

The University of North Carolina at Chapel Hill
Department of Anesthesiology
Annual Research Report
2016-2017



UNC
SCHOOL OF MEDICINE

Dear Reader:

Welcome to our 2016-2017 UNC Department of Anesthesiology Annual Research Report. I hope that this summary gives you a better understanding of the exciting research work being done in the department. Our goal is to serve our patients through discovery, and we have had a very productive year.

The research success summarized in this report is achieved by three main factors. First, we are fortunate to have gathered together an incredible group of faculty and staff in the department. Second, these individuals excel at working together in collaborative, multidisciplinary teams. Research is truly a team sport. The effective collaboration of individuals in each of the projects described in this report accounts for our success, and we are fortunate that our numbers continue to grow. Finally, we have a Chair who fully embraces the mission of the university to reduce suffering and improve outcomes through advances, which lead to improved patient health. Dr. Zvara has provided the infrastructure and leadership necessary for transformative research, even during very challenging economic times.

I encourage you to check back often and keep up with our department research activities via <http://www.med.unc.edu/anesthesiology/research>. Also, if you have any questions regarding our research or work, don't hesitate to email me any time at Samuel_McLean@med.unc.edu.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Sam McLean', with a stylized, flowing script.

Samuel McLean, MD, MPH
Vice Chair, Research, Department of Anesthesiology
The University of North Carolina at Chapel Hill
Chapel Hill, NC

Table of Contents

Areas of Departmental Research Focus

1. Institute of Trauma Recovery

A. AURORA	1
B. African American CRASH.....	2
C. The Women’s Health Study	5
D. Linnstaedt Lab	7
E. Project Burn.....	10

2. Anesthesiology Clinical Trials Research Unit

A. 3M Antimicrobial Dressing	12
------------------------------------	----

3. Resident Conference Presentations

	13
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Department Research Products

1. Published Abstracts.....	18
2. Journal Articles.....	20
3. Books.....	20
4. Grants.....	22

Areas of Departmental Research Focus

1. Institute for Trauma Recovery

On behalf of the Anesthesiology Department, welcome to our Research Division. Our research portfolio in the department includes a thematic, NIH-funded research program focused on improving pain outcomes and recovery after stress and trauma (UNC Institute for Trauma Recovery).



A. AURORA: Longitudinal Assessment of Post-traumatic Syndromes (U01MH110925, PI McLean)



**Scientific discovery to provide
new hope for veterans and
trauma survivors**

The AURORA study represents a major national initiative to improve the understanding, prevention, and recovery of individuals who have experienced a traumatic event. This is the largest-ever study of trauma recovery involving 12+ emergency departments nation-wide, more than 30 million dollars in federal and private funding, and involving partnerships with leading tech companies such as Google. Five thousand participants who present to the emergency department for evaluation after trauma exposure, meet screening and eligibility criteria, and consent to the study will undergo a brief emergency department assessment of trauma-related, psychosocial, neurocognitive, and

biological factors. Participants will be discharged with ecological monitoring, and will complete physiologic, biologic, neurocognitive, symptom, and health outcome assessments during one-year follow-up. Subsamples of study participants in Atlanta and Boston will undergo in-person deep phenotyping at 2 weeks and 6 months, consisting of biologic collection, functional magnetic resonance imaging (fMRI), and psychophysical evaluation. This past year was spent developing assessments with leading experts across the country, identifying and onboarding study sites, and beginning our nationwide study launch. You can learn more about the AURORA study at <https://www.med.unc.edu/itr/aurora-study/>.

B. African American CRASH: Applying the Biopsychosocial Model to Post-MVC Pain Development in African Americans (R01AR060852, PI McLean)

The goal of this study is to examine genotypic and phenotypic characteristics associated with the development of pain and related outcomes in African Americans experiencing motor vehicle collision. Patients involved in motor vehicle collision are enrolled via a network of study sites including sites in Michigan, Massachusetts, Pennsylvania, New Jersey, Washington D.C., North Carolina, Alabama, and Florida. This study is supported by the National Institute of Arthritis and Musculoskeletal and Skin Diseases of the National Institutes of Health (R01AR060852), and is enrolling 900 African Americans experiencing motor vehicle collision. Study participants complete a baseline assessment in the ED as well as a follow-up interview 6 weeks, 6 months, and 1 year following the motor vehicle collision. This study completed its no cost extension year in 2016-2017. An updated listing of abstracts and manuscripts from R01AR060852 is available at: <http://www.med.unc.edu/anesthesiology/research/triumph-research-group-1/triumph-studies/african-american-project-crash>



2016-2017 Abstracts Related to R01 AR060852 (African American CRASH)



Borde A, Bien M, Flannigan S, Soward A, Kurz M, Hendry P, Zimny E, Lewandowski C, Velilla MA, Damiron K, Pearson C, Domeier R, Kaushik S, Feldman J, Rosenberg M, Jones J, Swor R, Rathlev N, Peak D, Lee D, McLean SA: Post traumatic stress disorder outcomes at six months in African Americans vs. European Americans experiencing motor vehicle collision. *Biological Psychiatry* 2017 May; 206 (81); S85.



