4-5-2012

Proceedings - Wright State University Boonshoft School of Medicine Fourth Annual Medical Student Research Symposium: Celebrating Medical Student Scholarship

Wright State University Boonshoft School of Medicine Office of Research Affairs

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The Fourth Annual Medical Student Research Symposium culminates a productive year of academic programming sponsored by the Research Learning Community at Wright State University Boonshoft School of Medicine. The Research Learning Community was developed by the Medical Student Research Club and the BSoM Office of Research Affairs to promote research-related educational opportunities for WSU medical students. Programs supported by the Research Learning Community include the Medical Student Research Club, Medical Student Journal Club, Translational Research Lecture Series, and research electives for M1 and M2 students (SMD 616 and SMD 617).

Research Learning Community Home Page
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Proceedings, 2010 Medical Student Research Symposium
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PROGRAM

Opening...............................................................................................................................5:45pm
Atrium

Welcome & Distinguished Scholar Lecture......................................................................6:00pm
Auditorium

Poster Presentations and Reception..................................................................................6:30pm
Atrium

Awards...............................................................................................................................8:00pm
Atrium

2012 Distinguished Scholar

Kelly L. R. Miller, M.S. Ph.D., MS4

Dr. Kelly Miller is an MD/PhD candidate at the Wright State University Boonshoft School of Medicine. In 2010, she completed her Ph.D. studies in Biomedical Science with a concentration in Biochemistry and Molecular Biology in the laboratory of Steven Berberich, Ph.D. Her dissertation, *Induction of p53 Dependent Cellular Senescence through MDMX Inhibition or YPEL3 Expression*, not only provides new insight into mechanisms underlying cancer development, but also describes novel genetic targets for future therapeutic interventions against specific human cancers. Dr. Miller has numerous scientific publications in peer-reviewed journals and has presented her work at both national and international conferences. She is a member of the American Association for Cancer Research, the American Medical Association, and the American Medical Student Association, and has participated in several community outreach and volunteer programs, including providing patient care at Reach Out Montgomery County as well as coaching for the Dayton Special Olympics and Miami Trace High School. The Medical Student Research Club has selected Dr. Miller to be our 2012 Distinguished Scholar for her significant contributions to fundamental knowledge on cell cycle regulation and human oncogenic processes as well as her record of outstanding community service and promoting the advancement of BSOM student research. Dr. Miller is currently completing her M4 year and will begin residency training in Internal Medicine at Wright State University in Dayton, Ohio.
**Abstracts**

(In Alphabetical Order by Presenting Author)

**Cleidocranial dysostosis – a case report**
Matthew Abraham, MS4; Dawn Light, MD

*Presenting Author: Matthew Abraham*
*Faculty Mentor: Dawn Light, MD*
*Poster Number: 35*
*Key Words: dysostosis, clavicle hypoplasia, supernumerary teeth, open fontanels, bone formation*

Cleidocranial dysostosis is a hereditary disorder affecting intramembranous bone formation. Affected individuals present with delayed fontanel closure, hypoplastic or aplastic clavicles and pelvic bones, and short stature. These findings are usually incidental on radiology studies as patients are usually asymptomatic. We report an incidentally identified case of cleidocranial dysostosis in a pediatric patient with asthma.

**Delayed Management of a Superficial Femoral Artery Aneurysm**
Matthew Abraham, MS4; Kian Mostafavi, MD; William Rundell, MD

*Presenting Author: Matthew Abraham*
*Poster Number: 36*
*Key Words: Aneurysm, superficial femoral artery, vascular surgery*

Arterial aneurysms of the superficial femoral artery are rarely encountered. In contrast to other atherosclerotic aneurysms they are more likely to have ruptured on initial presentation. When reviewing the world's literature 54 cases have been encountered of which 27 been ruptured on presentation. Our case is of a 77 y/o male who presented with pain and ecchymosis of his right thigh. On presentation he also had a severe hypercapnic exacerbation of COPD with pH 7.19, pCO2 101. He was not a candidate for endovascular therapy due to the size of his aneurysm. After 4 days of medical optimization he was taken to the operating room for exclusion bypass using a reversed saphenous vein graft. He had unremarkable hospital course thereafter. Unlike ruptured abdominal aortic aneurysms where timely operative management is imperative to prevent life threatening hemorrhage, the natural history of ruptured superficial femoral artery aneurysms are not as well understood. Ischemic complications are not as prevalent as encountered in popliteal aneurysms. Although timely operative intervention should be the goal, as in our case it may be safe to delay surgery in ruptured superficial femoral artery aneurysms to allow for optimization of patients comorbidities.

**First Year Medical Student OSCE Performance and Specialty Choice**
Katherine A Backes, BA; Nicole J Borges, PhD; S. Bruce Binder, MD, PhD; Brenda JB Roman, MD

*Presenting Author: Katherine A Backes*
*Faculty Mentor: Nicole J. Borges, PhD*
*Poster Number: 44*
*Key Words: The Objective Structured Clinical Examination, OSCE, specialty choice, person or technique oriented specialties*

*Purpose:* Current literature reveals the multitude of factors influencing specialty choice among medical students; however, little is known about its relationship with Objective Structured Clinical Exam (OSCE) performance in the first year of medical school. This study examined whether first year physical exam (PE) and interview (INT) OSCE scores differ for medical students entering person or technique-oriented specialties. We chose the person versus technique-oriented classification system (Yufit et al., 1969, Wasserman et al., 1969, Zeldow et al., 1990) over the primary care versus non-primary care approach to classifying specialties because the former focuses on what physicians do in those specialties: working with people versus performing procedures rather than the type of care provided. *Methods:* Retrospective
review of OSCE PE and INT score database from 2004 to 2007 for first-year medical students at Wright State University Boonshoft School of Medicine. National Resident Matching Program (NRMP) results from this cohort of students matching from 2007 to 2010 were included. 

**Results:** T-test results (p < .05) showed a significant difference in the mean PE (mean = 92.85, sd = 3.94) versus INT (mean = 90.77, sd = 6.76) scores for those entering person-oriented specialties (N = 157, p < 0.001). There was also a significant difference (p < .05) in the mean PE (mean = 93.46, sd = 3.92) versus INT (mean = 91.40, sd = 5.75) scores for those entering technique-oriented specialties (N = 123, p < 0.001). Additionally, with outliers removed, significant differences (p < .05; Boneferroni correction for multiple comparisons p < .01) existed between the mean PE versus INT scores for specialties classified as person-oriented (family medicine, internal medicine, psychiatry, pediatrics and obstetrics-gynecology): PE scores being significantly higher than INT for these specialties, except psychiatry where INT scores were significantly higher. For technique-oriented specialties (anesthesiology, emergency medicine, radiology, surgery), PE scores were significantly higher than INT scores. 

**Conclusions:** Results of this study suggest that PE scores are significantly higher than INT scores for students regardless of whether they enter person or technique-oriented specialties, except for psychiatry where INT scores were significantly higher. For technique-oriented specialties, residency program directors were asked to give a general perception of intern preparation for the same list of tasks and situations. All survey participants were also asked to comment on what experiences could better prepare students for internship. Results: Most graduates felt confident performing most basic procedures, interpreting basic images, working as a member of a team and effectively communicating, prioritizing tasks, writing orders, and documenting in the medical record. Many graduates did not feel confident with placing peripheral IV lines, running a code, and performing more advanced procedures. Residency program director responses were consistent with the responses of graduates, with the exception of interpreting CT and MRI scans. Common themes, identified by respondents that could better prepare medical students for internship included: greater experience with the issues faced during overnight call and hand offs, more practice dealing with key clinical situations and procedures, and an increased level of responsibility and independence. 

**Conclusions:** Tailoring medical school experiences to address the identified areas of concern may help improve the confidence of future interns and better prepare them to handle potentially problematic situations and procedures encountered during internship.

**Survey of Recent Medical School Graduates and Residency Program Directors to Assess Preparation for Internship**

Robert Beaulieu, MSII; Raymond Ten Eyck, MD, MPH, FACEP

**Presenting Author:** Robert Beaulieu 
**Faculty Mentor:** Raymond Ten Eyck, MD, MPH 
**Poster Number:** 45

**Key Words:** Internship Preparation, Medical Education, Self Efficacy, Needs Assessment, Curriculum

**Introduction:** The transition from medical school to internship presents recent graduates with a new role in patient care, increased responsibility, and the need to master new information that directly impacts patient care. However, studies have shown that many medical school graduates do not feel adequately prepared to take on these new challenges. 

**Methods:** A survey was distributed to graduates of the class of 2011 at the Boonshoft School of Medicine, Wright State University and to all directors of the school’s residency programs. Graduates were asked to rank their level of confidence on performing specific tasks and handling specific situations. Residency program directors were asked to give a general perception of intern preparation for the same list of tasks and situations. All survey participants were also asked to comment on what experiences could better prepare students for internship. 

**Results:** Most graduates felt confident performing most basic procedures, interpreting basic images, working as a member of a team and effectively communicating, prioritizing tasks, writing orders, and documenting in the medical record. Many graduates did not feel confident with placing peripheral IV lines, running a code, and performing more advanced procedures. Residency program director responses were consistent with the responses of graduates, with the exception of interpreting CT and MRI scans. Common themes, identified by respondents that could better prepare medical students for internship included: greater experience with the issues faced during overnight call and hand offs, more practice dealing with key clinical situations and procedures, and an increased level of responsibility and independence.

**Conclusions:** Tailoring medical school experiences to address the identified areas of concern may help improve the confidence of future interns and better prepare them to handle potentially problematic situations and procedures encountered during internship.

**Topical Ultraconcentrated Capsaicin to Treat Post Herpetic Neuralgia**

Cole Budinsky; Christo Frangopoulos; Amol Soin, MD, MBA
**Presenting Author:** Cole Budinsky  
**Faculty Mentor:** Amol Soin, MD, MBA  
**Poster Number:** 18  
**Key Words:** Post Herpetic Neuralgia, Herpes Zoster Virus, Capsaicin, transdermal patch, and Qutenza

Post Herpetic Neuralgia (PNH) is a debilitating pain condition that occurs after an infection with Herpes Zoster Virus. Typically, those affected notice a unilateral rash affecting a single dermatome. Patients notice symptoms consistent with neuropathic pain, i.e. burning, irritation, allodynia, and hypersensitivity to touch. Current treatment modalities include antiviral medications such as acyclovir, topical lidocaine applied directly over the affected dermatome, and neuropathic pain agents such as Neurontin or Pregabalin. We proposed using a supraphysiologic form of Capsaicin, a formulation that is unlike the current standard Capsaicin formulation. The medication we used is in the form of a transdermal patch known as Qutenza, which contains 300 times greater concentration than over the counter Capsaicin. This algorithm using Qutenza to treat refractory post herpetic neuralgia represents a novel and new approach to treat PNH.

Eight consecutive patients suffering from severe, chronic, debilitating, and refractory pain from PHN were identified. We used a protocol where the patients had EMLA (Eutectic Mixture of Local Anesthetic) applied over the effected dermatome for approximately 1 hour prior to Capsaicin administration, preventing irritation and pain related to Capsaicin, which is a known skin irritant. Following the EMLA administration, the Capsaicin patch was placed over the effected dermatome. The patch was left on for approximately 1 hour. Every 15 minutes, vital signs and VAS (visual analog pain scale) pain score was assessed. All eight patients noticed burning pain and irritation near the site of the patch within 30 minutes of application. The VAS increased by an average of 48% in all 8 patients—an expected result of the Capsaicin application. At the conclusion of the cases, the patch was removed and a cleansing gel was administered to decrease the irritation patients experienced.

The patients were followed up at 2 weeks follow up. Two patients had 100% reduction in pain scores, one patient had 0% and the mean reduction was 48%. The mechanism of action of Capsaicin is believed to be the depletion of neurotransmitters involved in sending pain signals. Once depleted, overall pain perception diminishes. It is believed that this is a short-term treatment, and patients are currently scheduled to return at the 6-month interval. These results represent an initial snapshot of our first eight patients; continued patient recruitment and follow-up is planned. Initially, it does appear that this treatment algorithm with Qutenza provides promise in achieving some pain relief in patients with PHN refractory to other pain treatment modalities.

**Low Immune Cell Function Values as a Risk Factor for Current or Subsequent Infection**  
Terry Carman; Steven Burdette; Jared Klein

**Presenting Author:** Terry Carman  
**Faculty Mentor:** Steven Burdette, MD  
**Poster Number:** 9  
**Key Words:** Immune Cell Function, renal transplant patients, Infections

The Immune Cell Function (ICF, reported in ng/mL) assay measures the increase in intracellular ATP production that occurs in T-lymphocytes within 24 hours of stimulation by antigens or mitogens. Low ICF values (≤ 225) suggest an increased risk of infection. We evaluated 53 renal transplant recipients at Miami Valley Hospital in Dayton, Ohio who had at least two ICF values in addition to routine serum CMV, BK or EBV PCR screening to determine if a value less than 225 placed the recipient at an increased risk of current or subsequent infection (viral infection or wound infection). Urinary tract infections were not included as an infectious complication due to difficulty differentiating colonization from true infection retrospectively. The post-transplant prophylaxis protocol included valganciclovir 900 mg daily (dose adjusted according to CrCl) and TMP-SMX DS 3 times a week, both for 6 months. Routine immunosuppression included tacrolimus (goal trough of 6-8 mg/L). Patients with low ICF values routinely had adjustments made in the similar pain reduction scores as those achieved at two weeks follow up. Two patients had 100% reduction in pain scores, one patient had 0% and the mean reduction was 48%. The mechanism of action of Capsaicin is believed to be the depletion of neurotransmitters involved in sending pain signals. Once depleted, overall pain perception diminishes. It is believed that this is a short-term treatment, and patients are currently scheduled to return at the 6-month interval. These results represent an initial snapshot of our first eight patients; continued patient recruitment and follow-up is planned. Initially, it does appear that this treatment algorithm with Qutenza provides promise in achieving some pain relief in patients with PHN refractory to other pain treatment modalities.
immunosuppression at the time of results. 32 composition were performed. Results: Contact patients had at least a single ICF value ≤ 225 while 21 had an ICF value consistently greater than 225. 13/32 (40.6% with 95% CI of 25.5% to 57.9%) of patients with a single ICF ≤ 225 had a current or subsequent infection while only 3/21 (14.3% with 95% CI of 5.2% to 34.9%) of patients became infected when their ICF values were consistently greater than 225. 6 out 13 patients with infection and a low ICF developed infection after their ICF was low, while 7 of 13 were infected at the time of the ICF results. Mean ICF values, thymoglobulin induction rates and specifics on the various infectious complications are listed in table 1. This data suggests that the chances for post-transplant viral or bacterial wound infection are the lowest when the ICF value is always >225 and patients may warrant a combination of more aggressive infection surveillance, prolonged prophylaxis or further adjustment in immunosuppression when the ICF value is ≤ 225.

