

## Abstracts from The Texas Tech University Health Sciences Center School of Medicine Summer Research Program from the Lubbock Campus presented at the Student Research Week in March 2019

THE NAMES IN **BOLD** ARE THE MEDICAL STUDENTS WHO PARTICIPATED IN THIS PROGRAM IN 2018

### 1. Complications of thyroid surgery retrospective review of cases performed at Texas Tech University Medical Center

**Sara Al Dogom**, Tam Nguyen, Joe Hassin Cordero

Thyroid surgery is performed in the U.S. on a daily basis. This type of surgery is affected by a variety of complications. The aim of our study is to analyze retrospectively the type and incidence of postoperative complications of thyroid surgery experienced by adult patients at Texas Tech University Medical Center for nearly the past decade. The study will include several types of thyroid surgery performed such as lobectomy, near total, total thyroidectomy, and para thyroidectomy.

### 2. Amyloid beta and MicroRNAs in Alzheimer's disease

**Nnana Amakiri**, Aaron Kubosumi, James Tran, P Hemachandra Reddy

Alzheimer's disease (AD) is a progressive multifactorial neurodegenerative form of dementia. Due to the progressive degeneracy of the brain seen in this disease, AD is characterized by memory loss, numerous cognitive impairments, and changes in personality, thought, and behavior. Early on, AD has a substantial impact on one's daily routine by affecting areas of the brain that control memory, executive cognition, and visuospatial awareness. Personality, behavior, and language impairments tend to occur much later in the progression of AD.

Alzheimer's disease is recognized as a disease especially prevalent in the elderly. Due to advances in healthcare the average lifespan of human beings has rapidly increased. As a result, AD's impact on

the world today is also increasing. Due to this growing aging population, AD has become a major public health concern, with global costs in 2018 estimated at \$1 trillion. Unfortunately, there is a lack of effective prevention methods and no cure to combat this growing health concern. Due to its growing worldwide medical and financial burden, it is important to understand the different ways AD presents itself, the disease at the molecular level, and the modifiable and non-modifiable factors contributing to the characteristic features of AD. Currently, there are no early detectable biomarkers nor drugs that can delay and/or prevent disease process.

The purpose of this research is to highlight recent developments in AD, including 1) amyloid beta toxicity, 2) abnormal APP processing, 3) discovery of microRNAs & miRNAs biogenesis, and 4) involvement of miRNAs in aging and AD, particularly with abnormal APP processing and formation. This poster also summarizes miRNAs as potential biomarkers for AD.

### 3. Efficacy of clinical skills education for first-year medical students using simulated emergency department patient encounters

**James Bunch**, Thomas Pressley, Daniel Webster, Gregory L Brower

The field of medical education is constantly evolving based on assessment of the effectiveness of emerging educational methods. One potential avenue for improving medical education is to improve clinical reasoning through early clinical exposure. Early clinical exposure has been linked to improved performance in the third and fourth years of medical school, as well as improved attitudes toward medical education, and additionally has the potential to improve retention of important physiological concepts in undergraduate medical education. First-year medical students at

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TTUHSC SOM participate in Emergency Department (ED) Simulations during the Major Organ Systems (Systems Physiology) block, and again in the second year as part of the Systems Disorders block, with the goal of improving retention of clinical pathophysiology and quality of diagnostic reasoning. In a preliminary study we endeavored within Institutional guidelines to improve the quality of early clinical exposure, and in a second phase further refined the metrics used to gauge student success. Student performance was assessed by a pre- and post-test focused on clinical management of emergent disease and evaluation of clinical write-ups (i.e., SOAP notes) documenting the simulated patient encounters. Student performance on the post-test was significantly higher ( $p < 0.05$ ) than achieved on the pre-test for the material covered during the course. However, no improvement was seen on concepts that were not covered either in class or by a simulation during the course. These findings suggest that participating in ED simulations contributed to improved diagnostic reasoning skills and retention of clinical knowledge in first-year medical students at our Institution. Positive student feedback also indicated a perceived value to the simulated patient encounters and points to the efficacy of integrating exposure to clinical pathology and diagnostic imaging at an earlier point in the undergraduate medical curriculum.