Bhatt K, Borde A, Bien M, Flannigan S, Soward A, Kurz M, Hendry P, Zimny E, Lewandowski C, Velilla MA, Damiron K, Pearson C, Domeier R, Kaushik S, Feldman J, Rosenberg M, Jones J, Swor R, Rathlev N, McLean SA: Living in a low socioeconomic status neighborhood increases risk of developing clinically significant PTSD symptoms after motor vehicle collision: results of a prospective cohort study. *Biological Psychiatry* 2017 May; 204 (81); S84-S85.

Linnstaedt S, Yu S, Chen C, Kurz M, Pearson C, Hendry P, Lewandowski C, Domeier R, Damiron K, McLean SA: Expression levels of XIST RNA predict PTSD and chronic pain outcomes in women experiencing motor vehicle collision. *Biological Psychiatry* 2017 May; 334 (81); S137.

2016-2017 Publications Related to R01 AR060852 (African American CRASH)

Linnstaedt SD, Hu JunMei, Liu AY, Soward AC, Bollen KA, Wang HE, Hendry PL, Zimny E, Lewandowski C, Velilla MA, Damiron K, Pearson C, Domeier R, Kaushik S, Feldman J, Rosenberg M, Jones J, Swor R, Rathlev N, **McLean SA**. Methodology of the AA CRASH Prospective Observational Study Evaluating the Incidence and Pathogenesis of Chronic Pain and Adverse Psychological Outcomes in African Americans following Motor Vehicle Collision. *BMJ Open*. Accepted June 2016.



Institute for Trauma Recovery Research Group, October 2017

Back Row (L to R): Sophie Flotron, Donglin Zeng, Heather Lansdell, Van Tang, Aditi Borde, Jenyth Sullivan, Samuel McLean, Jessica Stanek, Matthew Mauck, Desma Jones, Council Mintz, Sarah Linnstaedt
 Front Row (L to R): John Cashwell, Rebecca Price, April Soward, Kartik Bhatt, Dana Sadek, Kristen Witkemper, Emmalee Metzler



Institute for Trauma Recovery Research Group, August 2017

Back Row (L to R): Jackie Kostyla, Sophie Flotron, Byron Maltez, Jenyth Sullivan, Jessica Stanek, Emmalee Metzler, Vicki Sandlin
 Front Row (L to R): Council Mintz, Kartik Bhatt, Desma Jones, Rebecca Price, Allison Hildebrand

C. The Women's Health Study: Influence of PTSD Symptoms on Chronic Pain Development after Sexual Assault (1R01AR064700-01A1, PI McLean)

Sexual assault is experienced by as many as 1 in 5 women worldwide, yet no research network dedicated to improving the recovery of sexual assault survivors exists anywhere in the world. No ongoing research studies are being performed to understand how to better improve the recovery of sexual assault survivors, and as a result little advances in the care and treatment of sexual assault survivors have occurred in decades. The long-term vision of the Better Tomorrow Network is that one day no sexual assault survivor will experience chronic reductions in physical health, mental health, or quality of life due to sexual assault.



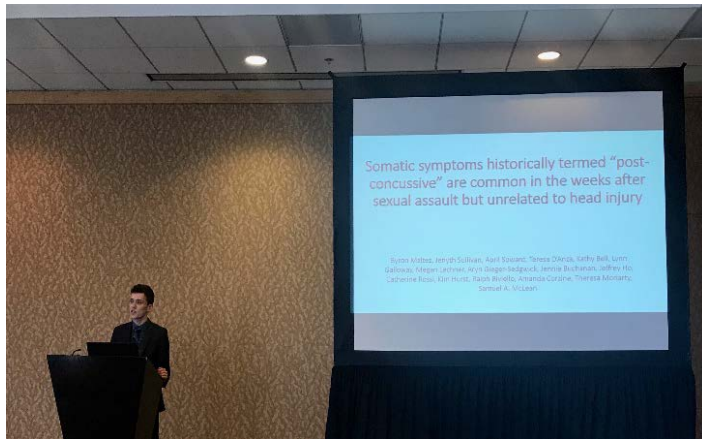
A research network dedicated to improving the care and treatment of sexual assault survivors.