**Holmium:YAG Optical Fiber Burnback Varies with Stone Composition**

Jennifer Castelbuono; Joel M. H. Teichman; Bodo E. Knudsen

*Presenting Author: Jennifer Castelbuono*

*Post Number: 10*

*Key Words: Fiber burnback, laser lithotripsy, optical fiber, renal stones*

**Introduction:** Optical fiber tip degradation (fiber burnback) occurs at variable rates during laser lithotripsy of renal stones. Prior research showed more fiber damage with calcium oxalate monohydrate (COM), calcium phosphate (CP), and struvite stones compared to uric acid stones. We hypothesize that the rate of fiber burnback varies with stone composition. **Methods:** An ex-vivo testing apparatus was used to bring a 240 µm core sized optical fiber into contact with stones of known composition (UA, CP, COM, and artificial Bego). Lead tape was used to ensure consistent pressure was applied to the stone. The holmium:YAG laser was activated until 100 J were delivered. Settings of 400 mJ and 1500 mJ at 5Hz were tested for all stone compositions. The amount of fiber burnback was measured. Fiber energy transmission was measured before and after each trial. Multiple trials with each stone composition were performed. **Results:** Contact with COM and CP stones resulted in greater burnback than with UA stones at both 400 mJ and 1500 mJ (p < 0.05). Contact with Bego stones resulted in similar burnback to COM and CAP stones, but greater than UA stones (p < 0.05). For COM, CP, and Bego stone compositions, burnback increased at the higher pulse energy setting (p < 0.05). Pulse energy did not alter the rate of burnback with UA stones. Fiber energy transmission did not change. **Conclusion:** Optical fiber burnback varies with stone composition and pulse energy setting with the exception of UA stones. Fiber burnback did not alter energy transmission. These findings are consistent with prior studies. A strategy of low pulse energy and high pulse repetition should minimize burnback while maintaining fragmentation efficiency.

**A Case Series Using the Observational Mechanical Gateway to Compare Spinal Cord Stimulation Sensations**

Sara Chinnappan; Telisha Ortiz; Cole Budinsky; Simon Choi; Dr. Amol Soin, MD, MBA

*Presenting Author: Sara Chinnappan*

*Faculty Mentor: Amol Soin, MD, MBA*

*Post Number: 17*

*Key Words: spinal cord stimulation, SCS, chronic pain, electrical stimulation*

Observational Mechanical Gateway (OMG) is a device that allows Boston Scientific to attach independent controls to leads implanted by other spinal cord stimulator manufacturers to allow a patient to “try” the stimulation from Boston Scientific. The OMG is essentially a reproduction of Boston Scientific’s IPG utilizing their Multiple Independent Control. Critics mention that this is a controversial technique that has oftentimes been labeled as a gimmicky sales tactic. Proponents mention that it is an avenue for the patient to “experience” different stimulation technology. The author decided to test the OMG process to better understand the procedure, and to see what differences in stimulation were noted.

Ten consecutive patients, who required spinal cord stimulation phase I trials were given the chance to participate in the OMG process. Of the ten patients, two patients had a diagnosis of reflex sympathetic dystrophy (Medtronic) and eight had
a diagnosis of failed back/post laminectomy syndrome (St. Jude). On day 7 of the trial, prior to the lead pull, the patients had an OMG session for 30 minutes. All ten patients reported feeling a “smoother” and “more comfortable” stimulation as well as a broader coverage of pain as far as surface area with the OMG than with their initial trialed device. When asked if this was significant enough to switch to Boston Scientific, four of the patients desired to switch. None of the ten patients reported an improved VAS pain score with the OMG. When asked why they did not want to switch devices, all six patients mentioned that they received similar pain relief with both devices and that they were already comfortable with the system they used for the trial week. Two patients mentioned their positive relationship with the representative from their trialed device as a big factor to not switch.

All ten patients were successful trials, and each went to permanent implantation with the desired device. Further study with larger sample sizes is warranted to draw any type of clinically significant conclusions.

**Student Attitudes’ Toward and Experiences in Teams during Their First Year of Medical School**

Adam S. Deardorff, MS; Sandy Cook, PhD; Annie Daniel, PhD; Nicole J. Borges, PhD; Dean Parmelee, MD; Kevin Krane, MD

*Presenting Author: Adam S. Deardorff*  
*Faculty Mentor: Nicole J. Borges, PhD*  
*Poster Number: 46*  
*Key Words: team based learning, team training, medical education, student attitudes*

**Background:** Compelling arguments have been made for integrating team training into formal undergraduate medical education. However, establishing the relevant outcome measures and appropriate methods to evaluate the efficacy of such programs remains a challenge. One solution is to rely on longitudinal student self report data. Team-Based Learning (TBL) is a strategy currently employed to promote both active learning and the development of teamwork skills in medical schools across the globe. This study explores student attitudes toward TBL and student experiences in teams during TBL instruction and how they change over the course of the first year of medical school. **Methods:** With Institutional Review Board approval, 2009-2010 and 2010-2011 first year classes at three medical schools using TBL as an instructional modality completed an Attitudes Survey (n = 388) and Team Performance Scale (n = 275) within the first few months of beginning medical school (when their TBL teams were formed) and at the end of their first year. Overall response rate was 70%. **Results:** Scores from each measure for the three medical schools were averaged resulting in composite scores for each administration of the survey. A Wilcoxon Rank Sum test (p < .002) Bonferroni correction) was conducted to determine if student attitudes toward TBL and their experiences in teams changed significantly from the beginning of their first year of medical school compared to the end of the year. One item on the Team Performance Scale (“All team members consistently paid attention during group discussions”) reached significance (p < .001). No other significant differences on either scale were found. **Conclusion:** Overall findings indicate no changes in first year medical student attitudes toward TBL or experiences in teams. A limitation is the quality and amount of TBL in the first year at the three medical schools varied.

**Neurostimulation as a Modality to Treat Chronic Pain**

Laura DeVita; Uloma Oziri; Cole Budinsky; Amol Soin, MD

*Presenting Author: Laura DeVita*  
*Faculty Mentor: Amol Soin, MD, MBA*  
*Poster Number: 26*  
*Key Words: neuromodulation, chronic pain, amputation, residual limb pain*

**Objective:** This is a preliminary report on two cases of our 5-subject, first-in-man study on a modality of neuromodulation to treat chronic pain. **Methods:** Two male patients with lower extremity amputations presented with severe and debilitating stump pain. Screening test showed significant pain relief on administering local anesthetic for blocking of the neuroma identified as the primary pain generator. During a 30-minute surgery, a 10-mm-diameter cuff electrode was wrapped around the sciatic nerve in one patient while the cuff
electrode was wrapped around the peroneal and tibial nerve of the other patient via an incision on the posterior aspect of the stump. The lead exited at the side of the thigh to connect to an external waveform generator. **Results:** Testing started one week after the surgery. Overall, the threshold and maximum tolerable amplitude were inversely correlated with frequencies in the range of 5 to 30 kHz. At frequencies of 10 kHz, patients reported that their pain scores dropped to zero consistently and reproducibly. Both patients were given an external pulse generator, and figure 1 displays the patients’ pain intensity reduction to a level of zero from an average of 7. Figure 2 is an image showing the implanted leads in the popliteal fossa, and figure 3 illustrates fluoroscopy views of the leads. After the current was turned off, the chronic pain gradually increased and eventually reached its pre-treatment level within 20 minutes. The subjects both reported this as their initial pain-free experience since their amputations. The implanted electrode was removed in 30 days per protocol. Upon inspection during the surgery, the nerve showed no sign of damage by either mechanical manipulation or electrical current, indicating safe interventional protocol. **Discussion:** High frequency alternating current shows potential for the treatment of residual limb pain. This study represents the first time this application has been utilized in this manner in humans. It is believed that the high frequency, alternating current creates a nerve block similar to that of Lidocaine, is gradable, and is also reversible. Patients were given an external pulse generator to self-titrate the nerve block and both patients report complete reduction of pain to a level of zero upon using the device. **Conclusions:** The initial findings demonstrate potential clinical utility of electrical nerve block for amputation pain. Further studies are warranted.

**Purpose:** The flexor to extensor transfer of the flexor digitorum longus (FDL) tendon is a common operative procedure for the treatment of a flexible hammer toe deformity and chronic metatarsophalangeal (MTP) dislocation. A rare complication of this procedure is iatrogenic fracture through the drill hole site for the tendon transfer. Little is known about the average measurements of the FDL tendon and the proximal phalanx, and the dimensions of each for the safe passage of the tendon through the bone. No study has examined the volume of bone remaining after drilling to maintain enough structural integrity to prevent iatrogenic fracture in the course of the usual post operative period. **Methods:** The proximal phalanx and FDL tendon of the 2nd, 3rd, and 4th toes of 14 preserved cadavers were dissected and the digit was amputated at the MTP joint. The dimensions of the FDL tendon and proximal phalanx were measured using a tendon sizer and radiographs at the level where a tendon transfer procedure would take place. The proximal phalanx diameter was measured at the metaphyseal-diaaphyseal junction. The measurements were then used to calculate the area and volume of the bone and the dimensions of a drill hole necessary to pass the tendon through. **Results:** The average bone and tendon measurements showed a gradual decrease in size from the 2nd to the 4th digits, with the bone measurements showing a slightly greater percentage of decrease. The average bone diameter decreased from 7.49 mm in the 2nd digit to 6.26 mm in the 4th digit and the average tendon diameter decreased from 3.75 mm to 3.39 mm from the 2nd to the 4th digits. The amount of bone remaining on either side of a hole drilled for the tendon transfer decreased from 1.78 mm to 1.43 mm from the 2nd to the 4th digits. The average volume of the bone and volume of a drill hole needed for the tendon transfer both showed a similar rate of decrease from the 2nd to the 4th toe so that the percentage of remaining bone after drilling was nearly identical regardless of the toe. **Conclusions:** In pre-operative planning for a flexor tendon transfer a radiograph of the digit in question should allow the surgeon to analyze the dimensions of the digit and decide if the proximal phalanx is capable of withstanding a drill hole made large enough to pass the average flexor tendon through while still maintaining enough

**Characterization of the Flexor Digitorum Tendon to the Proximal Phalanx in the Correction of Hammer Toe Deformity**
Matthew S. Ross, MD; Ronald J. Markert, PhD; Zachary DiPalo; Lorrie Kiger; Richard T. Laughlin, MD

**Presenting Author:** Zachary DiPalo, Lorrie Kiger
**Faculty Mentor:** Richard T. Laughlin, MD
**Poster Number:** 8
osseous structural integrity to prevent fracture through the drill hole site. An iatrogenic fracture may occur in proximal phalanges with a diameter less than 5.5 mm since there may be inadequate structural strength remaining to withstand post-operative stresses upon the digit after a hole has been drilled through it.

**Molecular analysis of YPEL3 gene mutations and splice variants in human tumors.**

Patrick Feasel; Kelly R. Miller PhD; David Hitch, MD; Remah Ali; Rebecca Tuttle MD; Steven J. Berberich, PhD

*Presenting Author: Patrick Feasel*

*Faculty Mentor: Steven J. Berberich, PhD*

*Poster Number: 2*

*Key Words: Cellular senescence, p53, tumor suppressor, colon cancer*

The recently discovered human Yippie-like 3 (YPEL3) gene represents a novel inducer of cellular senescence. Previous studies from our laboratory have shown YPEL3 to be directly activated by the p53 tumor suppressor protein such that induction of YPEL3 in both human tumor and normal cells triggers a permanent growth arrest. Analysis of human tumor samples led us to discover YPEL3 down-regulation at the mRNA level in ovarian and colorectal cancers. In an examination of 22 colon tumor and matched normal colonic epithelial specimens while YPEL3 showed a significant down-regulation in a majority of tumor specimens, two tumor specimens showed elevated YPEL3 mRNA compared to their matched controls. As down-regulation of YPEL3 gene expression appears to be a primary mechanism by which human colon tumors avoid induction of cellular senescence, we propose that human colon tumors expressing normal or elevated levels of YPEL3 may bypass the growth-suppressing effects through YPEL3 mutations or alternatively spliced mRNAs. Our goal is to explore this hypothesis by characterizing the YPEL3 mRNAs expressed in human tumors. Preliminary data generated in our laboratory led to the discovery of a mutant form of YPEL3 (DE2) that, through alternative splicing is predicted to encode a truncated YPEL3 protein. Unlike wild-type YPEL3, expression of YPEL3DE2 failed to elicit cellular senescence in human tumor cell lines. Two primary YPEL3 transcripts, V1 and V2, have also been reported to exist in varying proportions in tumor versus normal cells lines. Given that the V1 transcript is capable of encoding two YPEL3 proteins we are interested in determining the relative abundance of both transcripts in human tumors. Preliminary data suggests that in breast cancer cell lines V2 transcripts encoding the senescence inducing YPEL3 protein predominate and are downregulated epigenetically through an estrogen-dependent recruitment of a histone deacetylase repressor complex. Understanding the genetic mechanisms by which tumors bypass the growth suppressing effects of YPEL3 may move us one step closer toward developing targeted therapies and alternative treatments.

**Expanded Review: Intrathecal Bupivacaine and Ziconotide via a Patient Therapy Manager as a Non-Opioid Based, Chronic Pain Treatment**

Christo Frangopoulos; Cole Budinsky; Amol Soin MD, MBA

*Presenting Author: Christo Frangopoulos*

*Faculty Mentor: Amol Soin, MD, MBA*

*Poster Number: 19*

*Key Words: intrathecal pump, bupivacaine, Prialt®, patient therapy manager, chronic pain management*

**Introduction:** Intrathecal (IT) modalities have been used to treat various chronic pain states for decades. Opioids are most often used in IT therapy but have many associated complications, i.e. drug dependency, granuloma formation, tachyphylaxis, and dose escalation. Because of these unfavorable outcomes, we investigated a non-opioid based therapy in an effort to minimize complications. Our treatment involved continuous infusion of bupivacaine mixed with ziconotide (Prialt®) through an implanted intrathecal pump, while the patient used a Patient Therapy Manager (PTM) to bolus more medication on an as needed basis for breakthrough pain. **Methods:** Two patients were selected for this case series. Patient #1 was a male in his mid-40s who suffered from severe chronic lumbar radiculopathy. Following three major spinal surgeries, the patient had both a spinal cord stimulator and an intrathecal pump (ITP) implanted. He required rapid dose escalation of
the ITP-infused opioids due to increasing tolerance, ultimately making him opioid dependent. Thereafter, the patient completed a chronic pain rehabilitation program culminating with an ITP sustained by saline. We acquired the patient at this time, and trialed him on IT therapy using bupivacaine and Prialt®. Patient #2 was a male in his late 30s who developed complex regional pain syndrome type II of his lower extremities after a weight lifting accident. We acquired the patient after spinal cord stimulation and chronic narcotic management each had failed, and trialed him on our IT therapy regimen.

**Results:** Patient #1: Bupivacaine was the primary medication in the ITP, while Prialt® was run as the secondary medication. Continuous infusions of bupivacaine and Prialt® were dosed at 6.5mg/day and 2.4mcg/day, respectively. The patient was also given a PTM device which delivered 0.650mg/bolus of bupivacaine and 0.24mcg/bolus of Prialt®, for breakthrough pain. The patient noted 40% reduction in overall pain measured subjectively by the VAS (Visual Analog Scale) and a 50% improvement in functional status. Side effects included excessive numbness in the peri-abdominal area, mild urinary retention, and nausea when the PTM was used >7x per day. The same medication protocol was followed for Patient #2, but with increased Prialt® dosages: continuous infusion was dosed at 8.4mcg/day and the bolus dosage was 0.84mcg/bolus. The patient noted a 35% VAS overall pain reduction and a 23% improvement in functional status. Side effects were identical to patient #1, but this patient also experienced occasional auditory hallucinations when the PTM was used >10x per day. Note that both patients required PTM usage on average 5-7x per day. **Conclusions:** This case series reflects that ITP infusion of bupivacaine and Prialt® represent a non-opioid based treatment for chronic pain. Additionally, offering a PTM device allows patients to bolus these medications and to titrate medication delivery to treat breakthrough pain as needed. Further studies are warranted, however, our data reflects that this modality is a feasible option for treating chronic pain states.