#### **4. Specific antibodies play significant role in protection against *Schistosoma mansoni* challenge infection in mice**

Sanyukta Bihari, Adebayo J. Molehin, Afzal A. Siddiqui

Schistosomiasis, a disease caused by parasitic helminths belonging to the genus *Schistosoma*, currently affects over 240 million people worldwide with the majority being school-aged children. The effect of schistosomiasis control programs predicated on mass administration of praziquantel have been suboptimal due to lack of sustainability, inadequate coverage, and unabated re-infection rates. Therefore, there is an urgent need for the development of an effective schistosomiasis vaccine. The general consensus in the field is that progress toward schistosomiasis

elimination will be achieved only by integrated control measures with an effective vaccine serving as a fulcrum. Several vaccine efficacy studies by our group have demonstrated that the large subunit of *Schistosoma mansoni* calpain, Sm-p80, conferred immune protection against *S. mansoni* infections in rodents and non-human primate models of infection and disease. Mixed Th1/Th2 immune responses in immunized animals have been implicated in vaccine-mediated immunity. However, the mechanisms involved in Sm-p80-mediated immune protection are poorly understood. In this study, we evaluated the role(s) of passively-transferred Sm-p80-specific antibodies in protection against *S. mansoni* infections in C57BL/6J female mice. The mice passively-transferred with Sm-p80-specific antibodies had a significant worm burden reduction of 53.7% ( $p = 0.034$ ) at necropsy when compared to their control counterparts. We also observed moderate reduction in liver egg burden (36%) and intestine egg burden (10%) indicating an anti-pathology efficacy role for Sm-p80-specific antibodies. Cytokine expression profiling as determined by qRT-PCR showed an upregulation of Th2-specific cytokines, such as IL-4, IL-5 and IL-10 in experimental mice. Cumulatively, our study showed that Sm-p80-specific antibodies play a significant role in schistosomes' parasite killing and that the protection observed may be associated with the elevated levels of Th2 cytokines.

#### **5. Knowledge and attitudes of medical students about the HPV Vaccine**

Kathryn Boylan, Fatma Levent

Human Papilloma Virus is an STD that causes genital cancer. The preventative vaccine has proven successful, but the rate for the HPV vaccination is low due to socioeconomic status, race, religion, and beliefs. A physician's attitude about the vaccine also plays a major role in how patients and/or parents view the vaccination. A survey was created using Google Forms and e-mailed to first through fourth year medical students. Beliefs regarding the vaccine were surveyed, and the results were analyzed in a spreadsheet. Statistics were used to summarize the attitudes

about the vaccine. The data was further analyzed for association between attitudes and beliefs with respect to whether the subject has children, his or her year in school, and specialty of interest. Of the 192 student responses, 97.4% believe that healthcare providers should recommend the HPV vaccine to their patients, and that both boys and girls should receive the vaccine. 61.5% of students believe that if a healthcare provider recommends the HPV vaccine, the patient is more likely to receive the vaccine. 83.3% of students are likely to recommend the vaccine to their current/future patients. 11% of students are uncomfortable discussing the HPV vaccination with future patients and their parents. 31.3% of students who do not support the HPV vaccine believe that it will encourage patients to start having sex earlier. 86.4% of students believe that the main barrier to vaccination is parental reluctance to discuss issues about sexuality and sexually transmitted infections. Out of the students surveyed, 49.5% have personally completed the vaccination process. 27.6% of students are married, and 13% have children. 4.7% of students have an interest in Internal Medicine, and 4.2% show an interest in OB/GYN. TTUHSC medical students support the administration of the HPV vaccine, and believe that a physician's attitude regarding the vaccine can impact patient compliance.

## **6. Possible clinical implications of peripheral zone changes depending on prostate size**

**Joshua Frost**, Werner de Riese, Lisa Smith

Numerous studies have observed an inverse relationship between the extent of Benign Prostate Hypertrophy (BPH) and the incidence of prostate cancer (PCa). Despite this relationship being well documented within the literature, only few studies have explored specific mechanisms by which BPH and PCa may affect one another. One possibility has been brought up that growth in the transition zone due to BPH may cause pressure induced changes in the peripheral zone triggering fibrotic changes and causing gland atrophy within the peripheral zone, an area where 80% of cancer occurs. To shed more light on this phenomenon we studied the quantitative and

qualitative histo-anatomical changes that occur in the peripheral zone associated with BPH.

39 patients with small, medium, and large prostates were selected who had undergone radical prostatectomies between 2008 and 2016. The dorsal aspect of the peripheral zone of each prostate was examined in the 4:00, 6:00, and 8:00 positions of the two slices that represented the most equatorial areas of the prostate. At each location, changes in the peripheral zone were recorded by measuring the thickness of the capsule (peripheral fibrotic layer) and the extent of gland atrophy.

Results from the study revealed two major findings. First, multiple regression analysis demonstrated a strong, positive relationship between prostate size and average capsule thickness with a Pearson coefficient of .71, ( $p$  .05). Second, the extent of fibrotic material was spatially associated with changes of the glands within the peripheral zone. Unlike the round, full glands found in normal areas of the peripheral zone, glands surrounded by fibrosis were elongated and atrophied.

