPV for all specialties in The Match were determined to be: Anesthesiology ($3,863,917), Dermatology ($4,259,067), Diagnostic Radiology ($4,417,165), Family Medicine ($2,281,527), General Surgery ($3,522,245), Internal Medicine ($2,454,001), Neurological Surgery ($5,328,974), Neurology ($2,709,168), Obstetrics and Gynecology ($2,920,468), Orthopedic Surgery ($4,861,050), Otorhinolaryngology ($3,852,456), Pathology ($3,518,638), Pediatrics ($2,281,755), Pediatric Neurology ($2,501,195), Plastic and Reconstructive Surgery ($3,677,056), Psychiatry ($2,340,295), Radiation Oncology ($4,474,645). Moreover, we determined there is a strong positive correlation between a specialty’s NPV and that specialty’s average Step 1 score (R² = 0.72, Step 1 Score = 0.000008 * Career NPV + 207). For every $100,000 increase in NPV, we would expect Step I scores of applicants to increase by 0.8 points.

Conclusions: Our results indicate there is a significant correlation between USMLE Step 1 score and career value. Importantly, our data suggests that loan forgiveness programs are unlikely to have a great effect on the quality of applicant to a field. As such, increased recruitment of high caliber students to IM will require significant changes to the discrepancies between various specialty salaries. Finally, other non-financial strategies may be needed to encourage high quality applicants to the field, such as focusing on work flexibility, lifestyle, and numerous employment opportunities. Future longitudinal studies are needed to assess the impact of such non-financial factors on students’ specialty choice.
Treatment of acute or chronic pain is perhaps the most frequent reason patients seek care in the Emergency Department (ED). Furthermore, pain management is a critical aspect of emergency care and must always be addressed. However, current practice discourages overuse of narcotics (opioids), due to the associated adverse effects, namely addiction.

Patients who present to the Emergency Department (ED) with pain may benefit from the use of a simple biofeedback technique called regulated breathing. Data from the literature confirms the efficacy of biofeedback techniques in the treatment of both chronic and acute pain syndromes in the hospital. The primary aim of this study is to determine the effectiveness of regulated breathing (intervention) in the treatment of acute and chronic pain in patients who seek treatment in an academic ED. The secondary aims of this study are to define associations between the duration of pain, source of pain, and type of pain and the effectiveness of regulated breathing. Using data collected from a continued quality improvement survey, we were able to compare patients' vital signs, pain score using a visual analog scale slide rule, and patient demographic information from their chart. The inclusion criteria for our study are that the patients be oriented to person, place and time (A&O x3), capable of verbal consent, and have no prior history of acute or chronic respiratory distress that prevents them from deep breathing.

Prior evidence has shown regulated breathing seems to play a role in the reduction of blood pressure, heart rate, and Visual Analog Scale (VAS) pain score, in patients who come into the hospital for chronic or acute pain. The research question that we aimed to address is as follows: Will patients benefit from use of a simple mind-body therapy known as regulated breathing (RB) to treat pain in the ED? To address our research question we developed several hypotheses. Our null hypothesis states that there will be no difference in pain scores before and after the intervention known as RB for Emergency Department (ED) patients with pain. Our alternative hypothesis states that there will be a difference in pain scores before and after the intervention known as RB for ED patients with pain. Overall RB showed no significant difference between the intervention and non-intervention groups. (p=0.89). RB better benefited patients with visceral pain in comparison to to somatic pain. RB showed greater benefit to a younger age group, though there were no associations with gender. There was a greater reduction in pain scores associated with a longer duration of pain (chronic verses acute).
The Role of Socioeconomic Status in Leaving Against Medical Advice

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**Importance:** Individuals leaving against medical advice (AMA) are at risk for adverse health outcomes, including a 40% increased mortality rate a year after self-discharge. Additionally, leaving AMA may dramatically increase medical costs due to failure to complete treatment resulting in higher risk of readmission with additional co-morbidities.

**Objectives:** To assess the impact of socioeconomic status (SES) on leaving the hospital AMA.

**Design:** Retrospective study of inpatients utilizing the Healthcare Cost and Utilization Project (HCUP) 2012 National Inpatient Sample (NIS) database.