**Subcellular Localization of the Taurine Transporter in the Rat Brain**

Amanda N Freeman; James E Olson, PhD

**Presenting Author:** Amanda N Freeman
**Faculty Mentor:** James Olsen, PhD
**Poster Number:** 1
**Key Words:** Taurine, Membrane transporter, Cell swelling, Brain injury

**Background:** In cytotoxic brain edema, net efflux of taurine from neurons and accumulation by astrocytes contributes to neuronal volume regulation and astrocytic swelling. Taurine is accumulated in both cell types by a 72-75 kDa transporter, TauT. TauT functional activity decreases in osmotically swollen neurons but is unaltered in swollen astrocytes, in vitro. This swelling-induced down-regulation of neuronal TauT activity is blocked with tyrosine kinase (TK) inhibitors. In contrast, PKC activation has no effect on neuronal TauT, but inhibits astrocytic TauT. Thus, we hypothesize that neuronal TauT activity is regulated by a TK signaling pathway whereas astrogial TauT activity is regulated by serine/threonine kinases. This differential regulation contributes to neuronal volume regulation and astrocytic swelling via taurine redistribution during cytotoxic brain edema.

**Objectives:** Here, we describe the influence of cell volume and kinase signaling on plasma membrane expression of TauT in neurons and astrocytes.

**Methods:** Primary neuronal and astrocytic cultures from rat hippocampus were incubated under isoosmotic or hypoosmotic conditions in the presence or absence of activators or inhibitors of TK or PKC. Subcellular TauT expression was measured after 30 min using cell fractionation, cell surface biotinylation and western blot analyses.

**Results:** Neuronal TauT appeared as a 98 kDa peptide. Glycosidase treatment reduced this apparent molecular weight toward 72 kDa. In isoosmotic conditions, neuronal and glial TauT was primarily in cytosolic and membrane/particulate fractions. Hypoosmotic cell swelling reduced membrane TauT expression in neurons and this was blocked by treatment with 100 µM genistein. Similarly, cell surface biotinylation of neurons showed that plasma membrane TauT decreased with cell swelling (N=4). Membrane TauT expression in astrocytes was unaffected by cell swelling but decreased upon treatment with 1 µM PMA (N=3).

**Conclusions:** Neuronal TauT is substantially glycosylated in isoosmotic conditions and is
translocated from the cell membrane during hypoosmotic cell swelling via a tyrosine kinase signaling pathway. Astroglial TauT remains in the cell membrane during hypoosmotic cell swelling but is redistributed upon PKC activation under isoosmotic conditions. The responses of neuronal and astroglial TauT distribution can account for the observed reduction in functional TauT activity in swollen neurons and may contribute to neuronal volume regulation during cytotoxic edema.

Human Cadaveric Study to Plan In Vivo Application of a Spiral Cuff Electrode
Richa Garg; Lakshman Swamy; Cole Budinsky; Amol Soin, MD, MBA

Presenting Author: Richa Garg
Faculty Mentor: Amol Soin, MD, MBA
Poster Number: 32
Key Words: peripheral nerve, spiral cuff, cadaver, neuromodulate, peripheral nerve block, HFAC block, sciatic nerve, peroneal nerve, tibial nerve

Placement of a spiral cuff electrode around a peripheral nerve to obtain neuromodulation of the nerve presents many challenges clinically. Specifically, the anatomic structures around the peripheral nerve and the approximate average size of the nerve need to be better understood prior to placing the cuff in a human. To help plan and design a peripheral nerve stimulating cuff to being clinical trial work, human cadaveric dissections were carried out on two cadavers, one male and one female.

Dissections were carried out on each human cadaver, in which the upper and lower extremities were dissected down to the major peripheral nerves- the ulnar, median, femoral, sciatic, posterior tibial, and common peroneal nerves. Meanwhile, major anatomic structures, such as blood vessels and muscle groups, were left intact. These dissections not only demonstrate the feasibility of placing an electrode on or near any of the three major nerve groups: sciatic, peroneal, or tibial, but also gave insight into size variations between the particular nerves and potential variations between genders. Until precise measurements of the nerves and clear anatomical understanding of surrounding tissue are obtained, a mock-up of a peripheral nerve stimulating lead has been used in these cadavers to demonstrate placement. Figure 1 demonstrates a dissection of the popliteal fossa, in which a peripheral nerve stimulating lead is placed on the common peroneal nerve just distal to the sciatic nerve as it splits into the peroneal and tibial branches. Figure 2 shows a lead on the ulnar nerve in the upper extremity, proximal to the elbow. Figure 3 depicts an electrode on the sciatic nerve. Figure 4 is an anterior view of the lower extremity in which the electrode is placed on the femoral nerve, while the nearby femoral artery is left intact.

The use of a high frequency alternating current block is distinct from other mechanisms used to produce current through a nerve, as its activation of voltage-gated ion channels in the nerve membrane results in a nerve block. In this way, HFAC blocks nerve conduction through depolarization of the nerve membrane, despite a complete lack of charge being delivered to the surrounding tissue. This safely creates a complete depolarizing nerve block, without influencing motor capacity of the surrounding tissues, thereby opening the door for many options related to peripheral neuromodulation, as well as nerve blockade. As it has been shown in a previous study, in order for this nerve block to be produced, the implanting physician must place the electrical lead directly on the nerve, making it critical to create surgical cuffs of appropriate size, given the peripheral nerve being blocked. This method of nerve block represents a potential pathway from which to achieve analgesia, treat chronic pain conditions, post surgical neuromas, or even post-amputation residual limb pain.

Fluoroscopically Guided MILD to treat Spinal Stenosis- A Case Series of 25 Patients
Amol Soin, MD, Flor Guerengomba, Jessica Kirkland

Presenting Author: Flor Guerengomba
Faculty Mentor: Amol Soin, MD, MBA
Poster Number: 22

Introduction: Lumbar spinal stenosis affects more than 1.5 million Americans and cause debilitating low back pain. These patients are often unable to maintain acceptable activities of daily living and seek help to manage their pain. Physical therapy, traction, chiropractic care, medical management, epidural steroid injections, and
invasive surgery are used to treat symptoms of lumbar spinal stenosis. A large population with spinal stenosis fails conservative care but are not candidates for invasive spinal surgical intervention. Minimally invasive lumbar decompression (MILD) is a technique done under fluoroscopy to perform a laminotomy and debulkment of the ligamentum flavum, thereby achieving lumbar decompression and reduction of stenosis symptoms. **Methods:** The inclusion criteria included patients who have symptomatic lumbar spinal stenosis primarily caused by dorsal element (ligamentum flavum) hypertrophy, failure of conservative therapy, central canal cross sectional area < 100 mm², radiological confirmation of ligamentum flavum of at least 2.5 mm by MRI, anterior lysis of < 5mm, and able to ambulate at least 10 feet unaided before being limited by pain. 25 patients were identified for the case series. The patients underwent the minimally invasive lumbar decompression (MILD) technique by the primary author. Follow up occurred at 2 weeks and than 6 weeks. The patients were asked to complete a survey preoperatively and postoperatively. Patients were asked to rate their VAS Pain score 0 – 10 at the current moment, rank the VAS score when at its best and worst over the past week in the preoperative and postoperative periods. Postoperatively, patients were also asked to rate their perceived percentage of improvement in physical function at the 2 week and 6 week periods. A simple numerical average was obtained. **Results:** Preoperative VAS pain score 8.6, postoperative VAS score was reduced to 3.2 and 2.7 at 2 weeks and 6 weeks respectively, and perceived percentage of functional improvement was 86% and 79% in the 2 week and 6 week periods. (Reference result graphs on poster) The MILD technique also demonstrates decompression of lumbar spinal stenosis by reviewing intraoperative epidurography done in the pre-MILD and post-MILD period. Figure 1 demonstrates the patient after an initial epiduroscopy prior to the laminotomy and debulking operation of the ligamentum flavum. Figure 2 depicts the post-MILD patient and shows a significant increase in flow within the epidural space and even increased spread of contrast in the cephalic and caudal locations. **Discussion:** The minimally invasive lumbar decompression technique represents a new tool for the interventional pain management trained physician to treat patients who suffer from lumbar spinal stenosis. This outpatient technique shows promise in reduction of the patients overall VAS pain score and perceived percentage improvement in functional status. This study was limited by the small number of patients studied and the fact that the improvements were based on subjective patient surveys and not objective measurement of physical functions

**Usage of a Percutaneous Slim 8 Electrode neurostimulation paddle to achieve pain reduction in a patient with failed back surgery syndrome.**

Flor Guerengomba; Jessica Kirkland; Cole Budinsky; Amol Soin; MD,MBA; Clara Antoury

**Presenting Author:** Flor Guerengomba  
**Faculty Mentor:** Amol Soin, MD, MBA  
**Poster Number:** 23  
**Key Words:** Failed back surgery syndrome, slim 8 percutaneous paddles, spinal cord stimulation

**Introduction:** Spinal cord stimulation (SCS) is the modality of choice to help patients who suffer from failed back surgery syndrome (FBSS). FBSS is a chronic pain syndrome that occurs following one or more surgical interventions for chronic low back pain. A myriad of management options for FBBS exist including SCS. SCS attempts to modulate neurotransmission in the dorsal horn by transmitting electrical pulses through electrodes placed in the epidural space. Two types of leads exist for delivery of this current to the electrodes, percutaneous leads implanted by anesthesiology trained interventional pain physicians and paddle leads implanted by surgeons. Both implantation techniques have disadvantages. Paddle leads involve invasive surgery with laminotomy for placement while percutaneous leads are less secure tending to migrate out of position compromising favorable coverage. We describe the placement of a hybrid paddle lead via the percutaneous approach achieving pain reduction with minimal invasiveness and maximal security of the leads. **Case:** Patient is a 43-year-old white male who suffered from failed back syndrome. Using an epiducer (manufactured by St Jude medical), we achieved access into the epidural space at L2-L3 using the interlaminar approach. Access to the
epidural space was completed with a 14g Touhy needle and then a guide wire was placed. The Touhy was removed and the epiducer was inserted on top of the guide wire. The slim 8-paddle lead was inserted into the epidural space using fluoroscopy guidance to rest at the top of T8. Test stimulation was carried out and found to cover the patient’s pain areas with 1.3 milliamps and pulse of 50hz. Conclusion: In cases of failed back surgery syndrome, the usage of a slim 8 percutaneous paddle is a good way to achieve the advantages of a paddle lead while still being minimally invasive similar to a percutaneous lead.

**Tamoxifen for the Treatment of Severe Keloids: A Case Report and Review of the Literature**

Hoka Nyanda MD; Thomas Hagele BS; George Cohen, MD

*Presenting Author: Thomas Hagele  
Poster Number: 37  
Key Words: keloids, tamoxifen*

Keloids and hypertrophic scars, the products of abnormal tissue proliferation during wound healing, can be both physically and psychologically detrimental to affected patients. Lesions can be pruritic, painful, and lead to restricted mobility. Keloids can develop in people of all races, however black patients appear to have 3 to 18 times greater susceptibility compared to white patients. Women and men appear to be equally susceptible to keloid formation with a median lead time to development of 30.4 months following the initiating insult.

Many different therapies are available to treat keloids and hypertrophic scars. The most common modalities include intrallesional steroids, pressure, cryotherapy, laser therapy, radiation therapy, 5-flourouracil, onion extract, vitamin E, and interferon-alpha. Other novel agents such as imiquimod, bleomycin, verapamil hydrochloride, chochicine, botulinum toxin, tamoxifen citrate, and mitomycin C are currently being investigated for the treatment of keloids and hypertrophic scars.

One of the most promising agents for the treatment of recalcitrant keloids is tamoxifen. Several initial investigations exploring the effectiveness of tamoxifen have been promising. Although never tried in a patient with such extensive pathology, we are hopeful that tamoxifen will be effective.

**Neurophysiological and behavioral effects of procaine microinjections into the cockroach central complex**

AJ Pollack; AL Horomanski; ND Kathman; RE Ritzmann

*Presenting Author: Audra L Horomanski  
Poster Number: 3  
Key Words: Central complex, procaine, locomotion, decision making, multisensory*

The central complex (CC) is a set interconnected midline neuropils in insect brain that has been implicated in input/output control of locomotor behavior. Our lab has investigated this area with combinations of lesion, neural recording and stimulation studies. Neural units recorded in the CC of walking cockroaches demonstrate predictive firing for walking speed which is in turn altered through stimulation (Bender, et.al., [2010] Curr. Biol. 20:921). Electrolytic lesions within CC produce site specific behavioral deficits (Harley and Ritzmann [2010] JEB 213:2851), but these are permanent, tissue damaging techniques that could affect surrounding tissue. A method of reversibly inactivating cells in specific CC sites would greatly promote the further characterization of these critical structures. Procaine, a fast sodium channel blocker that has been used by others in insect brain studies, is a potential candidate.

We used a picospritzer to inject nano-liter amounts of a procaine into midline regions of the cockroach brain. 20% procaine was dissolved in isotonic insect saline with 0.1% Fast Green dye to assist in visualizing the injection site and distribution. Animals were immediately tested in a behavioral walking setup, and re-tested at intervals of thirty and sixty minutes post-injection. In initial trials, 100% of procaine-injected animals (n=7) demonstrated severe disruption of walking and turning in a T-maze at the immediate post-test. Individuals failed to turn on wall contact and showed unstable walking gaits. Recovery was apparent in 86% at 30 minutes and 100% at 60 minutes. Saline-injected controls did not demonstrate any locomotor difficulties in the T-maze.
We are currently working to better identify the injection site and effective migration of the drug. Dextran-conjugated fluorescein with a large molecular weight and low dispersion area has helped to precisely identify the injection site in discrete areas of the CC. Because any dye may migrate differently than procaine, we will assess the effective migration of the drug electrophysiologically, once we can routinely identify the injection site. A multi-channel probe will be inserted into the brain of a restrained cockroach. After recording baseline activity, procaine will be injected from various sites and the time taken to alter neural activity will be noted. Distance and time to reduced activity will be used to calculate rate of effective migration. With the injection site and effective migration established, we will be able to assess the effects of reversible neural block to specific brain regions in the T-maze as well as on various tether preparations that we use in our laboratory.