The mission of the Better Tomorrow Network is to conduct high quality research studies that yield continuously improved understanding, treatments, and services for sexual assault survivors.

The Women's Health Study is the first large-scale prospective study of sexual assault survivors within the Better Tomorrow Network. The five-year study will enroll 900 women who present for emergency care after sexual assault and will follow them prospectively for one year. This study will yield important new insights into sexual assault survivor experiences. In addition, the study will evaluate genetic, psychosocial, and environmental factors influencing adverse outcomes after sexual assault including chronic pain and posttraumatic stress disorder. This past year was focused on preliminary data analyses, study enrollment, and participant follow-up at the Women's Health Study recruiting sites.



2016-2017 Abstracts Related to R01 AR064700-01A1 (Women's Health Study)



Maltez B, Sullivan J, Soward A, D'Anza T, Bell K, Galloway L, Lechner M, Gieger-Sedgwick A, Buchanan J, Ho J, Rossi C, Hurst K, Riviello R, Corzine A, Moriarty T, McLean SA: Somatic symptoms historically termed "post-concussive" are common in the weeks after sexual assault but unrelated to head injury. *Biological Psychiatry* 2017 May; 408 (81); S166-S167.

Sullivan J, Maltez B, Soward A, D'Anza T, Bell K, Galloway L, Lechner M, Gieger-Sedgwick A, Metz M, Ho J, Rossi C, Hurst K, Riviello R, Corzine A, Moriarty T, McLean SA: Strangulation during sexual assault predicts increased PTSD symptoms six weeks after assault. *Biological Psychiatry* 2017 May; 205 (81), S85.



The Women's Health Study Team, October 2017

D. Linnstaedt Lab



The main goals of the Linnstaedt Lab are to a) understand individual biological susceptibility to the development of adverse outcomes following trauma exposure and b) to define novel mediators in the pathogenesis of posttraumatic outcomes such as chronic pain and posttraumatic stress. Over the past year, we



have made a number of important advances towards these goals. First, we showed that individuals with specific risk alleles in stress-associated genes increase susceptibility to chronic pain development following motor vehicle collision (**refs a, e, f, I**, below). We also found that



Linnstaedt Lab, 2016-2017

From left to right: Matt Carson, Kyle Riker, Shan Yu, Cathleen Rueckeis, Connie Chen, Phillip Huynh, Jameson Blount, Sarah Linnstaedt

genetic variants in circadian rhythm genes influence an individual's risk of developing posttraumatic stress symptoms (**ref b**), and that circadian and stress system genetic variants interact to influence the recovery process following trauma. Second, we determined that a number of molecular mechanisms driving persistent adverse outcomes following trauma exposure are sex dependent. For instance, miR-19b, a microRNA that is predicted to regulate more pain and posttraumatic stress associated transcripts than any other microRNA, and has been associated with both outcomes before, is differentially expressed in males and females who develop pain and posttraumatic stress versus recover following trauma (**ref d**). This is an important discovery because this microRNA had only been studied in male animals and humans previously. Another study that we focused on over the past year was whether genes that escape X chromosome inactivation are important in the post-trauma recovery process in women. Preliminary results indicate that *XIST* RNA, a non-coding RNA that

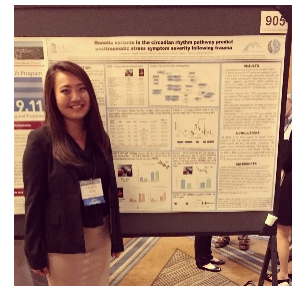
regulates gene expression from the X chromosome is an important predictor of chronic pain and posttraumatic stress following trauma exposure (**ref c**). Current experiments in the lab are focused on defining further mechanisms of sex dependent regulation and effects of pathogenic RNA in the context of post-trauma chronic pain and posttraumatic stress development.

2016-2017 Related Abstracts

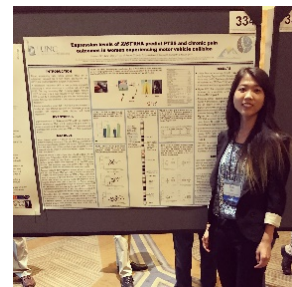
a. Linnstaedt SD, Riker KD, Kutchko KM, Lackey L, Kurz M, Lewandowski C, Pearson C, Hendry PL, Laederach A, McLean SA. *FKBP5* variant rs3800373 alters *FKBP5* RNA secondary structure and prevents stress-induced microRNA-320a downregulation of *FKBP5*, resulting in glucocorticoid resistance and increased vulnerability to chronic posttraumatic pain. *Invited Oral Presentation* at the 2017 Annual Society for Biological Psychiatry Meeting, San Diego, May 2017.