**Setting:** Hospital inpatient database comprising approximately 90% of all discharges within the US in 2012.

**Participants:** Patients 18 years and older who were discharged AMA or through regular discharge methods were included.

**Main outcome and measure:** Primary outcome measure was discharge type (AMA versus regular). Multivariate logistic regression to assess SES factors (insurance status, income, and area of residence) and possible confounders. Weighted analysis utilized Proc Surveylogistic in SAS version 9.4 (SAS Institute).

**Results:** After adjustment for possible confounders and other SES factors, increased odds of leaving AMA include a lack of insurance (ORadj = 4.16, 95% CI: 3.96-4.36) and presence of Medicare and Medicaid insurance (Medicare: ORadj = 2.10, 95% CI: 2.02-2.19; Medicaid: ORadj = 2.94, 95% CI: 2.81-3.08). Compared to the 0-25th percentile in zip code income, individuals in the 26th-50th percentile had a 20% decrease in odds of leaving AMA (ORadj = .80, 95% CI: 0.77-0.83), individuals in the 51st to 75th had a 30% decrease in odds of leaving AMA (ORadj = .68, 95% CI: 0.65-0.72) and individuals in the 76th to 100th percentile had the lowest odds of leaving AMA (ORadj = .62, 95% CI: 0.58-0.66).

**Conclusion and relevance:** Two groups at risk for leaving AMA were individuals lacking insurance and those within the 0-25th percentile in income. Our results are similar to previous analysis of 2002 NIS data, suggesting little improvement in AMA for those of lower SES. Additional work needs to be done to help healthcare providers set targeted preventative measures to address those at increased risk for leaving AMA in order to provide a higher standard of care for the patient.
Chronic pain is a debilitating disorder that affects millions of individuals worldwide. However, treatment and therapy options remain limited, in part, because the basic biological processes regulating nociceptive signaling are not well understood. Therefore, this project examined the modulatory processes underlying nociceptive signaling using the medicinal leech model as a system. Previous studies in the Burrell laboratory have shown that low-frequency stimulation can depress nociceptive signaling through an endocannabinoid-dependent mechanism (Yuan & Burrell, 2010, 2012, 2013a, 2013b). Endocannabinoids are lipid-based neurotransmitters involved in modulating numerous processes including appetite, emotion, cognition, and nociception (Di Marzo et al., 2004; Elphick, 2012). However, it is not known what patterns of activity result in increases in nociceptive signaling, e.g. long-term potentiation (LTP). Utilizing a tetanic stimulation protocol (high-frequency stimulation (HFS) at 25Hz; 10 spikes with 20 trains at 10sec intervals), we observed LTP in the nociceptive synapses. This potentiation was found to be NMDA receptor-dependent and synapse-specific, similar to other examples of LTP found throughout the central nervous system. Interesting, AP5, an NMDA receptor antagonist, not only blocked the LTP, but unmasked a form of synaptic depression elicited by the HFS. To test whether this synaptic depression was mediated by endocannabinoids, two sets of experiments were carried out. First, an inhibitor of endocannabinoid synthesis (tetrahydrolipstatin or THL) was injected into the postsynaptic neuron while tetanic stimulation was carried out in the presence of AP5 treatment groups. THL injection blocked the depression normally observed in AP5+tetanus treatment groups. Second, because a TRPV-like receptor was discovered to be involved in endocannabinoid-mediated depression, experiments were carried out in which the TRPV1 antagonist, SB366791, was injected into the presynaptic neuron during AP5+tetanus treatments. SB366791 injections inhibited the depression observed in AP5+tetanus treatment groups. Taken together, the unmasked depression appeared to be both endocannabinoid- and TRPV-dependent. These results suggest that strong synaptic stimulation can activate both NMDA receptor-based potentiating and endocannabinoid-dependent depressing processes, but that the potentiating processes dominate and actually suppress the influence of the depressive mechanisms. In addition, while LTP was synapse-specific, endocannabinoid-mediated depression affected both active and inactive nociceptive synapses.
Texas Poster Finalist - Research Carolina Velez-Mejia

Quality Improvement: Increasing clinical trial awareness and accrual in adults with solid tumor malignancies admitted at University Hospital