## **7. STAT3: protein-protein interactions on ribosome**

**Alejandro Espinosa-Tello**, Alexander Ha, Elena Tikhonova, **Andrey Karamyshev**

Cancer is the second leading cause of death in the US. Development of new approaches for cancer treatments is a high priority. It has been found that cancer is linked to expression of the STAT3 gene (Signal Transducer and Activator of Transcription 3). Abnormal upregulation of STAT3 is associated with uncontrolled cell growth, cancer progression and linked to 70% of tumors. It was demonstrated that STAT3 knockdown reduced abnormal cell growth, decreased tumor progression in mice and induced apoptosis of cancer cells thus making STAT3 a potential target. However, recent studies had shown that direct inhibitors of STAT3 activity did not work for cancer treatment. New strategies addressing biogenesis of STAT3 are needed.

In this project we are studying the early events of STAT3 translation and protein-protein interactions

on ribosomes. Our work focuses on detection of co-translational STAT3 interactions, identification of its interacting partners and verification of role of these interactions. To study protein interactions, we developed a system for in vitro translation of STAT3 protein. We used three different sources of ribosome and found that the Rabbit Reticulocyte Lysate system provided the best expression. Next, photo crosslinking was used to visualize protein-protein interactions. Specific amber mutations were introduced into STAT3 to direct incorporation of a Lysine tRNA with a covalently attached photo crosslinking probe. At different stages of translation newly synthesized STAT3 can interact with different binding partners therefore we introduced amber mutations at different positions. Our results showed that this approach allowed detection of STAT3 interactions on ribosome. Furthermore, we observed various protein complex profiles at different stages of STAT3 translation, suggesting that multiple proteins are interacting with STAT3 during synthesis. The future direction will include identification of these protein partners.

## 8. Child abuse and deformational plagiocephaly in a West Texas hospital system

Keith Hanson, Preston D'Souza, Pranati Pillutla, Peyton Presto, Brandon McCarty, Laszlo Nagy

*Introduction:* The aim of this study was to assess deformational plagiocephaly's (DP) predictive value in neglect and physical abuse (NAT) within the pediatric population. In addition, we sought to characterize the prevalence of DP and NAT for our hospital's mostly rural catchment area.

*Methods:* Data on hospitalized patients diagnosed with NAT and/or neglect between 2012–2018 was collected via retrospective chart review. All enrolled children were under the age of 4 years old at the time of diagnosis, and those without legible head CTs or MRIs during their initial hospitalization were excluded. Utilizing neuroimaging, we calculated the Cranial Vault Asymmetry Index (CVAI) and Cranial Index (CI) for each patient to assess for DP. Differences between the two groups were assessed using Wilcoxon rank sum test for continuous variables and Fisher's exact

test for categorical variables. A p-value of 0.05 or less was considered statistically significant. All analyses were conducted using SAS 9.4 (Cary, NC, USA).

*Results:* The prevalence of DP within the combined cohort of NAT and Neglect patients is 21%, similar to that reported in the literature for the general population (20–50%). There was no significance between the prevalence of DP and a history of NAT ( $p>0.1$ ) or Neglect ( $p>0.1$ ). Furthermore, there was no correlation between CVAI index and characteristics of initial presentation or history of trauma for either NAT (p-value: 0.359 and 0.250 respectively) or Neglect groups (p-value: 0.116 and 0.770 respectively).

*Conclusion:* While there are many limitations to this study, our results suggest that abused children are no more likely to have history of DP than the general population, and the degree of DP is not associated with severity of trauma history or initial presentation. We hope the results of this study promote future investigations for unique and subtle predictive factors of child abuse/neglect.

## 9. Mysterious identity: The CD206+ population in surviving allogeneic Sertoli cell grafts is neither macrophages nor dendritic cells

Bhargavesh Gottam, Kandis Wright and Jannette Dufour

Sertoli cells (SCs) are immune privileged cells in the testis that protect germ cells. Interestingly, SCs survive long-term post-allotransplantation (transplantation between the same species) without immunosuppressive therapy. However, current human transplantation recipients require life-long immune suppressive therapy to prevent tissue rejection with varying success. Therefore, by understanding the mechanisms by which SCs evade immune rejection, methods to improve human transplantation survival requiring little to no immunosuppressive drugs can be developed. Either primary SCs (pSCs) or mouse SC line (MSC-1) cells were transplanted underneath the kidney capsules of mice. The grafts were collected between day's 1–20 post-allotransplantation and the immune cells present in the grafts were characterized. The grafts

predominantly contained macrophages, which can be M1 (pro-inflammatory) or M2 (CD206+, F4/80+; anti-inflammatory). M2 macrophages were present throughout the surviving pSC compared to rejected MSC-1 cell control grafts. Interestingly, there were CD206+ cells in both grafts that were not macrophages. Since dendritic cells (DCs) express CD206 and are in the grafts, we further tried to identify if the CD206+ cells were DCs by immunohistochemistry. DCs (CD11c+) were seen in the middle of the pSC grafts at day 14 (D14) post-allotransplantation and at D14 and D20 in the MSC-1 grafts. CD206+ cells appeared near the edges of the grafts. Although there were CD11c+ CD206+ cells at D14 and D20 in both grafts, the majority of the CD206+ cells were not DCs. These data suggest that the role of macrophages, DCs, and other immune cells in the grafts is complex and requires further study. Future studies will identify CD206+ cells and characterize the DCs as mature, immature, or regulatory. Overall, if the mechanisms mediating SC survival post-allotransplantation become clearer, transplantation survival can be much improved without the use of immunosuppressive drugs.