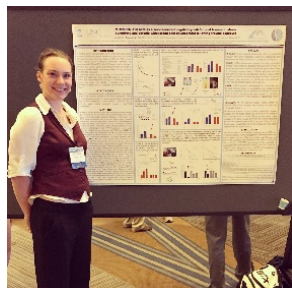
b. Linnstaedt SD, Jung LS, Zhou CY, Mauck MC, Kurz M, Zimny E, Pearson C, Hendry PL, McLean SA. Genetic variants in the circadian rhythm pathway predict PTSD symptoms following trauma exposure. *Poster Presentation* at the 2017 Annual Society for Biological Psychiatry Meeting, San Diego, May 2017.



c. Linnstaedt SD, Yu S, Chen C, Kurz M, Pearson C, Hendry PL, Lewandowski C, Domeier R, Damiron K, McLean SA. Expression levels of *XIST* RNA predict PTSD and chronic pain outcomes in women experiencing motor vehicle collision. *Poster Presentation* at the 2017 Annual Society for Biological Psychiatry Meeting, San Diego, May 2017.



d. Linnstaedt SD, Rueckeis CA, Riker KD, Yu S, Chen C, King T, Lewandowski C, Hendry PL, Pearson C, Kurz M, Damiron K, Domeier R, Liberzon I, McLean SA. microRNA -19b acts as a sex-dependent regulatory hub for PTSD and chronic widespread pain development following trauma exposure. *Poster Presentation* at the 2017 Annual Society for Biological Psychiatry Meeting, San Diego, May 2017.



e. Linnstaedt SD, Riker KD, Kurz M, Pearson C, Hendry PL, Lewandowski C, Zimny E, Velilla MA, Damiron K, McLean SA. miRNA-320a regulation of *FKBP5* mediates chronic posttraumatic pain vulnerability in an allele-specific manner. *Poster Presentation* at the 2017 Annual American Society for Anesthesiologists Meeting, Boston MA, October 2017.



Students at The Society for Biological Psychiatry Meeting in San Diego, May 2017.

From left to right: Lindsey Jung, Kyle Riker, Cathleen Rueckeis, Sarah Linnstaedt

2016-2017 Related Publications

f. Linnstaedt SD, Bortsov AV, Soward AC, Swor R, Peak D, Jones J, Rathlev N, Lee DC, Domeier R, Hendry P, McLean SA. *CRHBP* polymorphisms predict chronic pain development following motor vehicle collision. *Pain*. 2016 Jan; 157(1):273-9.

g. Linnstaedt SD, Riker KD, Walker MG, Nyland JE, Zimny E, Lewandowski C, Hendry PL, Damiron K, Pearson C, Velilla MA, Jones J, Swor RA, Domeier R, McLean SA. microRNA-320a predicts chronic axial and widespread pain development following motor vehicle collision in a stress-dependent manner. *J Orthop Sports Phys Ther*. 2016;46(10):911-919, B1-B3.

h. Linnstaedt SD, Hu JunMei, Liu AY, Soward AC, Bollen KA, Wang HE, Hendry PL, Zimny E, Lewandowski C, Velilla MA, Damiron K, Pearson C, Domeier R, Kaushik S, Feldman J, Rosenberg M, Jones J, Swor R, Rathlev N, McLean SA. Methodology of the AA CRASH Prospective Observational Study Evaluating the Incidence and Pathogenesis of Chronic Pain and Adverse Psychological Outcomes in African Americans following Motor Vehicle Collision. *BMJ Open*. 2016 Sep 6;6(9).

i. Linnstaedt SD, Walker MG, Riker KD, Nyland JE, Hu JM, Rossi C, Swor RA, Jones JS, Diatchenko L, Bortsov AV, Peak DA, McLean SA. Genetic variant rs3750625 in the 3'UTR of ADRA2A affects stress dependent acute pain severity after trauma and alters a microRNA-34a regulatory site. *Pain*. 2017 Feb;158(2):230-239

E. Understanding Mechanisms and Promoting Healing among survivors of Major Thermal Burn Injury.

The Institute for Trauma Recovery is working to better understand the mechanisms underlying chronic pain development in the aftermath of major thermal burn injury. Worldwide there are approximately 11 million burn injuries that occur annually, and a significant number of these individuals go on to experience life-altering chronic pain and itch. The Institute has teamed up with surgeons in the Jaycee Burn Center at UNC, as well as with leading burn centers from around the United States, to improve our understanding of the mechanisms responsible for chronic pain and suffering experienced by survivors of major burn injuries. Over previous years, this research network has enrolled 96 burn survivors in an observation cohort in which pain and post-traumatic outcomes were longitudinally measured. In this past year, we have published three findings from this cohort study, which will serve as the foundation for future, larger scale studies.