**Effectiveness of regenerated heterogenic stretch feedback**
Gabrielle M. Horstman, Paul Nardelli, Timothy C. Cope, PhD

*Presenting Author:* Gabrielle M Horstman  
*Faculty Mentor:* Timothy C. Cope, PhD  
*Poster Number:* 4  
*Key Words:* peripheral nerve injury, stretch reflex

It is firmly established that autogenic stretch reflexes do not recover with regeneration of a transected muscle nerve, even though 40% of regenerated IA afferents respond to stretch (Collins et al 1986) and the regenerated motoneurons (MNs) are capable of firing in response to excitatory input (Cope et al 1994). Recent evidence suggests that areflexia results in part because peripherally-regenerated IA afferents retract the collateral axon branches that normally project into LIX motor pools (Alvarez et al 2010). Regional retraction of axon collaterals would seem to deprive afferent input to all MNs regardless of whether or not they were injured, whereas synaptic stripping is restricted to only those MNs that sustain injury. We reasoned that if collateral axon retraction is a regional phenomenon and not selective for damaged MNs, then regenerated afferents should fail to generate heterogenic stretch reflexes in multiple heteronymous motor pools, even in ones that are injury-spared. To test this prediction, we examined muscle stretch reflexes in three acutely decerebrated cats in which the nerves supplying the medial and lateral gastrocnemius (G) muscles were sectioned and surgically rejoined one year earlier without damaging the soleus (SOL) nerve. Both EMG and force were recorded from G and SOL muscles which were activated reflexively when stretched by ramp-release or simultaneously or together, either at rest or during crossed extension reflexes. Comparisons were made between heterogenic stretch reflexes on the left (treated) and right (untreated) sides at matched background forces (index of motor pool excitability). Whereas the injury-spared SOL muscles generated robust autogenic stretch reflexes, they responded to stretch of the reinnervated G muscles with little or no heterogenic reflex. This is in sharp contrast to their normally strong response to G stretch observed on the control side. Therefore, the ineffectiveness of reinnervated muscle in initiating stretch reflexes extends to injury-spared motor pools, in line with the view that peripherally regenerated primary afferents retract their central axonal collaterals from spinal cord regions occupied by motor pools.

**Bridging Bronchus and The Ring-Sling Complex: A Case Analysis**
Ankush Kalra

*Presenting Author:* Ankush Kalra  
*Poster Number:* 42  
*Key Words:* Bridging Bronchus, Pulmonary Artery Sling, Tracheal Narrowing, Imperforate Anus

The combination of a left pulmonary artery sling and narrowing of the airway due to annular tracheal cartilages, or rings, was dubbed by Cohen and Landing in 1976 as the “ring-sling complex.” It is an anatomical anomaly that has been described throughout history, and even associated with other anomalies such as a bridging left bronchus and an imperforate anus. The present report considers a case of a 4 month old boy who presents with stridor and is being considered for treatment of a left pulmonary artery sling extending posteriorly to the left main bronchus. The patient also has Tetralogy of Fallot with left-
sided aortic arch, VATER association, partial anomalous pulmonary venous return to the superior vena cava, and imperforate anus status post anoplasty. The patient ultimately had all of his anomalies repaired, including a reimplantation of the left pulmonary artery into the main pulmonary artery as a treatment for his present stridor. The purpose of this case analysis is to analyze the symptomatic presentation and treatment of a rare set of anatomical anomalies that have been noted since the 19th century to occur together.

Nutrition Education in Medical School: Expectations and Perceived Proficiency
Avash Kalra; Ankush Kalra; Sara J. Paton, PhD

Presenting Author: Avash Kalra, Ankush Kalra
Faculty Mentor: Sara J. Paton, PhD
Poster Number: 43
Key Words: Bridging Bronchus, Pulmonary Artery Sling, Tracheal Narrowing, Imperforate Anus

Background: Increasingly, physicians are asked to provide nutrition education to patients and their families, especially as adult obesity rates have doubled or nearly doubled in 17 U.S. states during the last 15 years. The National Academy of Science recommends that U.S. medical schools provide students with a minimum of 25 hours of formal nutrition education. However, as of 2010, only 27% of medical schools met the 25 hour minimum guideline, with medical students receiving an average of only 19.6 hours of dedicated nutrition education during their medical school careers. Methods: Original surveys examined the expectations of first year medical students regarding the nutrition education they expect to receive during medical school, in addition to the self-perceived proficiency of fourth year medical students to competently counsel patients on healthy nutrition practices. Results: 90% of first year medical students expected to receive less than 20 hours of formal nutrition education. Nevertheless, while two-thirds of those students rated their current nutrition counseling proficiency as Poor or Fair, the same percentage expected to improved to Very Good or Excellent. In addition, several strengths and weaknesses exist among fourth year medical students regarding topics within nutrition. Discussion: The optimism of first year medical students regarding their anticipated ability to counsel patients on nutrition contrasts starkly with the reality that the vast majority of current fourth year students do not feel confident doing so. Knowledge gaps do appear to exist among current fourth year students, and these gaps may shape future curriculum decisions. For instance, fourth year students are generally confident in nutrition counseling with patients with diabetes and hyperlipidemia, but not those with liver failure, cancer, or HIV/AIDS.

Utilizing Social Media in Medical Education: A YouTube™ Video-based USMLE STEP 2 Board Preparation Course
Amy Kelley; Kevin Kelley

Presenting Author: Amy Kelley, Kevin Kelley
Poster Number: 50
Key Words: YouTube, Social Media, Medical student education

Today many medical students struggle to balance time spent between learning how to manage common disease processes seen frequently at the bedside during hospital clerkships and synthesizing an adequate understanding of less common but nonetheless important pathologies they may not ever encounter during third and fourth year clerkships. To accomplish the later, in the limited time available before taking their USMLE STEP II examination, medical students have increasingly relied on review books containing only abbreviated black and white text outlines of material covered with limited supplemental imagery. Moreover, detailed descriptions found in illustrated medical textbooks and journal review articles are, for the most part avoided because of time constraints that clash with demanding and rigorous clerkship schedules. In an effort to take advantage of the brevity of outline-based review books but not lose vital illustrational disease processes represented in traditional textbooks, we have attempted to combine both into a website-based board review course. Rather than static textbook imagery however, we have embedded a vast array of rich
multimedia in the form of medical video clips streamed from social media giant, YouTube, throughout a supplemental text and audio outline that is divided into the specialty-based subjects covered throughout traditional medical training.

Correlating microscopic images to vaginal fungal cultures in recurrent candida colonization
Michelle Kline, MS; Gary Ventolini, MD
Presenting Author: Michelle Kline
Faculty Mentor: Gary Ventolini, MD
Poster Number: 41
Key Words: Vaginal, Colonization, Fungal

Introduction: Candidas is the second most common cause of infectious vulvovaginitis and is thought to affect more than 75% of women throughout their reproductive years. Nearly 40% of women with vulvovaginal complaints are diagnosed with candidiasis. Recurrent fungal infection is defined as having three or more infections per year and affects an additional set of 5-8% of women who have no apparent risk factors. Factors that predispose women to Candida infections include recent antibiotic use, immunosuppression, diabetes mellitus and oral contraceptive pills. The diagnosis is made primarily by the following clinical symptoms; pelvic examination and wet mount microscopy. Fungal culture to identify the specific fungi responsible for the infection is rarely performed because Candida albicans is responsible for the majority of vaginal infections and fungal culture is a lengthy process. With different treatment guidelines for various candida species, correlating the specific fungi through microscopic morphology could be a valuable and important tool to select the most appropriate treatment. Objective: The objective was to correlate microscopic images containing fungal culture results from patients with recurrent vaginal colonization and assess the initial therapy utilized. Results: The seven most common positive fungal cultures were: Candida albicans 75%, C glabrata 14%, C krusei 5%, C parapsilosis 3%, C tropicalis 2%, C famata 1% and C lusitaneae 1%. The identification of fungi species at the wet mount microscopy did not correlate with the species culture 75% of the time and was positively correlated only 25% of the time (P=1). Since Fluconazole was the most commonly used medication for treatment approximately 25% of the patients received a species resistant drug. Conclusion: In our study, 25% of the patients received a species resistant drug most likely resulting in ineffective therapy. In patients diagnosed with symptomatic recurrent vaginal colonization it is recommended to culture specimens positively identified as fungi at wet mount microscopy.

Effect of cocaine abuse on serum thyrotropin levels in patients admitted to an inpatient mental health unit
Dean Bricker, MD; Jerome Schulte, MD; Thomas Koroscil, MD-PhD; Matthew Koroscil
Presenting Author: Matthew Koroscil
Poster Number: 11
Key Words: cocaine, thyrotropin, inpatient mental health

Objective: To assess the effect of acute cocaine use on thyrotropin concentrations. Methods: In this retrospective cohort study, patients admitted to the mental health unit at an academic inpatient setting were screened with urine drug toxicology tests and thyroid stimulating hormone (TSH) concentrations. Thyrotropin concentrations from patients who tested positive for cocaine on urine toxicology were compared with patients having negative cocaine screening. Results: 192 patients were included; 122 with positive cocaine screen, and 70 with negative cocaine screen. All patients were screened with a highly sensitive TSH assay. A positive cocaine screen was not associated with a statistically significant difference in TSH concentrations. The percentage of patients with hypothyroidism (TSH > 4.50 µIU/mL) or hyperthyroidism (TSH <0 .40 µIU/mL) were similar in both study groups. Conclusion: Acute
cocaine use does not affect thyrotropin concentrations. Routine thyroid function tests should not be routinely ordered on patients admitted to inpatient psychiatry units.

Systematic Review of Preservation Fluid Associated Candida Infections in SOT
Isabel Kwan; Steven Burdette

Presenting Author: Isabel Kwan
Faculty Mentor: Steven Burdette, MD
Poster Number: 12
Key Words: Transplant, Perfusion Fluid, Candida

Donor-derived fungal infections can be associated with serious complications in transplant (tx) recipients. Most cases of donor-derived candidiasis have occurred in kidney transplant recipients. Contamination of the preservation fluid (PF) has been the most frequently documented source. Data is limited regarding this clinical entity. A systematic review of available studies that investigated preservation fluid associated infections was done. 11 studies (between 1978 and 2011, excluding case reports) that reported preservation fluid associated candida infections in kidney, liver, pancreas and kidney/pancreas transplantation were identified. 6 studies reported on renal transplant, 3 on liver, 1 on liver and kidney and 1 kidney, pancreas and KP. In total, 3242 cultures were obtained from PF. There was no consistent protocol for obtaining cultures between these studies and no consistent data on immunosuppressive therapies. 66 of 3242 cultures were positive for Candida (2.0% with 95% CI = 1.6% to 2.6%) and 15 recipients with positive cultures went on to develop a Candida infection (22.7% with 95% CI = 14.3% to 34.2%). Infections included pyelonephritis, wound infections, liver abscesses (liver tx), peritonitis (liver tx), obstructing renal fungus ball and anastomotic infections / pseudoaneurysms. Species of Candida included C.albicans, C. tropicalis, C.guilliermondi and C.glabrata, though most studies did not report species. Prophylaxis was not given to all patients with positive PF cultures. In evaluating the PF positive cultures of recipients who received prophylaxis, there were 853 PF cultures obtained and 19 were positive (19/853 = 2.2% with 95% CI = 1.4% to 3.5%). 13 patients did not develop infection while 6 recipients did develop infection (6/19 = 31.6% with 95% CI = 15.4% to 54.3%), 2 of which were anastomotic infections in pancreas recipients. Prophylactic antifungals most commonly included fluconazole, though voriconazole or caspofungin were often used for resistant species of Candida. The only use of amphotericin B was from a study done in 1982. Duration of prophylaxis ranged from 2 weeks to 3 months. Despite prophylaxis, rates of fungal complications from candida isolated in the PF remain high. In addition to prophylaxis therapy, aggressive imaging and close monitoring is indicated. Guidelines will be published to help provide physicians with guidance on this condition.

Surveillance of Self-antigen Influences Lymphocyte Behavior in the Lymph Node
Rachel Liou; Alex Huang

Presenting Author: Rachel Liou
Poster Number: 7
Key Words: immunology, lymph node, 2-photon microscopy, intravital, T cell, dendritic cell, self-peptide, MHC

T lymphocytes recognize processed peptide antigens in complex with self-associated Major Histocompatibility Complex (MHC) molecules on target cells via the T cell receptor complex (TCR). When peptide antigens are derived from foreign invaders, T cells expressing TCR specific for these foreign peptides are activated. In contrast, peptide antigens derived from normal self-proteins do not typically induce a state of activation in the T cells. The discrimination between “self” and “non-self” targets by T cells is crucial in maintaining the protective capacity of the immune system while preserving self tissues from the potential harmful effect of immune destruction. The dynamics of foreign antigen T cell recognition has been well characterized, involving prolonged, cell-cell associations between T cells and antigen presenting cells (APCs). However, the behavior of T cells with self-antigen presenting cells in vivo is not well understood. We utilize a new, sophisticated imaging technique of intravital 2-photon microscopy to interrogate the 4-dimensional (xyzt) dynamic interaction between T cells and self-antigen associated APCs in order to quantify the duration of self-antigen recognition.
by T cells *in vivo*. By imaging and analyzing dynamic movies of fluorescently labeled APC and T cell populations in un-disturbed lymphoid tissues of mice, we were able to quantify cellular behavior *in vivo* and observe differences in the interaction duration between T cells and APCs that express or lack self-peptide/MHC complexes. In addition, we were able to demonstrate that such differences in self-antigen recognition can be quantified by differences in the duration of the cellular transit of CD4⁺T cells in the lymph node. This study demonstrates the important contribution of self-peptide antigen recognition by T cells during physiological homeostasis *in vivo*.

**A Time Study of Neuraxial Regional Anesthesia Technique from Patient Positioning to Needle Insertion: Implications for Chlorhexidine Skin Antisepsis**

Erika Manis, BA; Perry Nystrom, MD

*Presenting Author: Erika Manis*

*Faculty Mentor: Perry Nystron, MD*

*Poster Number: 13*

*Key Words: neuraxial, anesthesia, chlorhexidine*

**Introduction:** When performing neuraxial regional anesthesia techniques, antiseptic skin preparation is necessary to minimize infectious complications. Although there is not sufficient clinical data to support FDA approval of chlorhexidine use prior to lumbar puncture, chlorhexidine is recommended for skin preparation prior to spinal or epidural anesthesia.³ To date, chlorhexidine skin antisepsis has not been associated with neurologic complications.³ The manufacturer recommends up to three minutes of drying time after chlorhexidine prep. Most anesthesia providers apply skin antisepsis just prior to placing a sterile drape and beginning the procedure. This practice limits the amount of time for antiseptic solution skin contact and drying. **Hypothesis:** Application of skin antiseptic solution immediately after patient positioning and identification of anatomical landmarks provides at least 3 minutes for solution contact and drying prior to needle insertion. **Methods:** The study is an observational, blinded operator, time study of neuraxial technique from patient positioning and anatomical landmark identification to needle insertion. All anesthesia staff and trainees, unaware of the time study, were observed performing spinal and epidural anesthesia in routine practice. A hidden stopwatch recorded time from the moment the provider turned away from the patient after patient positioning and marking anatomical landmarks, i.e. start time. The time of skin antisepsis was noted (Tprep), and timing was stopped when the spinal or epidural needle contacted skin. Total time from start to stop was documented (Ttot) as well as skin prep to needle insertion (Tdiff=Ttot-Tprep). Descriptive statistical analysis was performed on the time results with SPSS 19.0. **Results/Conclusion:** Approximately 5 minutes elapse from the time a patient is positioned to the time a spinal or epidural needle contacts skin. A substantial number of neuraxial procedures are performed in much less time by anesthesia providers highly skilled in neuraxial techniques. In this study, 20/45 (44%) neuraxial procedures had less than 3 minutes of skin antisepsis contact and drying time. To allow the most time for antiseptic solution skin contact and drying during neuraxial procedures, a single application of skin antisepsis should occur immediately after positioning the patient and identifying the relevant procedural anatomy.