## 10. Mitochondrial MicroRNAs in aging and Alzheimer's

**A Kubosumi, PH Reddy**

Mitochondrial dysfunction is a hallmark of Alzheimer's and other neurodegenerative diseases. In recent years, microRNA's (miRNA) have been implicated in many disease processes and their roles in these processes have increasingly been explored. However, not much is known about the role of mitochondrial specific miRNA's in Alzheimer's disease. We hypothesized that mitochondrial miRNA's are misregulated in Alzheimer's disease. We selected 9 mitochondrial miRNAs that have been shown to be misregulated in various disease states and began searching for misregulation in APP and Tau mice compared to wild type mice. This process involved harvesting tissue from different sections of the mice brains (cortex, hippocampus). We then isolated the miRNAs from these samples, transcribed the miRNA to cDNA, and ran qt-pcr on our samples against

primers of our selected mitochondrial miRNAs. We found misregulation of certain mitochondrial miRNA's compared to the wild type mice.

## 11. The influence of rurality and travel time on pediatric cancer survival in a regional pediatric oncology center over the period of 2003–2014

**Ashley Maveddat, Udhaya Aelety, Duke Appiah, Kishor Bhende**

*Background:* Over the last quarter century, pediatric cancer outcomes and survivals have significantly improved. We assessed demographics of pediatric cancers at regional cancer center as well as differences in mortality and survival by rurality and travel time.

*Methods:* Data was from 248 pediatric cancer patients aged 0–19 years from Covenant Medical Center during the period of 2003–2014. Chi-square test and t tests were used to identify differences in cancer types and demographics between patients from rural or urban areas as well as travel time to this medical center. Cox proportional hazards regression was used to model the association of cancer survival with rurality and travel time.

*Results:* The mean age at diagnosis of patients was 8.8 years with 59% of them being males and 85% from Texas. Overall, 24% of patients had Leukemia, 11.3% had Lymphoma, 15.3% had central nervous system tumors and 32.3% had solid tumors. A greater proportion of rural cancer cases were from Texas compared to other states (99 vs. 83%,  $p = 0.001$ ). Patients who traveled more than a 1 hour to get to the treatment center were diagnosed with pediatric cancer at an earlier age compared to patients who travelled, <1 hour (7.8 vs. 9.7 years,  $p = 0.017$ ). Rural residents travelled longer hours to the treatment center than urban residents (1.43 vs. 0.99 hours,  $p = 0.001$ ). The overall 5-year survival was 85.8% (Rural: 88.4% vs urban: 84.2%,  $p = 0.539$ ). There was no difference in pediatric cancer survival regardless of type of cancer by rurality or time travelled treatment center.

*Conclusion:* Significant differences in the age at diagnosis and distance travelled to the treatment

center between cases from rural and urban counties did not significantly influence the overall survival for pediatric cancer in this regional pediatric oncology center.

## **12. Testing the beneficial effects of Sertoli cell-secreted C-peptide on cardiovascular related complications**

**Tanir Moreno**, Bilkis Mitu, Gurvinder Kaur, Jannette Dufour

Cardiovascular disease (CVD) is the leading cause of death among people with diabetes. Current insulin replacement therapies do not include C-peptide, which is a co-product of proinsulin. C-peptide has been shown to reduce high glucose (HG)-induced production of inflammatory cytokines. Transplantation of destroyed islet cells is the most physiological way to deliver insulin and C-peptide but is hindered by rejection. Immune-privileged Sertoli cells (SCs) can survive long-term when transplanted across immunological barrier, thus making SCs an excellent candidate for cell-based gene therapy. Previously, we have demonstrated that genetically engineered SCs, expressing insulin and C-peptide, transiently lowered blood glucose levels in diabetic mice. In this project, we are exploring the benefits of SC-secreted C-peptide as a novel therapy that may lower the risk of CVD. To test this hypothesis, we first generated a dose response curve to establish an optimal dose of C-peptide. Specifically, human umbilical vein endothelial cells (HUVECs), cultured in HG media, were treated with different concentrations of C-peptide (CP). HUVECs cultured in HG media alone were used as control. After 24hrs, RNA was collected and RT-qPCR was performed. C-peptide significantly decreased the expression of adhesion molecule (ICAM), proinflammatory cytokine (IL1b) and upregulated the expression of master anti-oxidant gene (Nrf2I2), at a concentration ranging from 0.5-5nM. Based on this information, HUVECs were treated with SC media containing secreted C-peptide (SCP) at concentration ranging from 0.5-5nM. SCP also significantly reduced the expression of adhesion molecules (ICAM and AGER) and upregulated the

expression of master anti-oxidant gene (Nrf2I2) as compared to control. No effect on pro-inflammatory cytokine (IL1b) or vasoconstrictor (endothelin) was detected. This suggests that genetically engineered SCs, secreting C-peptide, have the potential for lowering the risk of CVD.