First, we have demonstrated that pain and itch in the aftermath of major thermal burn injury is common and causes significant impact on mental and physical functioning. Our analysis revealed that pain appears to cause a greater impact on life function compared to itch. We have published this finding, which is fundamental in defining sensory problems and their impact in the aftermath of injury.



Matthew Mauck, MD, PhD

Second, we have published the finding that African American burn survivors experience a greater burden of pain and itch severity following major burn injury compared to European Americans. This finding is independent of age, sex, and whether opioids were administered. This finding is consistent with reports from the literature demonstrating that African Americans experience greater pain sensitivity than European Americans in experimental settings.

Finally, we have published results demonstrating that pathological scarring in the aftermath of burn injury is associated with chronic pain severity 6 months following major thermal burn injury. This result indicates that interventions that address scarring may improve pain outcomes and vice versa.



PROJECT BURN

Institute for Trauma Recovery

**Understanding Mechanisms
and Promoting Healing**

2016-2017 Related Abstracts

Mauck, M.C., et. al. Functional Consequences of Graft Site Pain and Itch in Survivors of Major Thermal Burn Injury. Given at: American Society of Anesthesiologists, Annual Meeting, Chicago, Illinois, 10/2016.

Mauck, M.C. et. al. African Americans Experience a Greater Burden of Pain and Itch after Major Thermal Burn Injury than European Americans (Lecture). Given at: International Association for the Study of Pain, Annual Meeting, Yokohama, Japan, 9/27/2016.

Best Translational Poster Award

Mauck M., McCall M.H., Sefton, C., Jones S., Hwang, J., Williams F., Shupp J., Karlnoski R., Smith D., Cairns B., McLean S. Initial posttraumatic stress symptoms predict persistent pain after major thermal burn injury. Given at: Annual Society for Biological Psychiatry Meeting, San Diego, May 2017.

2016-2017 Related Publications

Mauck MC, Smith J, Liu AY, Jones SW, Shupp JW, Villard MA, Williams F, Hwang J, Karlnoski R, Smith DJ, Cairns BA, Kessler RC, McLean SA. Chronic Pain and Itch are Common, Morbid Sequelae among Individuals Who Receive Tissue Autograft after Major Thermal Burn Injury. *Clin J Pain*. 2017 Jul;33(7):627-634.

Mauck MC, Smith J, Shupp JW, Weaver MA, Liu A, Bortsov AV, Lateef B, Jones SW, Williams F, Hwang J, Karlnoski R, Smith DJ, Cairns BA, McLean SA. Pain and itch outcome trajectories differ among European American and African American survivors of major thermal burn injury. *Pain*. 2017 Nov;158(11):2268-2276. doi: 10.1097/j.pain.0000000000001029.

Mauck, M.C., Shupp, J.W., Williams, F., Villard, M.A., Jones, S.W., Hwang, J., Smith, J., Karlnoski, R., Smith, D.J., Cairns, B.A., McLean, S.A.. Hypertrophic scar severity at autograft sites is associated with increased pain and itch after major thermal burn injury. *Journal of Burn Care and Research* 2017 in press.

2. Anesthesiology Clinical Trials Research Unit

The UNC Anesthesiology Clinical Trials Research Unit specializes in pain management interventional studies involving medications or devices. Their facilities at the hospital of UNC Health Care and the Pain Management Center at Southern Village allow them to attract a diverse patient population. They work with Department of Anesthesiology faculty to manage and conduct both industry-sponsored clinical trials and investigator-initiated studies. Their track record is a testament to this outstanding team: UNC is currently a national and international leader in the recruitment and retention of individuals for several clinical trials. Their team of professionals includes a full-time research coordinator and nursing staff, as well as regulatory and other support staff. Individual faculty studies performed in collaboration with the clinical trials team are described below.