First Author: Carolina Velez-Mejia Second Author: Dr. Kate I. Lathrop

Frequently, while deciphering what is the cause of the illness many patients are newly diagnosed of solid tumor cancer and in other occasions admission to the hospital is related to progression of the symptoms while being on chemotherapy. At the moment while there are a lot of clinical trials available to enroll patients, there isn’t a practical instrument that provides up-to-date information for fellows and attendings at the adult oncology service on which clinical trials are currently enrolling patients depending on each type of solid tumor. Therefore, patients are scheduled for outpatient appointment with medical oncologists just to receive this type of information and get an idea of what are clinical trials. Consequently, there’s a missed opportunity to encourage patients to participate in clinical trials and to receive basic information of them while being hospitalized in the University Hospital. The project is divided into two phases, the initial one is a characterization of the population prior having custom-made spreadsheets for every solid tumor with their specific available clinical trials, bilingual (English/Spanish) handouts of general information about clinical trials, establishment of systematically screening patients for potential in clinical trials and including the information as part of the plan of care. The second phase shows the impact of such interventions, but at the time it is still in progress and so there are only preliminary results. So far this approach has been widely accepted by fellows, attendings, patients and their families since these instruments are used for communicating and improving the relationship and quality of the patient-doctor encounter. Many attendings have implemented it to their daily routine while being on call in the University Hospital, since it allows them to recommend personalized therapies even if that isn’t their area of expertise. Additionally it gives patient and their families an opportunity to benefit from participating in clinical trials and ensure them to have access to this aspect of cancer care.
Archival Tumor Testing: A Potential Roadblock to Clinical Trial Enrollment

First Author: Matthew J Hadfield Second Author: John Schulz Third Author: Carl Hoegerl, DO

Purpose of Study: Advancements in genomic sequencing in recent years has ushered in a new era of highly targeted chemotherapeutic agents. Clinical trials often require genetic sequencing on tumor tissue prior to the enrollment in an effort to better understand how these agents are working against their targets. Genetic tumor testing requires several major steps including recovering archival tumor tissue on patients and processing that tissue for appropriate testing. Given the increasing emphasis on genetic profiling in cancer treatments a prospective study was conducted to determine the median wait time for tumor profiling for patients waiting to enroll on clinical trials.

Methods: From 2013 to 2015 an excel database was constructed to evaluate and track the median wait times for receiving genetic profiling 169 patients enrolling on two different phase 1 clinical trials at Dana Farber Cancer Institute, both of which required testing prior to enrollment. Results were stratified into internal tumor block requests and external tumor block requests. Internal requests consisted of patients with tumor blocks located at Dana Farber Cancer Institutes. External requests consisted of patients with tumor blocks located at outside facilities.

Results: The median wait time from signing consent to receiving results of genomic profiling was 31 days for internally requested tumor blocks and 34 days for externally requested tumor blocks. 13 patients (8%) transferred their care to hospice or passed away prior to receiving results. *

Discussion: Precision medicine offers hope and promise in the field of oncology. There remains little doubt that targeted treatments for certain malignancies may become the standard of care. As these agents become widely available, timely acquisition of genetic profiling, including early requests and expedited results, will be essential for patients waiting for treatment.
Lymph node CD 169+ macrophages are significantly depleted during acute Simian Immunodeficiency Virus infection in a CD8+ T cell depleted model.

First Author: Sichen Liu, Derek Irons, Allison Lindgren, Adam Filipowics, Marcelo J. Kuroda, Woong-ki Kim

Background: Macrophages are classically divided into M1 and M2 subpopulations, but a relatively new subpopulation of CD169+ (sialoadhesin; Siglec-1) macrophages are noted in their role in antiviral response. It is now known that CD169+ macrophages can capture then internalize HIV-1. In a recent study, we demonstrated in rhesus macaque HIV infection model that there was a sharp increase of CD169 expression on monocytes that was positively correlated with plasma viral load. Interestingly, in said study, CD169+ lymph node (LN) macrophages were significantly depleted in rhesus macaques that were sub-acutely and chronically infected with Simian Immunodeficiency Virus (SIV) while chronically SIV-infected CD8-depleted macaques had no observed loss. No related studies in acutely infected macaques were done, and the mechanism of depletion has yet been elucidated. Therefore, we hypothesize that CD169+ LN macrophages are infected during the early acute phase of HIV infection as part of the antiviral response to prevent rapid dissemination of virus, and these infected macrophages are subsequently eliminated by CD8+ T cells.