## **13. Management of postsurgical donor site pain in burn injuries using a preoperative combination of bupivacaine plus liposomal bupivacaine injections**

**Bradley Osemwengie**, Grant Sorensen, John Griswold

*Introduction:* The skin graft donor site is often the most painful part of the healing process in a post-operative burn victim. Solutions such as adrenaline-lidocaine subcutaneous infiltrations have proven to be effective. In spite of all of this, standard of care at burn centers across the U.S. is currently just a wound dressing. Other procedures and strategies have been employed for managing donor site pain. A common concern is the duration of postoperative analgesic effects that persist in the patient in order to offer pain relief. The rapid loss of analgesia at the donor site is associated with increased pain which may be accompanied with decreased patient satisfaction, longer hospital stays, difficulties with dressing changes, comorbidities, and increased cost of care.

We propose that the combination bupivacaine plus liposomal bupivacaine injections will have a longer-lasting analgesic effect that reduces postoperative donor site pain and pain medication use compared to standard wound care using opticell dressing.

*Methods:* The study is a prospective, randomized design with each patient being randomly assigned to either a treatment or control group. Both groups will receive the standard of care opticell wound dressing, but the treatment group will receive the additional pre-surgical analgesia injections. The treatment group will receive a dose of 0.04 ml/cm<sup>2</sup> (0.52 mg/cm<sup>2</sup>) of bupivacaine and liposomal bupivacaine injections prior to skin harvest (4). Post-operatively, the wound will

be managed using the standard opticell wound care dressing. The control group will receive the standard of care, which consists only of postoperative wound care using opticell dressings. Self-reported donor site pain score will be recorded at the following intervals: postoperative day 1 at donor site outer dressing removal, as well as the mornings of postoperative day 2, 3, and 4. A final donor site pain assessment will be collected on day 7.

#### **14. Internal medicine weight based demographics**

**Samantha Edwards, Drew Payne, Marcella Rivas, Sharan Bijlani, Hannah Fairley, Nathan Lloyd**

Obesity is a contributing factor to many disease processes and continues to rise nationwide. The aim of this study was to estimate frequency and prevalence of obesity and its association with congestive heart failure, diabetes mellitus, obstructive sleep apnea, hypertension, and myocardial infarction in West Texas adults. Data were extracted from Texas Tech HSC internal medicine clinic from January 1st, 2016 through March 31st, 2018 (n = 9,528). Average levels of income based on zip code were also extrapolated. We found statistically significant differences (p<0.001) in all variables except MI (p = 0.055) and ethnicity (p = 0.054). We observed lower prevalence in our sample of any degree of obesity in males compared to females (43.8% vs. 48.6%), and particularly in the highest degree of obesity (20.1% vs. 27.4%). Male gender was slightly associated with lower weight, OR = 0.92 (95% CI: 0.85-0.99). Similarly, younger age (OR = 0.96, 95% CI: 0.94-0.98) and higher income level of residency area (OR = 0.96, 95% CI: 0.94-0.98) were found to have unadjusted very small protective effect on heavier weight status. Among health status predictors, we found that OSA (OR = 4.56, 95% CI: 4.02-5.17) was largely associated to heavier weight status. Diabetes (OR = 2.01, 95% CI: 1.86-2.17), HTN (OR = 1.88, 95% CI: 1.73-2.03), and HLD (OR = 1.56, 95% CI: 1.44-1.68) also showed a small effect size association with heavier weight status. The effect size of CAD (OR = 1.11, 95% CI: 1.01-1.22) was small, and

MI did not show any association with weight status. The frequency and prevalence of obesity continues to increase in West Texas adults. Comorbidities with significant morbidity and mortality are linked to obesity. Income is a protective characteristic and likely allows access to more effective preventive interventions. Access to these preventive interventions are needed to slow the rising prevalence of obesity and its comorbidities.