Clinical Research Team, 2016-2017

Left to Right: Vicki Sandlin, Dr. Priya Kumar, Ken Norman, Jackie Kostyla

A. 3M Antimicrobial Dressing - A Multi-center, Open-label, Prospective, Observational Pilot Study of the Performance of an Investigational Antimicrobial Dressing



The objective of this study was to evaluate performance of an investigational antimicrobial dressing. Performance was evaluated based on dressing wear time, ease of dressing applications and removals and patient comfort. Enrollment was completed in April 2017. 28 participants were enrolled at UNC.

3. Resident Conference Presentations

Presenter	Title	Conference	Place
CBY Residents			
Hallman, Matt	Optimizing Administration of Postoperative Oral Opioids in Ambulatory Surgery Patients	Society for Ambulatory Anesthesia Annual Meeting 2017	Scottsdale, AZ
CA-1 Residents			
Clerizier, Soshana	Radiation Safety Educational Module Increases Radiation Exposure Awareness Among Anesthesia Personnel	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Foushee, Madison	Esophageal Perforation and Concurrent Myocardial Infarction: A Complicated and Morbid Combination	Society of Cardiovascular Anesthesiologists Annual Meeting 2017	Orlando, FL
Hill, Adam	Standardization of the Transfer of Patient Care from the OR to the CTICU Improves Provider Satisfaction and Handover Quality	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Mojesky, Colton	Anaphylaxis Secondary to an IgE- Mediated Cisatracurium Allergy	North Carolina Society of Anesthesiologists Annual Meeting 2016	Charleston, SC
Mozingo, Cy	The Impact of an Educational Module on the Use of Perioperative Non-opioid Multimodal Analgesics in Laparoscopic Hernia Repair Procedures	North Carolina Society of Anesthesiologists Annual Meeting 2016	Charleston, SC
Park, Jeff	Neck Hamartoma	North Carolina Society of Anesthesiologists Annual Meeting 2016	Charleston, SC
Rose, Kathryn	Assessing Feedback Quality for OB Anesthesia Post-op Visits	North Carolina Society of Anesthesiologists Annual Meeting 2016	Charleston, SC
Schott, Katherine	Improving Patient, Nurse, and Physician Satisfaction with Patient Completed Agenda Forms at a Public Hospital Pain Clinic	North Carolina Society of Anesthesiologists Annual Meeting 2016	Charleston, SC
Schott, Katherine	Intrathecal Drug Delivery System in an Elderly Male with Cancer	American Society of Anesthesiologist Annual Meeting 2016	Chicago, IL
Schott, Katherine	1. Dermatitis in a Patient with Progesterone Hypersensitivity after Spinal Steroid Injection 2. Intrathecal Drug Delivery System in an Elderly Male with Cancer on Anticoagulation	American Society of Regional Anesthesia and Pain Medicine Annual Meeting 2017	San Francisco, CA
CA-2 Residents			
Acosta, Stephen	Cardiac Herniation after Right-Sided Robotic Assisted Thymectomy	Society of Cardiovascular Anesthesiologists Annual Meeting 2017	Orlando, FL

Berry, Barden	Ambulatory Orthopedic Surgery in a Patient with a History of both Severe Postoperative Nausea and Vomiting and Confirmed Intraoperative Awareness	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Berry, Barden	Unicuspid Aortic Valve by Trans-esophageal Echocardiography during Aortic Valve Replacement	Society of Cardiovascular Anesthesiologists Annual Meeting 2017	Orlando, FL
Bowling, Britney	Epidural Abscess Following a Dog Bite	Pain Society of the Carolinas Meeting 2016	Asheville, NC
Bowling, Britney	1. Ventricular Bigeminy as a Consequence of Severe Anemia 2. Difficult Airway Management in Severe Ehlers-Danlos Syndrome 3. Anesthetic Considerations of a Patient with a Metal Tracheostomy Tube	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Hensier, Erica	Neostigmine-Induced Asystole in a Patient with Myasthenia Gravis	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Henley, Megan	1. Acute Angioedema and Laryngeal Edema at Emergence Necessitating Emergent Reintubation 2. Hypercarbia, Hypertension, and Tachycardia without Acidosis: Malignant Hyperthermia?	North Carolina Society of Anesthesiologists Annual Meeting 2016	Charleston, SC
Henley, Megan	1. Acute Angioedema and Laryngeal Edema at Emergence Necessitating Emergent Reintubation 2. Postoperative Hypercarbic Respiratory Failure Leading to Stroke-like Symptoms 3. Approach to Management of a Massive Recurrent Mycotic Aortic Pseudoaneurysm: A Tale of Three Surgeries	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Henley, Megan	Chronic Circumferential Aortic Dissection Masquerading as a Supraaortic Membrane	Society of Cardiovascular Anesthesiologists Echo Week 2017	Atlanta, GA
Mathew, Anita	1. Airway Management in a Patient with a Large Tracheal Mass 2. Anesthetic Considerations for Cramp Fasciculation Syndrome 3. The Pediatric Anterior Mediastinal Mass	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Mayo, Kristina	Hypoxia in a Liver Transplant Patient Presenting for Elective Ventral Hernia Repair	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
McMillan, Daniel	Intraoperative Pulmonary Embolism Identified in Patient with Persistent Hypoxia: How to Proceed with Management	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Pesantes, Paola	1. Aorto-esophageal Fistula after Esophageal Stent Placement: Anesthetic Management 2. Malignant Hyperthermia Masked by Alcohol Withdrawal 3. Tracheal Aspiration of a Nasal Airway in a Patient with Laryngeal Cancer	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Pesantes, Paola	1. Hemorrhage Cart: How Much Time is Saved in a Critical Scenario? 2. Type 1 vWD: Factor Levels don't Always Correct During Pregnancy	Society for Obstetric Anesthesia and Perinatology Annual Meeting 2017	Bellevue, WA