**A Cost/Benefit Analysis of Indirect Video Laryngoscopy for Routine Intubations**

Jason Miller; Eric Vangeloff; Cole Budinsky; Amol Soin, MD, MBA

*Presenting Author: Jason Miller*

*Faculty Mentor: Amol Soin, MD, MBA*

*Poster Number: 21*

*Key Words: Direct Laryngoscopy, Indirect Laryngoscopy, Mallampati Classification*

In order to adequately anesthetize a patient and place them on mechanical ventilation, the physician must secure the airway. In the traditional method, an endotracheal tube (ET) is placed under direct laryngoscopy. This technique involves placement of a laryngoscope into the mouth and directly visualizing the vocal cords to place an ET. This can also be done using a video laryngoscope to employ indirect visualization to place the endotracheal tube. Often, a “difficult airway” can arise in which it is impossible to secure using direct laryngoscopy. This has resulted in high morbidity and mortality in patients and may even
lead to patient death. As a result, a number of third party manufacturers have created “new” devices to incorporate indirect video technology to safely achieve airway access. Examples include: Glidescope, King Airway Systems, and Air Traq. Here, we look at the cost/benefit of incorporating the technology in a hospital for routine intubations. The cost of direct laryngoscopy kits, consisting of reusable blades and equipment, is about $800. For indirect video laryngoscopy, Glidescope units cost approximately $12,000 and come with reusable blades, but you would need to purchase one unit for each operating room. King Airway Systems are $1000 for the device, but all of the blades are disposable and cost $75 each. Therefore, using this method with high volumes in a large hospital would lead to costs adding up quickly. The last example is AirTraq, which is $75 per unit and is single use only. The question of cost/benefit must be balanced with patient safety and outcomes. Today, the current costs of reusable direct laryngoscopy equipment is nominal compared to the high costs of indirect laryngoscopy. Due to this, direct laryngoscopy should be the modality of choice in documented simple Mallampati Class I or II airways. For difficult airways, an attempt at direct laryngoscopy may be appropriate, but having a video laryngoscope in those cases of an anticipated difficult airway is best. Thus the cost/benefit analysis favors usage of video laryngoscopy as a backup to the traditional direct approach in the cases of medical emergencies or anticipated difficulties. 

Emergency Medicine Bedside Assessment Course (EMBAC): An Evidence-Based Guide to Physical Examination in the Emergency Department

Jeremy Moore; Brendan Devine; Stacey Poznanski, DO

Presenting Author: Jeremy Moore
Faculty Mentor: Stacey Poznanski, DO
Poster Number: 47
Key Words: Medical education, emergency medicine, physical exam, asynchronous learning, eLearning

Over the past few decades, it has been well documented that the physical exam and general bedside assessment skills of medical students have been declining. The technological demands and time-constraints of modern medicine have taken away the emphasis from bedside teaching and, as a result, physical exam skills have suffered. Most medical schools have an introductory curriculum on clinical assessment in the first and/or second year of school; however, very few medical schools continue any structured instruction in the physical exam beyond that time. This is exemplified in the fact that bedside assessment skills start their decline as soon as the clinical years start.

A clinical assessment is performed on every patient in the Emergency Department; however, the data gained from this is used sporadically, often without much confidence or evidence-based rationale. In the wake of health-care reform and the need for more cost-effective medicine, it stands to reason that more attention be paid to inexpensive methods that will teach students current evidence-based techniques. The end product should improve medical students’ ability to demonstrate efficiency in physical exam techniques, informed interpretations of findings, increased clinical reasoning, and confidence in performing the bedside assessment. The aim of the current study is to define and present an evidence-based review of the bedside assessment skills that have the most diagnostic yield to the Emergency Medicine physician. Subsequently, this information will be used to develop course content and create an eLearning module (the Emergency Medicine Bedside Assessment Course).

The instructional module will contain three sections: Didactics, Techniques, and Bedside. The Didactics section will provide a synopsis of the literature review regarding the importance of the physical examination as well as an overview of how to practice evidence-based medicine. The Techniques section will include a brief description of each technique, a video demonstrating the performance, auditory or visual examples of normal and abnormal findings, when the technique is most useful, and a literature review of its diagnostic utility in various disease states. They will be organized by organ system, chief complaint, and disease process. The Bedside section will consist of three modes of formative assessment: a practice quiz, script concordance testing, and interactive cases.
The use of evidence-based medicine in everyday practice is more important now than ever before. It is our hope to use the information gathered through this systematic review to create a novel approach to teaching the bedside assessment in the Emergency Department. In the future, we hope to use the Emergency Medicine Bedside Assessment Course to improve knowledge, skill, reasoning, and confidence in the bedside assessment performed by fourth year medical students at Wright State University Boonshoft School of Medicine.

**Intrathecal Infusions via a Patient Therapy Manager to Allow Self-Titration in the Chronic Pain Patient**

Ryan Noska; Emily Tibbits; Cole Budinsky; Amol Soin; MD, MBA

*Presenting Author: Ryan Noska*
*Faculty Mentor: Amol Soin, MD, MBA*
*Poster Number: 29*
*Key Words: intrathecal pump, patient therapy manager, PTM, chronic pain management*

**Introduction:** Intrathecal (IT) modalities have been used over the past three decades to treat chronic pain states. Currently, the most often used IT agents are opioids, including morphine, hydromorphone, and fentanyl. These medications are administered via continuous infusion through an implanted IT pump in conjunction with a Patient Therapy Manager (PTM), a new device similar to a patient-controlled analgesia (PCA) device, to bolus more medication on an as needed basis. This new modality allows self-administration of medications, which gives the patient freedom and control of their medication. As a safety mechanism, the PTM is equipped with a “lockout” in order to prevent the patient from an overdose.

**Methods:** A 49 year-old male patient with chronic and severe lumbar radiculopathy pain due to multiple spinal surgeries was selected for IT/PTM therapy, as his spinal cord stimulator was proving ineffective. We inserted an IT pump with morphine running at 2 mg/day via continuous infusion along with the PTM device to set to give him a 100 mcg bolus as needed with a 10 bolus per 24 hour lockout. This allowed the patient to self-titrate the medications through his pump and eliminated the need for oral pain medications.

**Results:** The patient noted 88% reduction in overall pain measured subjectively by the VAS (Visual Analog Scale) and a 55% improvement in functional status. The patient was weaned off all oral opioid pain medications leading to a noted reduction in side effects such as constipation and breakthrough pain, which were secondary to the pain medications. **Conclusions:** The PTM device allows the patient to bolus medication and titrate the medication delivery to treat the patient’s pain needs. Further studies are warranted with additional patients, but based on this case report, this modality is a feasible option to treat chronic pain and needs to be further explored for the treatment of chronic pain.

**Surgical Placement of a Spiral Cuff Neuroelectrode to Achieve Pain Reduction- a case series of 5 patients**

Telisha Ortiz; Sara Chinnappan; Cole Budinsky; Dr. Amol Soin, MD, MBA

*Presenting Author: Telisha Ortiz*
*Faculty Mentor: Amol Soin, MD, MBA*
*Poster Number: 16*
*Key Words: spiral cuff implantation; chronic pain; high frequency alternating current*

Unwanted or uncoordinated generation of nerve impulses is a major disabling factor in many chronic pain conditions. If these impulses could be intercepted or blocked utilizing high frequency alternating current (HFAC) along the peripheral nerves, then the disabling condition could be reduced or eliminated. Delivery of HFAC requires surgical implantation of an insulated nerve cuff electrode (or lead) on the targeted peripheral nerve.

Patients who suffer from pain originating from a neuroma post amputation of the lower extremity were selected as candidates for spiral cuff implantation to administer peripheral nerve stimulation. Prior to lead implantation, patients are screened by undergoing at least two diagnostic peripheral nerve blocks using 0.2% Ropivicaine near the suspected peripheral nerve pain generator; proximal to the neuroma. After two successful nerve blocks, the patient was determined to be a good candidate for spiral cuff electrode implantation. The site of peripheral spiral cuff electrode implantation was in the popliteal fossa at
the junction of the sciatic, peroneal and tibial nerve clusters. After general anesthesia was administered, the patient was placed prone on the operating room table and a 1.5 inch incision was made on the posterior aspect of the popliteal fossa. The spiral cuff was inserted a few centimeters distal to the nerve junction. The lead was then tunneled under the skin to exit proximal to the incision. The incision was closed and the proximal end of the lead was attached to the external pulse generator to administer the high frequency alternating current.

Clinical application of HFAC nerve block is dependent upon successful surgical implantation of a nerve cuff electrode. Further studies are warranted to determine the effectiveness and utility of HFAC in humans. The clinical application and potential for HFAC include the ability to produce a reliable, gradable, and reversible nerve block to treat several chronic pain states such as residual limb pain, neuroma pain, chronic post surgical pain, and chronic neuropathic pain states.

Three-dimensional Color Discography to Enhance the Diagnostic Utility of Traditional Discography
Uloma Oziri; Laura DeVita; Cole Budinsky; Amol Soin, MD

**Presenting Author:** Uloma Oziri
**Faculty Mentor:** Amol Soin, MD, MBA
**Poster Number:** 27
**Key Words:** Discography, color, three-dimensional

**Objective:** To develop more advanced images of intervertebral disc morphology through advancement of the traditional provocative discography. Using a high powered, three-dimensional color CT scan similar to those used for cardiac CT scanning of coronary arteries, three-dimensional images of the intervertebral disc could be obtained. **Summary:** Provocative discography is a diagnostic procedure that attempts to correlate the patient’s subjective pain symptoms with the morphology of the intervertebral disc. Proponents of discography have noted that it is a technique used to diagnose discogenic pain and allows for imaging of intervertebral disc anomalies. Discography is traditionally done using fluoroscopic image guidance with a manometer to measure pressures during critical moments of the procedure. Immediately following the process, some practitioners obtain a post-discography CT scan. The study attempted to utilize similar technology incorporated by the 64-slice cardiac CT scan to acquire three-dimensional, colored discography images of the intervertebral disc. By using the software for three-dimensional CT scans, manipulation of the images is then possible to allow for unique depiction of discogenic morphology. **Methods:** A 44-year-old white male presented to the outpatient pain center with complaints of lower back pain that occasionally radiated to the bilateral buttocks but never extending below the thighs. A presumptive diagnosis of discogenic pain was made by a neurosurgeon and provocative discography was requested. The patient underwent traditional discography using fluoroscopy and, immediately following the fluoroscopy, was sent to obtain CT scanning. The CT scan was a high-powered, 64-slice CT scan, and the images were reconstructed using color three-dimensional technology. The images could then be manipulated through the rotation and removal of spinal tissue to obtain colored, three-dimensional images of the epidural space, the intervertebral disc, and the morphology of the spine. Movie animations depicting the entire disc and spine were also created. **Discussion:** Although this is an early description of the three-dimensional color discography technique, it does preface further study and advancement of the procedure. The possibilities of utilizing the technology to visualize subtle differences and pathological changes in intervertebral disc morphology are intriguing and may provide superior information regarding discogenic pain than those of traditional MRI and CT scans. By obtaining more enhanced and objective data, three-dimensional color CT guidance may also strengthen the diagnostic utility of an otherwise controversial technique.

Effect of psychiatry clerkship on attitudes toward mental illness amongst third year medical students
Julie Popritkin; Brenda Roman, MD; Nicole Borges, PhD

**Presenting Author:** Julie Popritkin
Objective: The purpose of this study was to explore changes in attitudes of third year medical students toward the mentally ill during their psychiatry clerkship. In a previous part of the study, changes in attitudes were evaluated in second year medical students during their psychopathology course and results indicated a significant difference in attitudes pre and post the course. The current study aims to determine whether direct exposure to mentally ill individuals during the clerkship led to further change in the attitudes of medical students toward mental illness or whether a “hidden curriculum” exists that leads to development of stigma and negative attitudes amongst the medical students as they advance in their training. Method: 78 medical students were surveyed prior to the start and after completion of their mandatory third year psychiatry clerkship using the same survey to assess attitudes toward mental illnesses. The survey consisted of 25 total items with 13 questions regarding how the responder personally feels as well as 12 questions exploring how the responder perceived that others would feel toward the topic. Results: The results from the survey were evaluated using the Wilcoxon Matched Pairs Signed Rank Test, which was chosen because of the nonparametric data. The results indicated no significant difference between the pre and post test results (p < .05; Bonferroni correction for multiple comparisons p < .002). Conclusion: While results from the previous part of the study indicate that participation in a second year psychopathology course led to change in attitudes amongst second year medical students, the current results indicate that direct exposure to the mentally ill did not lead to change in attitudes of third year medical students toward mental illness. Previous studies have shown that a possible “hidden curriculum” exists in medical education that leads medical students to develop stigmatized, cynical outlooks and a decrease in empathy as they progress through their medical education. The results of the current study further indicate that this may be occurring. While students were more adaptable in their attitudes during their earlier medical career by the time they reached the third year clerkship it appears that their attitudes toward mental illness were deeply ingrained and not swayed by exposure to persons with mental illness.

A Case of Abnormal DXA and Spontaneous Fractures: Primary Osteoporosis?

Presenting Author: Sara Puening
Faculty Mentor: Susan Williams MD, MS, RD, CNSP, CCD
Poster Number: 38
Key Words: DXA, hyperparathyroidism, spontaneous fractures

Introduction: An abnormal DXA can be indicative of bone problems other than osteoporosis. Recognizing abnormal results at specific anatomical sites can help guide the clinician in making an accurate diagnosis. Case: M.Y. is a 78-year-old Caucasian female who was referred to the Bone Clinic by her PCP due to abnormal DXA, multiple fractures and chronic bone pain. Her history is significant for five ‘fragility’ fractures within the five past years, loss of three inches of height, lifelong low calcium intake, and weight of less than 127 pounds. The patient denied a history of renal stones, headaches, or psychiatric disturbances on her initial visit, but later reported feelings of “brain fog” on follow up. She is a lifelong nonsmoker and has no history of taking anticonvulsants, steroids, anti-estrogen drugs or antiresorptive (bone) medications. The physical exam was notable for diffuse back pain, point tenderness of the left hip, kyphosis, and proximal weakness. Blood tests showed elevated alkaline phosphatase 246 U/L (40-150 U/L) and elevated parathyroid hormone 112 pg/mL (10-60 pg/mL) with normal calcium 10.1 mg/dL (8.5-10.5 mg/dL) and vitamin D 40.6 ng/mL (31.0-80.0 ng/mL). Imaging revealed diffuse osteopenia and multiple osteoporotic fractures of the pelvis and femur. DXA revealed abnormal T- and Z-scores, the lowest of which was in the distal third of the
radius. A Tc-99m sestamibi scan of the neck and chest was subsequently ordered but failed to reveal parathyroid adenoma or ectopic parathyroid tissue. **Discussion:** At first, our patient’s low BMD, history of fractures, and post-menopausal state appeared to indicate a diagnosis of osteoporosis, but a closer look at DXA imaging showed that a metabolic disorder was a more likely the cause of her bone disease. Her DXA scan revealed an overall decrease in T and Z scores, but the scores were worst in the distal third of the left radius, a site that is predominantly cortical bone. This is an important finding in differentiating post-menopausal bone disease from hyperparathyroidism. Elevated PTH has a catabolic effect on cortical bone and was evident in our patient whose bone density was lowest at the distal third of the radius. Our patient does not currently meet criteria for parathyroid surgery. Non-surgical management of her metabolic bone disease includes optimizing calcium and Vitamin D, physical therapy, annual zolendronic acid, and repeat labs every six months. **Conclusion:** Not all abnormal DXA results are due to osteoporosis. When interpreting a DXA scan it is important to not only look at the severity of the T and Z scores but to also compare the scores between measured regions of interest. In our patient, the T-scores were significantly abnormal, painting a picture of severe osteoporosis to the untrained observer. Recognizing that the distal radius was most severely affected gave us the clue we needed to look further for the correct diagnosis.