Methods: We examine the expression of CD169, CD8, and viral DNA through In-Situ Hybridization (ISH), immunohistochemistry (IHC), and immunofluorescence (IF) in LNs and Spleen tissues collected from 10 acutely SIV-infected (10 - 21 days, post-infection) rhesus macaques along with 4 uninfected macaques serving as control. Of the 10 infected macaques, 4 are depleted of CD8+ T cells while 6 are not depleted. Through IHC, CD169+ macrophage numbers visualized then quantified for comparison between two experiment groups.

In the 6 acutely infected non-CD8 depleted macaques, 2 were infected with deltaGY SIV variant that does not infect macrophages. We utilized multi-label IF and ISH to examine the localization of infected CD169+ macrophages and CD8+ T cells in the tissue, and their relations to each other.

Results: In acutely infected non-CD8 depleted macaques, we observed a significant decrease in viral DNA+, CD169+ LN macrophages, and the opposite of that in CD8 depleted animals. Additional work in the next two months will seek to demonstrate that CD169+ macrophages are indeed positive for viral DNA, depicting that CD169+ macrophages serve as an early infection host. CD8+ T cell work will aim to depict direct contact between CD169+ macrophages and CD8+ T cells, which implies cytotoxic action exerted by the T cell. With deltaGY SIV variant, we seek to demonstrate CD169+ macrophage quantity should equate to uninfected control.

Conclusion: Our preliminary results show that depletion of CD169+ LN macrophages occurs during the acute phase of SIV infection and is directly mediated by CD8+ T cells in the LN. Elucidating the role of CD169+ macrophages is important to further map out the pathophysiology of acute HIV infection. This is important in identifying a possible additional modulating target to control HIV dissemination.
INTRODUCTION: Atrial Fibrillation (AF) is the most common cardiac arrhythmia effecting 2.7-6.1 million people in the US and is responsible for 15-20% of ischemic strokes. AF leads to 750,000 hospitalizations and 130,000 deaths annually costing the health care system 6 billion dollars. An intercalated disc nanodomain, the perinexus, has been shown to be a possible site of gap junction independent intercellular coupling. Expansion of the perinexus has been shown to slow conduction velocity and increase the incidence of arrhythmia in animal models. This structure has yet to be studied in human myocardium. The purpose of this study is to characterize the human perinexus and determine if perinexal width is greater in patients with AF than in those without AF.

METHODS: Patients ages 18-75 undergoing non-emergent cardiac surgery at Carilion Roanoke Memorial Hospital were enrolled in the study (n=39). Cardiac tissue was collected from the atrium intraoperatively and fixed in 2.5% glutaraldehyde in phosphate buffered saline. Tissue was then prepared for transmission electron microscopy (TEM). The gap junction and adjacent perinexus was identified and photographed on TEM at 150,000x magnification. The width of the perinexus was then measured using ImageJ software at distances of 5-150nm from the gap junction by two blinded, independent observers. Mean width of the perinexus (Wp) was averaged over all samples.

RESULTS: Both observers found dynamic nanodomains adjacent to the gap junction that were characterized as the perinexus. Inter-observer Wp measurements correlated with a slope not significantly different than 1 ($R^2=0.60$). Importantly, both observers found that Wp was significantly wider in patients with a history of AF (20±3nm and 25±2nm) than in patients with no history of AF (17±2nm and 21±2nm).

CONCLUSION: Human atria have a dynamic anatomic separation adjacent to the gap junction that is consistent with animal model descriptions. Further, perinexal width is greater in patients with AF undergoing cardiac surgery than in those without AF. These data suggest that perinexal expansion may be a new determinant of arrhythmogenic myocardium.
Background: In Lima, Peru, up to 22% of men who have sex with men (MSM) and transgender women (TGW) are HIV positive. Patterns of sexual behavior vary across types of partners and impact risk of HIV. Understanding risk factors for different types of partnerships and unprotected anal intercourse (UAI) within those partnerships can guide interventions to reduce HIV transmission. This analysis examines risk factors among MSM and TGW in Lima for (1) being in each of four types of partnerships (main, casual, one-time, or client) and (2) having UAI with those partners.