Reddy, Aravind	1. Delayed Detection of an Epidural Abscess on Contrast-Enhanced MRI 2. King Cobra Envenomation: Critical Care Considerations	North Carolina Society of Anesthesiologists Annual Meeting 2016	Charleston, SC
Reddy, Aravind	1. Delayed Detection of an Epidural Abscess on Contrast-Enhanced MRI 2. King Cobra Envenomation: Critical Care Considerations 3. Massive Transfusion Protocols in Trauma: An Ethical Dilemma	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Rosenkrans, Daniel	Traumatic Tracheal Perforation from Crush Injury: Anesthesia and Surgical Considerations	Society of Cardiovascular Anesthesiologists Annual Meeting 2017	Orlando, FL
Specht, Brian	Therapeutic and Diagnostic Use of Regional Anesthesia for Recurrent Intractable Hiccups	North Carolina Society of Anesthesiologists Annual Meeting 2016	Charleston, SC
Specht, Brian	1. Enhanced Recovery Clinical Pathway for Pancreatic Surgical Patients Decreases Unanticipated ICU Admissions 2. Cardiopulmonary Bypass Options for Open TAAA Repair	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Specht, Brian	Goal Directed Fluid Therapy During Hemispherotomy	Society for Pediatric Anesthesia Annual Meeting 2017	Austin, TX
Specht, Brian	In-situ Simulation Program in Gastrointestinal Procedures Suite Improves Application of Crisis Resource Management Principles	International Meeting on Simulation in Healthcare Meeting 2017	Orlando, FL
Straube, Lacey	Considering Radiation-Induced Baroreceptor Dysfunction on the Differential for Post-Induction Hypotension	American Society for Anesthesiologists Annual Meeting 2016	Chicago, IL
Wang, Jacob	1. Awake Intubation in a Disoriented ICU Trauma Patient 2. Anesthetic Management of Rare Genetic Disorders: A Case of Dyggve Melchoir Clausen Syndrome	North Carolina Society of Anesthesiologists Annual Meeting 2016	Charleston, SC
Wang, Jacob	1. Perioperative Management of Preinduction 2. Preventing Phantom Eye Syndrome	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Wang, Jacob	Intrapleural Fibrinolytics and Thoracic Epidurals	American Society of Regional Anesthesia Pain Medicine Annual Meeting 2017	San Francisco, CA
CA-3 Residents			
Ashraf, Muhammad	Reasons for Missed Appointments at an Academic Pain Center	North Carolina Society of Anesthesiologists Annual Meeting 2016	Charleston, SC
Ashraf, Muhammad	Adult Emergent Intubation Using a LONA Pediatric Bougie and Fiberoptic Scope	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Bruno, Kelly	Early Removal of Urinary Catheters in Patients with Thoracic Epidurals	Pain Society of the Carolinas Meeting 2016	Asheville, NC