**Pediatric Allergic Rhinitis: Is there a link between disease control and parental self-efficacy?**

Jennifer Rammel, MPH; Adrienne Stolfi, MSPH; Shalini G Forbis, MD, MPH

*Presenting Author:* Jennifer Rammel  
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*Poster Number:* 14  
*Key Words:* Pediatrics, Allergic Rhinitis, Self-efficacy

**Background:** Allergic rhinitis (AR) is the most common chronic pediatric disease in the US. AR interferes with sleep quality, decreases quality of life, increases school absenteeism, and exacerbates conditions like asthma. **Objective:** To assess current status of pediatric AR including symptom control, medication use and correlation with parental self-efficacy. **Methods:** An anonymous survey was given to parents of children between 3-17 years with allergies in 4 pediatric clinics: 2 suburban population and 2 low socioeconomic (SES) population. The survey included 3 validated tools: Modified Score for Allergic Rhinitis (mSFAR) for diagnosis of AR, Rhinitis Symptom Utility Index (RSUI) for AR symptom control, and General Self-efficacy Scale (GSE) for parental self-efficacy. Other topics: demographics, medications, environmental measures, and confidence level (CL) in managing child's AR/achieving relief of AR symptoms. Data were analyzed using descriptive statistics, Spearman rank correlations (rs), and Wilcoxon rank sums test. **Results:** 167 surveys were analyzed; mSFAR scores were positive for AR in 135 (81%). Parent education levels were 25% < high school, 31% some college, 44% college degree. Mean (SD) child age was 8.9 (3.7) years. Children were 73% Caucasian, 21% African American. Insurance was 47% private, 53% government. The mean age of AR symptom onset was 4.0 (3.2) years. 16% of children with positive scores for AR were not on any medication. 93% attempted 1 environmental measures. Mean CL for managing AR was 7.5 (2.2) and for achieving symptom relief was 6.5 (2.6). Statistically significant associations were found for the following: GSE and CL in managing AR (rs=0.358, p=<0.001) and GSE and CL in relieving AR symptoms (rs=0.253, p=0.001). There was no association between GSE and mSFAR or RSUI. mSFAR scores consistent with AR were associated with child taking allergy medicine (p=0.001), but not RSUI or GSE. mSFAR score was associated with parents' wanting to make changes in child's allergy management (p=0.043). Medication use and attempting environmental measures were not associated with parent education level or child insurance status. **Conclusion:** Parental self-efficacy correlated positively with confidence levels in managing AR and achieving symptom relief, but not with actual disease control. Further research is necessary to determine what barriers exist in achieving disease control in order to improve outcomes for children with AR.
Advanced Giant Cell Arteritis Associated with Multiple Intracranial Aneurysms
Shanika Ranasinghe; Ronald Warwar, MD

Presenting Author: Shanika Ranasinghe
Faculty Mentor: Ronald Warwar
Poster Number: 39
Key Words: Giant cell arteritis, intracranial aneurysm, cranial nerve III palsy

A 68 year old woman developed a central retinal artery occlusion, cranial nerve III palsy, tongue, lip, and scalp necrosis from giant cell arteritis (GCA). Neuroimaging identified four intracranial aneurysms, including bilateral posterior communicating artery aneurysms. The cranial nerve III palsy resolved following clipping of the ipsilateral aneurysm. This case suggests that intracranial aneurysms, either directly or indirectly, may be associated with GCA, and that neuroimaging should be considered in cases of GCA associated with cranial nerve III palsies.

Neuroelectrode Placement by Ultrasound Mapping
Scott Seider; Samira Sihabdeen; Cole Budinsky; Amol Soin, MD, MBA

Presenting Author: Scott Seider
Faculty Mentor: Amol Soin, MD, MBA
Poster Number: 31
Key Words: High frequency alternating current, neuromodulation, chronic pain, ultrasound mapping, peripheral nerve, analgesia, residual limb pain, cadaveric dissection.

With chronic pain on the rise in the United States, new techniques are being developed in order to accomplish analgesia. One such method is the placement of high frequency alternating current (HFAC) on peripheral nerves under ultrasound guidance. The use of ultrasound has already allowed anesthesiologists to become more precise with needle and continuous catheter placement in peripheral nerve blocks. In order to achieve effective neuromodulation of a peripheral nerve with HFAC, a surgical cuff stimulating lead will need to be placed on and anchored to the peripheral nerve. Traditionally, the lead is then attached to an internal pulse generator for continuous stimulation and blockade. Electrical currents produce blockade of nerve conduction through their influence on voltage-gated ion channels in the nerve membrane. HFAC appears to block nerve conduction through depolarization of the nerve membrane, despite the fact that there is a zero net charge delivered to the tissue. Since placement of surgical cuff electrodes near peripheral nerves is not a technique typically done by pain management physicians, cadaveric dissection was completed to demonstrate the feasibility of peripheral nerve electrode placement. The methods included human cadaveric dissections of the upper and lower extremities to expose major peripheral nerves such as the femoral, median, ulnar, sciatic, posterior tibial, and common peroneal nerves. Models of peripheral stimulating leads were used to demonstrate placement on peripheral nerves to pain management physicians. The major anatomic structures such as blood vessels and muscle groups were maintained intact throughout the dissection. In conclusion, ultrasound guided HFAC lead placement has the potential to create a reliable and gradable nerve block that can be used to effectively deliver analgesia in a variety of conditions. HFAC can be used to treat neuroma, post surgical pain, chronic headache, peripheral limb pain, and post-amputation residual limb pain. Since HFAC creates a complete depolarizing nerve block of both motor and sensory nerves, the first human testing for HFAC in chronic pain will focus on treating post-amputation residual limb pain. The study and dissection demonstrated that placement of a HFAC lead on the offending nerve is possible by an interventional pain management physician.

ProSeal Utilization to Achieve Airway Access in a Patient with Documented Difficult Airway
Samira Sihabdeen; Scott Seider; Cole Budinsky; Amol Soin, MD, MBA

Presenting Author: Samira Sihabdeen
Faculty Mentor: Amol Soin, MD, MBA
Poster Number: 30
Key Words: LMA, ProSeal, difficult airway, abdominal surgery, positive pressure ventilation, high peak airway pressure, aspiration risk

Difficult airways can pose unique challenges for the anesthesiologist, necessitating use of a
laryngeal mask airway (LMA) to attain airway access. However, LMA utilization is unsuitable when conducting positive pressure ventilation that reaches peak airway pressures greater than 20mmHg. At higher peak airway pressures, air enters the gastrointestinal tract through the esophagus, potentially causing abdominal distention and aspiration of gastric contents. The possibility of these undesirable events limits the ability to use LMAs when conducting positive pressure ventilation. To combat the risk of aspiration during positive pressure ventilation, a new type of LMA, called a ProSeal, was developed. The ProSeal not only forms a better seal than the traditional LMA, but also incorporates an open tip that allows placement of an orogastric tube down the esophagus and into the stomach. This enables suction through the orogastric tube, preventing gastric distention and removing contents from the gastrointestinal tract that would otherwise pose an aspiration risk. The study involves a 28-year-old morbidly obese female with documented difficult airway who presents for laparotomy secondary to small bowel obstruction. Given past difficulty placing an airway, the decision was made to employ the use of a ProSeal. The suction was periodically attached to the orogastric tube while positive pressure was maintained. To prevent insufflation of air into the gastrointestinal tract, peak airway pressure was maintained below 20mmHg by lowering tidal volumes and increasing respiratory rates. At the conclusion of the case, positive pressure ventilation was discontinued and the patient resumed normal respirations. Upon awakening, the ProSeal was removed and the patient was transferred to recovery in stable condition. In conclusion, the study demonstrates that ProSeal is a viable option to achieve airway access during abdominal surgery in a patient with a documented difficult airway and risk of aspiration.

**Presenting Author:** Lakshman Swamy  
**Faculty Mentor:** Amol Soin, MD, MBA  
**Poster Number:** 33  
**Key Words:** Stellate ganglion, nerve block, pain, complications

Stellate ganglion nerve blocks are often used as a diagnostic and a therapeutic approach to treating sympathetically mediated pain of the upper extremity. The stellate ganglion lies anterior to the C6, C7, and T1 area. Most stellate ganglion blocks are performed using fluoroscopic image guidance with the needle placed anteriorly to the C7-T1 tubercle.

We describe a case of an inadvertent arterial puncture in a routine stellate ganglion block. The patient is a 39 year old African American female who suffered from Reflex Sympathetic Dystrophy which is a painful disorder characterized by vasomotor and pseudomotor changes in an extremity that is mediated by the sympathetic nerve chain. We decided to complete a stellate ganglion block as a therapeutic modality for the pain. The patient was placed supine on the operating room table and, using fluoroscopy, a 25 gauge spinal needle was inserted on the C7-T1 tubercle. A total of 3cc of Omnipaque dye was injected and revealed an inadvertent arteriogram. (Figure 1) This clearly showed the entire vascular tree and in fact appeared to supply the spinal cord. It is believed that a radicular branch of the vertebral artery was punctured. Routine nerve blocks involve the placement of local anesthetic such as Lidocaine or Bupivacaine; had this been injected without dye in this patient, it is possible that seizure activity or cardiac arrest may have occurred. Additionally, if particulate steroids such as Depo-Medrol were also added, it is likely that the patient would have developed a spinal cord infarction. This could have potentially resulted in permanent paralysis related to the embolic nature of the particulate steroid compound.

Given the fact that major blood vessels lie near the stellate ganglion, it is recommended that fluoroscopy with the assistance of contrast dye be utilized prior to completing a stellate ganglion block. In the case of arterial puncture, repositioning and repeating the contrast dye injection should be completed prior to injecting the therapeutic medications.
**Why Put Patients Behind Bars? Reducing Unnecessary Isolation through Rapid Pathogen Detection**
Lakshman Swamy; Rebekah Wang-Cheng, MD; Carol Quinter, PhD

*Presenting Author: Lakshman Swamy*  
*Poster Number: 34*  
*Key Words: Contact isolation, infection reduction, PCR, cost reduction, MRSA, VRE, quality*

Our project considered the effects of instituting in-house TEM-PCR technology for the rapid identification of patients who require isolation precautions. TEM-PCR allows high sensitivity and specificity identification of multiple pathogens in a single test in a short period of time, often as little as six hours. Though the test is more expensive than traditional testing, we hypothesized that the benefits of rapid identification would outweigh the costs. The initial phase of the project, described in detail in this application, address the financial savings in isolation days averted. We found that utilizing the TEM-PCR technology for patients with a history of MRSA and VRE saved a total of $265,145 over the cost of testing. Ongoing investigations are examining outcomes aligned with all six of the Institute of Medicine’s aims of patient care. Care should be patient centered, and so we are investigating the effects of isolation on patient satisfaction and mental health. Literature supports increased anxiety and depression as well as generally decreased satisfaction. Care should be effective and evidence based, and patients should not receive care they do not require. Unnecessary isolation is a perfect example of ineffective care; not only does it not provide a needed service, but it has potential adverse effects. Care should be safe, and the literature describes increased adverse events such as falls with patients on isolation precautions. Care should be equitable, and we believe we may find a correlation between MRSA and low-income patients. Finally, care should be timely, and we are examining the effect of isolation precautions on the total length of stay of patients as well as other related factors such as timely documentation by physicians and nurses.

**Stereotactic radiation treatment of posttraumatic atypical facial pain using a Gamma Knife**
Emily Tibbits; Ryan Noska; Cole Budinsky; Amol Soin, MD, MBA

*Presenting Author: Emily Tibbits*  
*Faculty Mentor: Amol Soin, MD, MBA*  
*Poster Number: 28*  
*Key Words: Stereotactic radiosurgery, Gamma Knife, posttraumatic facial pain*

**Objectives:** To describe a novel technique to treat atypical facial pain using Gamma Knife or a linear accelerator-based radiation therapy. **Summary:** Atypical facial pain can be a difficult entity to treat for the pain practitioner. Oftentimes, patients fail trails of NSAID’s, narcotics, medications such as gabapentin or pregabalin to treat neuropathic components of pain, and interventional pain management procedures. We describe a case series of two patients who presented to an interventional pain management clinic complaining of facial pain due to trauma. The patients were males aged 26 and 44 respectively. The former was involved in a motor vehicle accident in which his face struck the dashboard; the latter was involved in a complicated sinus surgery and awoke from anesthesia with severe, sharp, shooting facial pain. Both patients arrived to the clinic on high doses of hydrocodone as the only avenue of some sort of pain relief. Interestingly, the distribution of pain in both patients was unilateral, on the anterior portion of the face extending from the orbit to the jaw. A trial of trigeminal nerve blocks under fluoroscopic guidance was minimally successful. Each patient reported a “few hours” of pain relief, and it was unclear if this was related to the block itself or the fentanyl used during sedation. Next, both patients underwent a trial of sphenopalatine ganglion blocks, also with transient, unpredictable relief. Before committing these patients to lifelong usage of high dose narcotics, it was thought to attempt stereotactic radiation therapy using a Gamma Knife. **Radiosurgical Technique:** A team made up of the interventional pain physician, a neuroradiologist, a radiation oncologist, a medical physicist, and a neurosurgeon were involved in both of these cases. The patients had stereotactic head frames placed while awake using local anesthetic. High resolution MRI images of the...
target area were utilized, with both gadolinium-enhanced T1-weighted MRI with magnetization-prepared, rapid-gradient echo, and T2-weighted fast-spin echo sequence. The target area that was identified was the trigeminal nerve. Using coronal, sagittal, and axial planes to track the course of the nerve from the brainstem to Meckel’s cave, the target was radiated using the gamma knife. The patients were then transferred to recovery and the head frames were removed.

**Discussion and Conclusion:** Both patients have noted an immediate decrease in frequency and severity of the atypical posttraumatic facial pain after Gamma Knife treatment to the trigeminal nerve. Neither patient met the definition of trigeminal neuralgia. After a trial of Gamma Knife therapy to the trigeminal nerve, both patients noted a decrease in overall VAS pain scores. There was an immediate decrease in pain of 20% and 25% respectively, however after a 6 week follow-up both patients noted further improvement of 60% and 45% respectively for the 26- and 44-year-old. Although further study is certainly warranted, stereotactic radiation therapy may present a successful avenue for the treatment of posttraumatic atypical facial pain.