#### **15. Lone Star Peripheral Arterial Disease Registry (For PAD-CLI diagnosis, treatment and outcomes)**

**Tyler Helton, Rasikh Ajmal, Mohammad M. Ansari**

*Introduction:* Peripheral artery disease (PAD) is a prevalent and under-diagnosed disease. The etiology of this disease consists of atherosclerosis in the vasculature of the extremities and can cause many symptoms ranging from mild claudication to ischemia, necrosis and subsequent limb amputation. The study of PAD is an important area of research in cardiology as there is relatively little information on the outcomes of PAD treatment. There are only two known registries, but no registries in West Texas region where the disease is almost an epidemic due to high incidence of risk factors like DM, HTN, HLD, CAD, and smoking history. Therefore, the focus of this project is to compile the Lone Star PAD Registry, a quality initiative. This registry will contribute to further research, quality improvement, and better metrics and guidelines when addressing PAD patients in West Texas.

*Methods:* For the purpose of our quality control initiative, data collection was collected in fields consisting of patient's co-morbidities, demographics, presence of symptoms, ulcers, gangrene, Rutherford classification, ultrasound use, access site location, vessel lesion location, balloon and stent type, length and diameter of the stent or balloon used, type of atherectomy device used, type of crosser that was used, access site closure device used, and patient presentation and outcomes. Follow up includes management of disease and incidence of amputation, myocardial infarction, stroke and death.

**Conclusion:** This registry will contribute to further research, quality improvement, and better metrics and guidelines when addressing PAD patients in West Texas. Data collection is still ongoing, and currently has over 1,000 interventional procedures compiled from 2013 to 2018. The registry will soon have 5 consecutive years of data to make comparisons, and understand the disease prevalence in our community for the very first time.

### **16. *Acinetobacter baumannii* differentially regulates its transcriptome during its growth in blood from severely burned patients**

**Alikhan Karimi**, Moamen Elmassry, Sharmila Dissanaiké, John Griswold, Jane Colmer-Hamood, Abdul Hamood

The multidrug-resistant Gram-negative bacterium *Acinetobacter baumannii* (AB) is one of the main causes of infections of traumatic wounds and burns. AB rapidly disseminates within the host leads to bacteremia, sepsis and shock. Depending on the route of infection, mortality rates in patients with AB bacteremia vary from 30 to 75%. At this time, little is known regarding the pathogenesis of AB during septicemia in severely burned patients (SBP). We hypothesized that changes in the blood of SBP affect the expression of AB genes. To address this hypothesis, we grew AB strain A118 in whole blood from either SBP or healthy volunteers (HV) and examined the global gene expression using RNA-seq technology. Compared with its growth in blood from HV, the growth of AB in blood from SBP significantly altered the expression of 524 genes, upregulating the expression of 168 genes (including genes for nitrate [5], histidine degradation [3], and macrolide-specific efflux [2]) and downregulating the expression of 356 others (including genes for iron acquisition and transport [9], type VI secretion system [9], capsule formation [5], and type 1 pilus assembly [5]). To confirm these results, we analyzed the expression of some of these genes using qRT-PCR. As in the RNA-seq analysis, the level of xxxA, yyyB, zzzD, and, aaaZ expression was significantly reduced. These results suggest that during systemic infection in SBP and to adapt to the burn induced

changes in blood *A. baumannii* either upregulates or downregulates the expression of numerous genes related to virulence, antibiotic resistance, and anaerobic respiration.

### **17. Takayasu arteritis presenting as atypical Kawasaki disease**

**Aisha S. Khan, Roy Jacob, Fatma Levent**

Takayasu arteritis is an inflammation of large systemic vessels which is a very uncommon disease in children. We report the case of a 12-year old female who presented with fever lasting 8 days, weight loss, headache, and intermittent right foot and ankle pain. Upon further inquiry, fatigue, and left ankle joint pain were also noted. Inflammation markers including erythrocyte sedimentation rate (ESR), C-Reactive Protein (CRP), and platelets were elevated. Cultures remained negative for any microbial growth. An initial echocardiogram (ECHO) demonstrated a dilated proximal left main coronary artery measuring 5 mm with no aneurysms detected. These abnormal findings suggested a primary diagnosis of atypical Kawasaki's disease. A second ECHO performed before discharge revealed stable, a 5-mm dilated left main coronary artery. Approximately one month later, the patient's coronary enlargement was reported to have regressed with lower reactive marker values. Patient presented for follow-up with a nodule on her right arm and right flank region. A Magnetic Resonance Imaging (MRI) with contrast of ankle and joint revealed enhancement and edema around the posterior tibial artery of the distal leg, at the tibiotalar joint, and surrounding the peroneal nerve in the distal leg and ankle. A Computerized Tomography (CT) angiogram of her chest, abdomen, and pelvis were performed which demonstrated abnormal thickening of large and medium-sized vessels in the chest, abdomen, and pelvis as well as mild narrowing of the infrarenal abdominal aorta. Irregular renal involvement was also noted. These abnormal findings were indicative of Takayasu arteritis. Patient received intravenous immunoglobulin (IVIG) and high dose aspirin for treatment of initial diagnosis of atypical Kawasaki's Disease. Her fever resolved and foot and ankle pain improved upon completion

of IVIG administration. In light of abnormal imaging findings, she was referred to Pediatric Rheumatology for further evaluation.