Methods: A cohort of high-risk, HIV-negative MSM and TGW in Lima was followed for up to 36 months with monthly surveys on risk behaviors. Participants indicated whether they had any main partners, casual partners, one-time partners, or clients in the past 30 days and whether they had UAI with these partners. Odds ratios (ORs) were calculated using generalized estimating equations to assess the relationship between risk factors and each outcome.

Results: Of 1,831 MSM and TGW who completed 14,792 study visits, 90.7% had a main partner at =1 follow-up visits, 82.7% a casual partner, 81.2% a one-time partner, and 52.4% a client. Among those who ever had a main partner, 68.6% reported UAI at least once, compared to 59.0% for casual partners, 52.4% for one-time partners, and 42.3% for clients. In multivariate analysis, drug use in the last 30 days significantly increased the odds of having each type of partner (main: OR 1.49 (95% CI 1.27-1.75); casual: 1.57 (1.33-1.85); one-time: 1.60 (1.36-1.89); client 1.78 (1.46-2.18)). Alcohol use in the past 30 days significantly increased the odds of having every type of partner except main partners, while having an alcohol use disorder (AUD) was not significantly associated with having any type of partner. In multivariate analysis, presence of an AUD significantly increased the odds of UAI with each type of partner (main: 1.36 (1.17-1.57); casual: 1.49 (1.27-1.75); one-time: 1.45 (1.22-1.72); client 1.52 (1.12-2.08)). Alcohol use in the last 30 days only increased the odds of UAI with a main partner (1.15 (1.04-1.28)), while drug use in the last 30 days was not significantly associated with UAI with any type of partner. Having multiple main partners increased the odds of UAI with all types of partners.

Conclusions: Risk factors for sexual behavior among MSM and TGW in Lima are similar for those who have casual partners, one-time partners, and clients. AUDs and having multiple main partners are associated with increased odds of UAI with all types of partners, whereas recent drug use and alcohol use are not. Interventions targeted at AUDs and reducing the number of sexual contacts could reduce UAI and HIV risk in this high-risk population.
Myeloid Translocation Genes (MTGs), such as Myeloid Translocation Gene Related 1 (MTGR1), are transcriptional repressors known to regulate intestinal homeostasis through key differentiation programs, namely the Wnt and Notch pathways. Previous research has demonstrated Mtgr1 loss activates the Notch pathway and leads to a decrease in the secretory cell lineage and decreased viability of ex vivo crypt cultures (enteroids).

As such, it was our hypothesis that reduced Mtgr1 expression would have an intermediate effect on viability and secretory cell differentiation in the intestines. To first determine the effect of Mtgr1 reduction in Notch signal regulation, Mtgr1 HT enteroids were cultured, assessed for viability over five days, and compared those from WT littermates. Goblet cells were quantified by PAS staining on WT and HT small intestinal tissue.

To next determine the effect of Mtgr1 on other cellular pathways, we utilized previously generated RNA-Sequencing data from Mtgr1 null mice for identification of up-regulated genes. Genes were analyzed for metabolic pathway associations using the Protein Analysis THrough Evolutionary Relationships (PANTHER) Classification System and The Broad Institute’s Molecular Signature Database (MSigDB). Selected genes were validated by RT-qPCR, and then analyzed in hCRC tissue relative to patient-matched samples procured through the Cooperative Human Tissue Network (CHTN) – Western Division to correlate expression with MTGR1. Results showed no difference between Mtgr1 WT and HT in plating efficiency (56.55±7.20% and 48.53±9.16%, P=0.517) and viability after five days (82.87±7.94% and 82.85±3.00%, P=0.999); however, a significant difference in the number of goblet cells per crypt-villus unit was found (23.87±9.35 and 10.57±5.85, P<0.0001). In addition, most identified genes failed to show an association with MTG1 expression in hCRC; however, two (KRT23 and TFAP2A) demonstrated a weak, inverse relationship to MTG1 ($R^2 = -0.129$ and -0.143, respectively). Overall, these data suggest a partial loss of MTGR1 may play a significant role in retarding the proliferation of goblet cells, although analysis of other secretory cell lineages is still needed. Furthermore, decreased MTGR1 expression may enable overexpression of other genes associated specifically with hCRC (KRT23) and with other cancers as well (TFAP2A).