**Indirect Video Laryngoscopy to Achieve Airway Access in Documented Difficult Airways**

Eric Vangeloff; Jason Miller; Cole Budinsky; Amol Soin, MD, MBA

*Presenting Author:* Eric Vangeloff  
*Faculty Mentor:* Amol Soin, MD, MBA  
*Poster Number:* 20  
*Key Words:* Direct Laryngoscopy, Indirect Laryngoscopy

In order for a patient to be adequately anesthetized and placed on mechanical ventilation, the physician must be able to secure the airway. The traditional method for doing this involves placement of an endotracheal tube under direct laryngoscopy. This technique involves placing a laryngoscope into the patient’s mouth and directly visualizing the vocal cords for correct endotracheal tube placement. One of the many risk factors that make this technique difficult is obesity. As the level of obesity rises in the United States, routine use of direct laryngoscopy is not always practical. As a result, a new technique to secure the airway has emerged known as indirect video laryngoscopy. In this technique, the anesthesiologist inserts a laryngoscope, equipped with a camera at the tip of the blade, into the oral cavity and is then able to visualize on a screen where to place the endotracheal tube. These devices give the anesthesiologist a vantage point that is not possible using direct laryngoscopy. As a result, a number of manufactures have used this technology to create devices to safely achieve airway access. The current airway algorithm for patients with a difficult airway involves attempting direct laryngoscopy first; if this technique fails, indirect video laryngoscopy should be attempted. Based on advancements in technology the airway algorithm should be revisited to include indirect video laryngoscopy as a first line modality to achieve airway access in a documented difficult airway.

**Common Pregnancy Complaints: update counseling**

Christopher Croom MD; Tasha Vardya; Gary Ventolini, MD

*Presenting Author:* Tasha Vardya  
*Faculty Mentor:* Gary Ventolini, MD  
*Poster Number:* 40  
*Key Words:* Pregnancy, Disorders, Management

A pregnant patient may interact with her obstetrician, family physician or nurse midwife throughout her pregnancy. She is likely to have anxiety, apprehension, concerns and ailments that span a vast spectrum of common pregnancy related disorders. This study aimed to provide obstetricians, family physicians, nurses and midwives the most up-to-date management strategies for common complaints during pregnancy. Through review of PubMed, Cochrane Review and the ACOG practice bulletins, we found the latest studies investigating these disorders and the most appropriate ways to manage them. Among the common complaints researched were nausea and vomiting, constipation, stretch marks, benign pruritus, leg cramps and questions regarding energy protein supplementation. Evidence based obstetrics is difficult to obtain for ethical, legal and economical reasons. Periodic updates on common issues
Concerning pregnant women are advisable to contribute to the most effective care of our patients.

**Role of Angiotensin Converting Enzyme 2 in Body Fat and Glucose Tolerance**

Nathan M. Weir; Danielle Barnhart; Zhongyu Yan; Khalid M. Elased; Mariana Morris

**Presenting Author:** Nathan M. Weir  
**Faculty Mentor:** Mariana Morris, PhD  
**Poster Number:** 5  
**Key Words:** ACE2, obesity, glucose tolerance, mice

Studies in diabetic humans have found dysregulation of the renin angiotensin system (RAS), specifically angiotensin (Ang) II. Angiotensin converting enzyme (ACE) 2 is often upregulated as a compensatory enzyme during times of cardiovascular and metabolic stress. We hypothesize global loss of ACE2 will negatively affect glucose homeostasis in mice with diet induced obesity. To study this hypothesis, ACE2 knockout (KO) and wild type (WT) mice were fed either a 60% high fat (HF) chow for 12 weeks or maintained on normal chow (NC). At 8 weeks of age before initiation of the diet, basic metabolic parameters were measured using QNMR for body fat analysis. Both strains had similar baseline body weight (WT=23.90±0.76, KO=23.70±0.75 g) but KO mice showed increased percent body fat [WT=4.51±0.80% (1.08 of 23.91 g), KO=7.01±0.76% (1.66 of 23.69 g)] and increased fed glucose (WT=147.9±4.53, KO=164.1±5.31 mg/dl). Daily caloric intake was comparable between strains (WT=11.84±0.37, KO=11.49±1.27 kcal). After 12 weeks of diet, both WT and KO mice had gained significant body weight from baseline (WT 13.96, KO=14.63 g) and differences in body fat were eliminated, however, glucose handling was altered. Fed glucose showed a main effect for both strain (WT=140.31±4.00, KO=156.83±4.23 mg/dl) and diet (NC=141.67±3.78, HF=155.48±4.47 mg/dl). Fasted glucose revealed a strain and diet interaction (NCxWT=101.11±5.00, NCxKO=94.44±5.00, HFxWT=105.83±6.13, HFxKO=138.14±5.67 mg/dl). Additionally, an intraperitoneal glucose tolerance test showed HF KO mice had a significantly elevated area under the curve compared to HF WT mice (WT=311.1±20.20, KO=382±18.26 mg/dl/min) while NC WT and NC KO had overlapping curves (WT=237.0±9.12, KO=239.0±7.92 mg/dl/min). Plasma analysis revealed decreased circulating insulin in NC KO mice (WT=1.1±0.075, KO=0.86±0.056 ng/ml). High fat diet increased insulin in both strains, but more so in WT (HF WT=3.8±0.63, HF KO=3.0±0.61 ng/ml). HF WT mice also demonstrated increased pancreas ACE2 activity (NC WT=0.56±0.13, HF WT=2.14±0.5 pmol MCA/µg/h). These combined results indicate loss of ACE2 negatively affects glucose homeostasis, in part, through insulin handling in the pancreas.

**Renal Angiotensin Converting Enzyme 2 Protects Kidney Function during Chronic Ang II Infusion in Mice**

Nathan M. Weir; Esam Salem; Nadja Grobe; Zhongyu Yan; Mariana Morris; Khalid M Elased

**Presenting Author:** Nathan M. Weir  
**Faculty Mentor:** Mariana Morris, PhD  
**Poster Number:** 6  
**Key Words:** ACE2, Ang II, Albuminuria, Mice

Angiotensin converting enzyme (ACE) 2 is known to degrade angiotensin (Ang) II, the major effector peptide of the renin angiotensin system (RAS). In diabetes and hypertension, ACE2 is often upregulated to compensate for increased circulating Ang II. We hypothesize loss of ACE2 activity negatively affects kidney function during chronic Ang II infusion. Wild type (WT) and ACE2 knockout (KO) mice were infused with 1000 ng/kg/min Ang II via osmotic pump for 4 weeks. Urine samples were collected pre and post Ang II infusion. Blood pressure measurements using radiotelemetry revealed similar baseline systolic (WTpre=110.1±2.0, KOPre=113.4±2.3 mm Hg) and mean arterial pressure (MAP) (WTpre=98.8±1.5, KOPre=102.4±2.1 mm Hg). Urinary albumin excretion (UAE) was also unaltered in KO mice (WTpre=53.7±3.4, KOPre=52.5±4.7 µg albumin / mg creatinine), though water intake (WTpre=7.6±1.1, KOPre=11.4±2.4) and urine output (WTpre=1.1±0.3, KO=2.0±0.4 ml/24 h) were both higher. Urinary Ang (1-7) content (WT=0.52±0.1, KO=0.63±0.2 pg Ang (1-7)/µg creatinine) was also unaffected in
KO mice and coincided with increased renal neprilysin expression over WT. Chronic infusion of Ang II elevated blood pressure in both strains to comparable levels (systolic: WT_post=154.5±4.0, KO_post=160.2±3.7; MAP: WT_post=143.3±0.4, KO_post=141±0.1 mm Hg). Urine output (WT_post=8.7±2.0, KO_post=8.5±0.6 ml/24h) and UAE were elevated in both groups. However, UAE of KO mice increased significantly more than WT (KO_post=2722±327, WT_post=1052±392 µg/mg). WT mice showed an increased pressure natriuresis from baseline while KO mice had a blunted sodium response (WT: pre=300±34 vs. post=855±253, KO: pre=371±68 vs. post=412±61 mM Na⁺/mg creatinine). Matrix assisted laser desorption/ionization (MALDI) imaging confirmed increased Ang II accumulation in cortex of KO kidney sections (KO=9.58±0.6, WT=4.80±0.2 AU). Ang II infusion decreased WT renal ACE2 protein expression but not activity (WT_pre=4.2±0.2, WT_post=4.4±0.3 pmol MCA/µg/h). Kidney neprilysin expression was unchanged in KO post infusion. These findings suggest renal ACE2 plays an important role in RAS dysregulation to clear excessive Ang II and protect normal kidney function independent of changes in systemic blood pressure.

Standardized Patient Encounters for Enhancing Third-Year Medical Students’ Communication Skills

Ryan Whitt; Gregory Toussaint, MD; Bruce Binder, MD, PhD; Nicole Borges, PhD

Presenting Author: Ryan Whitt
Faculty Mentors: Gregory Toussaint, MD; Bruce Binder, MD, PhD
Poster Number: 49
Key Words: Medical Education, Standardized Patients, Pediatric clerkship, Communication

It is well known that deliberately practicing clinical communication and receiving feedback are effective learning strategies for medical students. While medical students have numerous opportunities to practice clinical communication in adult settings, such practice in pediatric settings is limited during medical school. The purpose of this study is to examine how standardized patient encounters strengthen third-year medical students’ communication skills during the pediatrics clerkship. Specifically, medical students struggle with managing emotion during patient interviews and literature demonstrates that medical students show a significant decline in empathic attitudes as they progress through medical school. This indicates a need for more educational interventions for students to continue to develop their communication abilities. Standardized patient encounters are beneficial in the pediatric clerkship because they require a unique balance of content mastery and advanced communication abilities. Also, the USMLE requires medical students to pass a clinical skills examination which includes pediatric cases. Our intervention provides a forum to practice for such examinations. Three pediatric scenarios were designed to represent common and realistic patient encounters which were intended to challenge the students but within their scope of expertise. Third-year medical students during their pediatric clerkship engaged in the three scenarios and received both written and oral feedback from a preceptor observing the encounter. Evaluation of student attitudes towards the educational intervention was measured through an 8-item pre- and post-experience Likert-type scale questionnaire. The questionnaire assessed student self-perceived confidence and abilities at performing advanced communication skills. Preliminary data (N = 39) analyzed using a Wilcoxon-Matched Pairs Signed-Rank test demonstrated a statistically significant difference in students’ perception of their confidence and abilities regarding performing advanced communication skills assessed during the standardized patient encounters (p <.05, Bonferroni correction p < .006). Students reported more confidence and ability after engaging in the three scenarios. Outcomes are also being assessed qualitatively through focus group discussions regarding the experience. Additional strengths of the intervention are that it is relatively inexpensive and easily reproducible. The intervention could be further improved by expanding on the number and type of cases presented to students. Volunteers were obtained through the local children’s hospital volunteer department and through the local schools. Because the program is incredibly inexpensive, the intervention can continue as long as deemed valuable. This program’s simple design and ease of maintenance allow it to be easily implemented
Yield of Fecal Immunochemical Test in Detection of Colorectal Cancer and Advanced Neoplasia in Veteran Population at Dayton VA Medical Center
Salma Akram, MD; Justin Hartke, MS4; Josh Wilson, MS4

Presenting Author: Josh Wilson
Faculty Mentor: Salma Akram, MD
Poster Number: 15
Key Words: FOBT, FIT, adenocarcinoma, advanced colorectal neoplasia

Background: Fecal occult blood test (FOBT) is a widely accepted, non-invasive technique for colorectal cancer (CRC) screening. The rationale for using FOBT is to identify high risk individuals who require a diagnostic colonoscopy. According to the VA health directive, a diagnostic colonoscopy must be performed within 60 calendar days of the positive FOBT screening test. Since May 2009, the Dayton VAMC has replaced the guaiac-based fecal occult blood test (gFOBT) with a more sensitive fecal immunochemical test (FIT) for CRC screening. However, performance characteristics of FIT screening test using a cut-off of 100mg/ml hemoglobin has not been studied in this population. Moreover, the rate of compliance with follow-up colonoscopy has not been determined. Aim: To compare the yield of gFOBT versus FIT in detection of CRC and advanced colorectal neoplasia (ACRN) in average risk veteran population. We also aim to determine the rate of compliance with a follow-up colonoscopy within 60 days of a positive stool test. Methods: We performed a retrospective chart review of all patients referred for follow-up colonoscopy after a positive FOBT at Dayton VAMC between January 1st 2008 and August 31st 2011. Result: During the study period, a total of 351 subjects with positive FOBT were referred for colonoscopy. A total of 171 subjects had a positive gFOBT and 180 had positive FIT. A total of 65% (229/351) patients completed a colonoscopy during the study period with 71% (122/171) of those with positive gFOBT and 59% (107/180) with positive FIT. Median interval between positive FOBT and colonoscopy was 74 days (Range 1-846 days). Colonoscopy was completed after a positive test in 28% (65/229) and 66% (152/229) of the subjects within 60 days and 90 days, respectively. There were 96% males with median age of 62 years (Range 38-90 years) at the time of positive FOBT. Positive colonoscopy findings (hemorrhoids, diverticuli, polyps, AVMs, mass, inflammation, ischemia) were noted in 80% (97/122) of gFOBT versus 88% (94/107) of the FIT group (p=0.11). Overall prevalence of ACRN after a positive FOBT was 21% (48/229). The prevalence of ACRN was 19% (23/122) in gFOBT group versus 23% (25/107) in FIT group. Prevalence of ACRN in single positive gFOBT was 12% (8/69) versus 28% (15/53) in those with two or three positive gFOBT (p=0.03). Prevalence of ACRN in single positive FIT was 13% (8/61) versus 37% (17/46) for two or three positive FIT (p=0.005). Among all patients with positive FOBT, ACRN proximal and distal to the splenic flexure was 17% (8/48) and 33% (16/48) respectively. Synchronous proximal and distal ACRN was noted in 50% (24/48) of the patients. Among patients with proximal ACRN 63% (5/8) had positive gFOBT and 37% (3/8) had positive FIT (p=0.45). Among patients with ACRN distal to the splenic flexure, 35% (8/23) were gFOBT positive versus 32% (8/25) FIT positive (p=1.0). Synchronous proximal and distal ACRN was noted in 44% (10/23) and 56% (14/25) of gFOBT and FIT positive groups respectively (p=0.56). Adenocarcinoma of the colon was diagnosed in 4% (8/229) of the patients with median age of 72.5 years (Range: 55-85 years) at diagnosis. Six cancers were detected distal and two proximal to the splenic flexure. Two-thirds of the patients (6/8) with colon cancer had all three positive FOBT samples and one-third (2/8) had two positive stool samples. Prevalence of invasive adenocarcinoma was 5% (6/122) in gFOBT group compared to 2% (2/107) in FIT group (p=0.28). The prevalence of adenomas 10 mm or more in size was 27% (17/63) and 35% (21/60) respectively in the gFOBT group compared to FIT group (p=0.44). Chronic low dose aspirin use was noted in 43% (53/122) of subjects with positive gFOBT versus 35% (37/107) with positive FIT (p=0.18). Among 122 patients who did not have a follow-up colonoscopy, 26% (32/122) declined the procedure, 17% (21/122) had advanced age or comorbid conditions that prevented colonoscopy.
Procedure cancellation and no show rate was about 16% (19/122). **Conclusion:** The prevalence of ACRN was higher in the FIT group as compared to the gFOBT group, possibly indicating that the FIT test could be more sensitive for detecting earlier stages of neoplasia. Patients with all three positive FIT were more likely to have ACRN. Less than one third of the subjects were able to complete a colonoscopy within 60 days of a positive test, indicating a significant need to improve compliance for follow-up colonoscopy.