### **18. Radiological findings supporting the diagnosis of tertiary syphilis**

**Shanshan Lee**, Mark Lacy, Roy Jacob, Fatma Levent

*Introduction:* Syphilis is an ancient, sexually transmitted disease caused by the spirochete *Treponema pallidum*. The course of the disease has several different stages, including primary, secondary, latent, and tertiary. From 2015 to 2016, the total cases of reported syphilis in the United States has increased by 17.8% reaching 8.7 cases per 100,000 population. Cases of tertiary stage also rose by 17.2%, mirroring the increase of rare manifestations of the disease. Sometimes syphilis presents with focal neurologic signs.

*Observations/Case presentation:* A 34 year-old African-American, Human immunodeficiency virus (HIV)-negative man presented to the clinic with a two-week history of blurry vision in the left eye and a droopy left upper eyelid. On examination, his visual acuity was 20/30. While lifting the upper eyelid, he was able to fully abduct his gaze but other extraocular motions were limited. Binocular diplopia and Argyll-Robertson pupil, where the pupil does not react to light, were also present. Subsequent magnetic resonance imaging showed an abnormal enhancement in left middle cerebral peduncle with involvement of cisternal segment of the left oculomotor nerve. Vasogenic edema was present in the left middle cerebral peduncle extending into the left aspect of mid-brain. Syphilitic gumma lesion was suspected and infection confirmed by various laboratory tests including serum rapid plasma reagin (RPR), cerebral spinal fluid (CSF) venereal disease research laboratory test (VDRL), and CSF fluorescent treponemal antibody absorption test (FTA-ABS).

*Conclusion:* Neurosyphilis should be suspected in patients with neurological signs and symptoms. A combination of serum non-treponemal screening and treponemal confirmatory tests, CSF analysis, and

radiographic imaging can be useful during diagnosis. Empiric antibiotic treatment and close observation of the patient's response should be pursued first before considering other options.

### **19. A student-generated, peer-led teaching activity for MSK and bone disorders**

**Brandon Pires, Kristie Benejan, Taylor Brown, Jacob Darter, Chandon Loya, Emily Mendez, Jackson Reynolds, Joshua Sorenson**, Gurvinder Kaur, Cassie Kruczek, Jennifer Mitchell, David Edwards, Betsy Jones

*Background:* TTUHSC School of Medicine has a 3-year MD curriculum leading to FM residency, the FMAT program. An 8-week course between the M1 and M2 years includes one week devoted to the MSK system. Immediately following, FMAT students participate in the Multisystems Disorders block with their peers in the traditional curriculum, including MSK and bone disorders.

*Methods:* For this initiative, FMAT students developed a student-generated/ led activity for the MSD course. Objectives were to assess whether FMAT students 1) develop proficiency in MSK exams and clinical reasoning; 2) can serve as effective peer teachers; and 3) perform better on relevant block exams compared to peers. At the beginning of the 2018 FMAT1 course, students measured their baseline knowledge and skills about MSK conditions and tests. During FMAT MSK week, they developed a teaching case for bone disorders for a peer-led session in the fall MSD course. Outcomes include FMAT and traditional student performance on pertinent exam questions during the MSD course.

*Results:* Significant improvement on MSK related questions was observed following peer-led instruction; however, no significant difference in scores on summative and formative assessments was observed between groups. Insignificant differences in scoring are likely attributable to the in-house unit exam content being broader than the scope of a single STS session. Some limitations include varying population sizes between groups with presenters making up the smallest sample (n = 30) and most affected

by variations in scores. Also, the formative assessment included questions not specific to STS session material.

*Discussion:* Future iterations should include feedback for each presentation, appropriateness to the current block material, and feedback of the presenter groups. While significant score improvement was not observed, overall, the presentations were regarded as useful and enjoyable and promoted independent learning.