**A Case Series of Thermal Radiofrequency Ablation of the Sacroiliac Joint Using a Single Probe**

Vivek Yedavalli; Jim Brockett; Chong Yun; Cole Budinsky; Amol Soin MD, MBA

**Presenting Author:** Vivek Yedavalli  
**Faculty Mentor:** Amol Soin, MD, MBA  
**Poster Number:** 24  
**Key Words:** sacroiliitis, thermal radiofrequency ablation (RFA)

**Introduction:**
Sacroiliitis is a common cause of chronic low back pain. The sacroiliac (SI) joint is often injured in falls, heavy lifting or twisting, or direct trauma to the sacral region, and is prone to degenerative arthritis. It is commonly associated with spondyloarthropathies. Current treatment options include physical therapy, anti-inflammatory and analgesic medications, injections of local anesthetic into the joint, and chiropractic manipulation. Often, the pain is refractory to these treatment modalities. A novel treatment providing more sustained pain relief is described. In this method, thermal radiofrequency ablation (RFA) is delivered to the sensory neurons of the sacral nerve roots that innervate the SI joint (S1-4). This treatment option involves the use of a needle inserted into the joint to and heat is delivered along the painful nerve to eradicate. This treatment is thought to provide durable pain relief by ablating or producing lesions in these sensory nerves. This procedure does not damage the nerve in question as much as it stuns it to reduce the pain. **Methods:** A 37-year old Caucasian woman presented with signs and symptoms consistent with left-sided sacroiliitis and a 44 year old white male presented with bilateral sacroiliac joint pain. They both failed all treatment modalities with the exception of a local anesthetic block near the sacral nerve roots, which alleviated the pain temporarily. Traditional RFA utilizes a 20- or 22-gauge needle to create small lesions distal to the tip of the needle. With numerous small branches of nerve fibers coming off the larger nerve trunks, traditional RFA is impractical, as it would require placing 15 or more needles into the patient. We therefore used a single probe containing multiple electrodes, which could be placed parallel to the patient’s sacrum to create a strip lesion across the S1-4 nerve roots. A test current of 2 milliamps at 2 Hz was first applied to the electrodes to confirm the absence of contact with any motor fibers. If no parasacral muscle twitching was noted, sensory testing was then carried out by delivering 50 milliamps at 0.5 Hz, which reproduced her pain. Upon this confirmation of appropriate probe placement, RFA lesion creation was carried out at 80 °C for 90 seconds per site. They were both discharged home without complication. **Conclusions:** The patients were seen in follow up at 2 weeks and at 3 months. They reported an average 86% reduction in sacroiliac and lower back pain. They both denied motor weakness or excessive numbness, and also reported an increase in functional status scores. Additional patient trials are planned, but this case report demonstrates the feasibility of creating a sacral nerve root strip lesion by RFA as a safe, effective, durable, and minimally invasive treatment of refractory sacroiliac joint pain.

**Pneumocephalus as a Result of the Usage of Air to Achieve Access in the Epidural Space**

Chong Yun; Jim Brockett; Vivek Yedavalli; Cole Budinsky; Amol Soin, MD MBA

**Presenting Author:** Chong Yun  
**Faculty Mentor:** Amol Soin, MD, MBA  
**Poster Number:** 25  
**Key Words:** Pneumocephalus, Epidural Anesthesia, Dural Puncture

There are two techniques typically used to achieve access into the epidural space in the method of loss of resistance. A glass syringe can be filled with either air or saline. Recent case reports have surfaced demonstrating that saline
may be safer in the event of an accidental dural puncture. This is because air can produce a pneumocephalus after direct injection into the subarachnoid or subdural space, and it has also been shown to occur after a routine lumbar epidural steroid injection secondary to a dural defect.

In the case, the patient developed a severe, constant headache after the placement of a spinal cord stimulator trial. Air was used for the loss of resistance technique to obtain access into the epidural space. During the loss of resistance, cerebral spinal fluid was noted to come out of the Touhy needle. A prophylactic blood patch was administered in the recovery room, however the patient continued to complain of a headache for several days. Eventually, a workup for meningitis proved to be negative, but a CT scan showed a pneumocephalus. It was thought that the headache symptoms were the result of a pneumocephalus caused by air entrainment in the epidural space possibly by the loss of resistance technique. The patient was treated prophylactically with intravenous antibiotics for the prevention of meningitis, and the patient's headache resolved spontaneously over one week.

Air in the epidural space can be the result of numerous causes. Here we discussed a case that demonstrated the impact that air in the epidural space can have on diagnosis and management of the patient. In the acute setting, the onset of headache after instrumentation of the epidural space can occur secondary to: post dural puncture headache, pneumocephalus, migraine, or subarachnoid hemorrhage. Traditionally, a post dural puncture headache arises within 24 to 48 hours after instrumentation. Patients can experience a positional headache, with symptoms being worse on standing and improving in the supine position. A subarachnoid hemorrhage is a very rare and dangerous cause of an acute severe headache that requires immediate neurosurgical intervention. Mortality rates approach 50% in this case. Pneumocephalus should be considered as a cause especially if air was used as the loss of resistance technique. A CT scan can be done in this setting to diagnose a pneumocephalus. In the chronic setting, a pneumocephalus can occur secondary to long-term epidural infusions via: air being accidentally injected through the catheter, air used for loss of resistance, meningitis, or infectious sequelae.
POSTER INDEX
(In Order by Poster Number)

1. Subcellular Localization of the Taurine Transporter in the Rat Brain - Amanda N Freeman; James E Olson, PhD

2. Molecular analysis of YPEL3 gene mutations and splice variants in human tumors - Patrick Feasel; Kelly R. Miller PhD; David Hitch, MD; Remah Ali; Rebecca Tuttle MD; Steven J. Berberich, PhD

3. Neurophysiological and behavioral effects of procaine microinjections into the cockroach central complex - AJ Pollack; AL Horomanski; ND Kathman; RE Ritzmann

4. Effectiveness of regenerated heterogenic stretch feedback - Gabrielle M. Horstman; Paul Nardelli; Timothy C. Cope, PhD

5. Role of Angiotensin Converting Enzyme 2 in Body Fat and Glucose Tolerance - Nathan M. Weir; Danielle Barnhart; Zhongyu Yan; Khalid M. Elased; Mariana Morris

6. Renal Angiotensin Converting Enzyme 2 Protects Kidney Function during Chronic Ang II Infusion in Mice - Nathan M. Weir; Esam Salem; Nadja Grobe; Zhongyu Yan; Mariana Morris; Khalid M Elased

7. Surveillance of Self-antigen Influences Lymphocyte Behavior in the Lymph Node - Rachel Liou; Alex Huang

8. Characterization of the Flexor Digitorum Tendon to the Proximal Phalanx in the Correction of Hammer Toe Deformity - Matthew S. Ross, MD; Ronald J. Markert, PhD; Zachary Dipaolo; Lorrie Kiger; Richard T. Laughlin, MD

9. Low Immune Cell Function Values as a Risk Factor for Current or Subsequent Infection - Terry Carman; Steven Burdette; Jared Klein


11. Effect of cocaine abuse on serum thyrotropin levels in patients admitted to an inpatient mental health unit - Dean Bricker, MD; Jerome Schulte, MD; Thomas Koroscil, MD-PhD; Matthew Koroscil

12. Systematic Review of Preservation Fluid Associated Candida Infections in SOT - Isabel Kwan; Steven Burdette

13. A Time Study of Neuraxial Regional Anesthesia Technique from Patient Positioning to Needle Insertion: Implications for Chlorhexidine Skin Antisepsis - Erika Manis, BA; Perry Nystrom, MD

14. Pediatric Allergic Rhinitis: Is there a link between disease control and parental self-efficacy? - Jennifer Rammel, MPH; Adrienne Stolfi, MSPH; Shalini G Forbis, MD, MPH
Yield of Fecal Immunochemical Test in Detection of Colorectal Cancer and Advanced Neoplasia in Veteran Population at Dayton VA Medical Center - Salma Akram, MD; Justin Hartke, MS4; Josh Wilson, MS4

Surgical Placement of a Spiral Cuff Neuroelectrode to Achieve Pain Reduction- a case series of 5 patients - Telisha Ortiz; Sara Chinnappan; Cole Budinsky; Dr. Amol Soin, MD, MBA

A Case Series Using the Observational Mechanical Gateway to Compare Spinal Cord Stimulation Sensations - Sara Chinnappan; Telisha Ortiz; Cole Budinsky; Simon Choi; Dr. Amol Soin, MD, MBA

Topical Ultraconcentrated Capsaicin to Treat Post Herpetic Neuralgia - Cole Budinsky; Christo Frangopoulos; Amol Soin, MD, MBA

Expanded Review: Intrathecal Bupivacaine and Ziconotide via a Patient Therapy Manager as a Non-Opioid Based, Chronic Pain Treatment - Christo Frangopoulos; Cole Budinsky; Amol Soin MD, MBA

Indirect Video Laryngoscopy to Achieve Airway Access in Documented Difficult Airways - Eric Vangeloff; Jason Miller; Cole Budinsky; Amol Soin, MD, MBA

A Cost/Benefit Analysis of Indirect Video Laryngoscopy for Routine Intubations - Jason Miller; Eric Vangeloff; Cole Budinsky; Amol Soin, MD, MBA

Fluoroscopically Guided MILD to treat Spinal Stenosis- A Case Series of 25 Patients - Amol Soin, MD, Flor Guerengomba, Jessica Kirkland

Usage of a Percutaneous Slim 8 Electrode neurostimulation paddle to achieve pain reduction in a patient with failed back surgery syndrome - Flor Guerengomba; Jessica Kirkland; Cole Budinsky; Amol Soin; MD,MBA; Clara Antoury

A Case Series of Thermal Radiofrequency Ablation of the Sacroiliac Joint Using a Single Probe - Vivek Yedavalli; Jim Brockett; Chong Yun; Cole Budinsky; Amol Soin MD, MBA

Pneumocephalus as a Result of the Usage of Air to Achieve Access in the Epidural Space - Chong Yun; Jim Brockett; Vivek Yedavalli; Cole Budinsky; Amol Soin, MD MBA

Neurostimulation as a Modality to Treat Chronic Pain - Laura DeVita; Uloma Oziri; Cole Budinsky; Amol Soin, MD

Three-dimensional Color Discography to Enhance the Diagnostic Utility of Traditional Discography - Uloma Oziri; Laura DeVita; Cole Budinsky; Amol Soin, MD

Stereotactic radiation treatment of posttraumatic atypical facial pain using a Gamma Knife - Emily Tibbits; Ryan Noska; Cole Budinsky; Amol Soin, MD, MBA

Intrathecal Infusions via a Patient Therapy Manager to Allow Self-Titration in the Chronic Pain Patient - Ryan Noska; Emily Tibbits; Cole Budinsky; Amol Soin; MD, MBA

ProSeal Utilization to Achieve Airway Access in a Patient with Documented Difficult Airway - Samira Sihabdeen; Scott Seider; Cole Budinsky; Amol Soin, MD, MBA
31. Neuroelectrode Placement by Ultrasound Mapping - Scott Seider; Samira Sihabdeen; Cole Budinsky; Amol Soin, MD, MBA

32. Human Cadaveric Study to Plan In Vivo Application of a Spiral Cuff Electrode - Richa Garg; Lakshman Swamy; Cole Budinsky; Amol Soin, MD, MBA

33. Preventing Patient Harm in Pain Management: Avoiding Inadvertent Arterial Puncture in Stellate Ganglion Block - Lakshman Swamy; Richa Garg; Cole Budinsky; Ankush Kalra; Jennifer Castelbuono; Amol Soin, MD, MBA

34. Why Put Patients Behind Bars? Reducing Unnecessary Isolation through Rapid Pathogen Detection - Lakshman Swamy; Rebekah Wang-Cheng, MD; Carol Quinter, PhD

35. Cleidocranial dysostosis – a case report - Matthew Abraham, MS4; Dawn Light, MD

36. Delayed Management of a Superficial Femoral Artery - Matthew Abraham, MS4; Kian Mostafavi, MD; William Rundell, MD

37. Tamoxifen for the Treatment of Severe Keloids: A Case Report and Review of the Literature - Hoka Nyanda MD; Thomas Hagele BS; George Cohen, MD

38. A Case of Abnormal DXA and Spontaneous Fractures: Primary Osteoporosis? - Sara Puening RD, LD, MSIII; Susan Williams MD, MS, RD, CNSP, CCD

39. Advanced Giant Cell Arteritis Associated with Multiple Intracranial Aneurysms - Shanika Ranasinghe; Ronald Warwar, MD

40. Common Pregnancy Complaints: update counseling - Christopher Croom MD; Tasha Vardya; Gary Ventolini, MD

41. Correlating microscopic images to vaginal fungal cultures in recurrent candida colonization – Michelle Kline, MS; Gary Ventolini, MD

42. Bridging Bronchus and The Ring-Sling Complex: A Case Analysis - Ankush Kalra

43. Nutrition Education in Medical School: Expectations and Perceived Proficiency - Avash Kalra; Ankush Kalra; Sara J. Paton, PhD

44. First Year Medical Student OSCE Performance and Specialty Choice - Katherine A Backes, BA; Nicole J Borges, PhD; S. Bruce Binder, MD, PhD; Brenda JB Roman, MD

45. Survey of Recent Medical School Graduates and Residency Program Directors to Assess Preparation for Internship - Robert Beaulieu, MSII; Raymond Ten Eyck, MD, MPH, FACEP

46. Student Attitudes’ Toward and Experiences in Teams during Their First Year of Medical School - Adam S. Deardorff, MS; Sandy Cook, PhD; Annie Daniel, PhD; Nicole J. Borges, PhD; Dean Parmelee, MD; Kevin Krane, MD

47. Emergency Medicine Bedside Assessment Course (EMBAC): An Evidence-Based Guide to Physical Examination in the Emergency Department - Jeremy Moore; Brendan Devine; Stacey Poznanski, DO
48. Effect of psychiatry clerkship on attitudes toward mental illness amongst third year medical students - Julie Popritkin; Brenda Roman, MD; Nicole Borges, PhD

49. Standardized Patient Encounters for Enhancing Third-Year Medical Students’ Communication Skills - Ryan Whitt; Gregory Toussaint, MD; Bruce Binder, MD, PhD; Nicole Borges, PhD

50. Utilizing Social Media in Medical Education: A YouTube™ Video-based USMLE STEP 2 Board Preparation Course – Amy Kelley; Kevin Kelley
ACKNOWLEDGEMENTS

The Fourth Annual Medical Student Research Symposium was made possible in part by generous donations from the Boonshoft School of Medicine Departments of Biochemistry and Molecular Biology; Community Health; Geriatrics; Internal Medicine; Neuroscience, Cell Biology, and Physiology; Orthopaedic Surgery, Rehabilitation, and Sports Medicine; Pediatrics; and Psychiatry.


The Medical Student Research Club is deeply grateful for the continued support and guidance of Arthur S. Pickoff, M.D, Mark Willis, M.A., and Ginny Byrd of the Boonshoft School of Medicine Office of Research Affairs; Robert E.W. Fyffe, Ph.D. and Kathleen Friedman of the Wright State University Office of the Vice President for Research and Graduate Studies; and our faculty advisor Mark Rich, M.D., Ph.D. of the Department of Neuroscience, Cell Biology, and Physiology.

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Organized by the Medical Student Research Club with the support of the Boonshoft School of Medicine Office of Research Affairs.