## **20. Diabetes distress and socioeconomic factors: a cross sectional survey in West Texas**

**Caleb Stewart**, David S. Edwards

Diabetes distress is a distinct psychological diagnosis associated with living with type two diabetes, and consists of emotional burden, physician-related distress, regimen-related distress, and interpersonal distress. Diabetes distress has been clinically associated with poor glycemic control and self-care, with estimated prevalence in studies ranging from 18–36% of patients. In conjunction with surveying other social determinants of health, we used seven questions from the Diabetes Distress Screening Scale to determine if there was any correlation between socioeconomic factors such as a lack of transportation or employment/income, demographic data, and control of diabetes. We hypothesized that the prevalence of diabetes distress would be increased in patients with lack of reliable transportation and patients of low socioeconomic status. The research design was a cross sectional study in which a survey in Spanish or English was administered by medical students at ten clinics across the state of Texas. Inclusion criteria were patients over the age of 18 with type 2 diabetes diagnosis. Statewide analyses are pending, as data is continuing to be collected until n is sufficient for a measure of validity. Local data (n = 18, means age 59.7, 50% female) showed: 39% of patients reported moderate to severe regimen related distress; 44% reported moderate to serious emotional burden, 0% reported moderate to serious physician-related burden; 17% reported moderate to severe interpersonal distress. 50% of patients had uncontrolled

diabetes (HgbA1C>9). Overall, 67% of patients with uncontrolled type 2 diabetes responded yes to at least one measure of diabetes distress, but no patients had transportation issues. Diabetes distress is associated with adverse effects on patient outcomes. With increased awareness of this diagnosis, healthcare providers can be more ready to acknowledge patient distress, and help ameliorate it.

## **21. Screening for diagnostic markers of Alzheimer's disease**

**James Tran**, Hemachandra Reddy, Subodh Kumar, Nnana Amakiri, Aaron Kubosumi

Alzheimer's disease, the most common cause of dementia, is caused by progressive neurodegeneration of the brain leading to consequences such as but not limited to: memory loss, decreasing cognition, and changes in personality and behavior. Key histologic findings in post-mortem AD brain samples are amyloid plaques and neurofibrillary tangles consisting of denatured tau. It is projected that AD costs in the United States alone will total to an estimated \$277,000,000,000. Currently, AD is a diagnosis of exclusion as there are no methods of detection to confirm AD other than post-mortem brain tissue samples. Additionally, there is no strong evidence for a prevention or treatment for AD. As such, microRNA are brimming with potential not only as a probable diagnostic tool for AD and many other diseases but also as a therapeutic mechanism which may be able to combat AD. This group has purified mRNA from 4 wild-type and 4 tau-pathology mice cerebral cortex and hippocampus samples for real time quantitative PCR analysis to detect the presence of differential miRNA upregulation or downregulation between healthy control and AD mouse model brains. Specifically, presence or absence of miR-125b, miR-34a, miR-219, miR-9, miR-206, miR-146a, and miR-15/107 may elucidate more information as to how tau becomes hyperphosphorylated and aggregates into tangles in AD and may shed information into mechanisms which can be upregulated or downregulated in order to relieve or prevent the symptoms and progression of AD.

## **22. The role of Sm-p80-specific antibodies in protection against *Schistosoma mansoni* challenge infection in mice**

**Jonathan Umelo**, Adebayo J. Molehin, Afzal A. Siddiqui

Schistosomiasis remains a major global health issue caused by parasitic helminths belonging to the genus *Schistosoma*. There are 3 major schistosome species that can cause infection in humans. *Schistosoma mansoni*, the major cause of schistosomiasis in Africa and South America, will be the focus of this study. *S. mansoni* lives in fresh water snails. The cercariae (infectious form) emerges from the snail and contaminates fresh water. The cercariae penetrates the skin of individuals who come in contact with the contaminated water leading to intestinal disease. Over 240 million people are estimated to be currently infected worldwide with the majority being school-aged children. Current control measures centered on mass drug administration of praziquantel are inadequate due to lack of sustainability, inadequate coverage and sustained re-infection rates. Hence, there is an urgent need for the development of an effective schistosomiasis vaccine for long term protection. In addition, experts believe that elimination of schistosomiasis is only feasible through an integrated approach

combining current control measures with an effective schistosomiasis vaccine. Previous vaccine efficacy studies by our group have shown that the large subunit of *Schistosoma mansoni* calpain, Sm-p80, conferred immune protection against *S. mansoni* infections in rodents and non-human primate models of infection and disease. A balanced Th1/Th2 immune response in immunized animals are thought to be associated with immune protection against schistosomiasis. However, our understanding of the mechanisms involved in Sm-p80-mediated immune protection is limited. In this present study, we evaluated the role(s) of passively-transferred Sm-p80-specific antibodies in vaccine-mediated immunity against *S. mansoni* infections in C57BL/6J mice. We report a significant worm burden reduction of 53.7% ( $p = 0.034$ ) in experimental mice compared to their control counterpart. We also observed moderate reduction in liver egg burden (36%) and intestine egg burden (10%) demonstrating improved efficacy of Sm-p80-specific antibodies. Data from cytokine expression profiling shows that Th1-specific cytokines, IFN- $\gamma$ , IL-2 and TNF- $\alpha$ , are associated with the protection observed. Overall, our study showed that Sm-p80-specific antibodies play an important role in vaccine-mediated protection against schistosomiasis.