Bruno, Kelly	ECG Artifact in Isoelectric Bispectral Index (BIS) Monitor Recording	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Bruno, Kelly	Tricuspid Valve Avulsion After Blunt Chest Wall Trauma: Replace Now or Wait?	Society of Cardiovascular Anesthesiologists Annual Meeting 2017	Orlando, FL
Dhandha, Vishal	1. Hyperkalemic Periodic Paralysis in the Patient with Suspected Airway 2. Back in the Saddle: A Spinal Anesthetic on a Patient with Facioscapulohumeral Muscular Dystrophy Presenting for a Hemorrhoidectomy	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Dhandha, Vishal	Acute, Severe Aortic Insufficiency Leading to Cardiac Arrest in Trans-catheter Aortic Valve Replacement: Implications and Management	Society of Cardiovascular Anesthesiologists Annual Meeting 2017	Orlando, FL
Frangopoulous, Christo	Adductor Canal vs. Femoral Nerve Catheters: A Retrospective Comparison in Total Knee Arthroplasty Patients	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Frangopoulous, Christo	1. Enlarged Coronary Sinus Discovery after Bacterial Endocarditis Diagnosis 2. Analgesic Techniques for a Thoracic Enhanced Recovery Pathway: Intercostal Blocks Provide Equivocal Analgesia and Shorter Length of Stay Compared to Thoracic Epidurals	Society of Cardiovascular Anesthesiologists Annual Meeting 2017	Orlando, FL
Thompson, Jessica	Implementation of UNC Perioperative Blood Management Strategy for Urologic Surgery	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Thompson, Jessica	Impaired Labor Epidural Analgesia Following Epidural Blood Patch Complicated by Arachnoiditis	Society for Obstetric Anesthesia and Perinatology Annual Meeting 2017	Bellevue, WA
Kazior, Michael	1. Emergency Manuals Improve Novice Physician Performance During Simulated ICU Emergencies 2. The Good, the Bad, and the Ugly: Intraoperative Transitions of Care Amongst Anesthesia Providers	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Lateef, Bilal	Use of Pulsed Radiofrequency Ablation of Genitofemoral Nerve and Deep Perineal Trigger Point in the Treatment of Chronic Genital Pain	Pain Society of the Carolinas Meeting 2016	Asheville, NC
Lateef, Bilal	Development and Implementation of an EPIC Anticoagulation Flowsheet	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Lateef, Bilal	Spinal Epidural Abscess: Examination of Risk Factors	American Society of Regional Anesthesia and Pain Medicine Pain Conference 2016	San Diego, CA
Lateef, Bilal	Development and Implementation of an EPIC Anticoagulation Flowsheet	American Society of Regional Anesthesia and Pain Medicine Annual Meeting 2017	San Francisco, CA

Low, Aaron	Reducing Noise During Pediatric Inductions: Making Anesthesia Safer for Our Children	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Low, Aaron	1. Prior Failed Airway? The role of... 2. Pediatric Superior...	Society for Pediatric Anesthesia Annual Meeting 2017	Austin, TX
Marino, Morgan	Improved Immediate Postoperative Mental Status and Decreased PACU Times as a Result of an ERAS Clinical Pathway	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Maves, Gregory	Implementation on an Enhanced Recovery Pathway for Children Undergoing Major Bowel Surgery	Society for Pediatric Anesthesia Annual Meeting 2017	Austin, TX
Maves, Gregory	Dynamic Tracheal Obstruction from a Posterior Mediastinal Hematoma	Society of Cardiovascular Anesthesiologists Annual Meeting 2017	Orlando, FL
Rohman, Timothy	1. Enhanced Recovery Pathway (ERP) for Thoracic Surgical Patients Decrease PACU Recovery Time and Opioid Use 2. Left Ventricular Foreign Body after Failed Transcatheter Mitral Valve Repair: Implications and Management	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Sitzman, Dustin	1. Time is Brain: Is the Addition of an Anesthesia Care Team a Waste of Brain? 2. Heart Transplant Patient that Developed Right Ventricular Failure after Suspected Protamine Reaction	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL
Smeltz, Alan	Detection of Massive Pulmonary Embolism in the Absence of Right Heart Strain using Transesophageal Echocardiography	American Society of Anesthesiologists Annual Meeting 2016	Chicago, IL

Departmental Research Products

1. Published Abstracts (in alphabetical order of first author)

Balfanz, G., Sellers, S., Isaak, R., In-Situ "Code-Blue" Simulations Unmask Areas in Critical Need of Improvement by Code Response Team. Program Innovation Abstract Poster Presentation presented at: International Meeting for Simulation in Healthcare. Orlando, FL January 29, 2017.

Chen, F., Harendra, A., Martinelli, S.M. Use of Key Performance Indicators for Milestone Assessment in Semi-Annual Clinical Competency Committee Meetings. Poster to be presented at Society for Education in Anesthesia Spring Annual Meeting, Jacksonville, FL.

Chen, F., Stiegler, M., & Isaak, R. Global Rating Scores Have a Strong Correlation to Competence Referenced Checklist Scores for OSCE. Poster to be presented at International Anesthesia Research Society 2017 Annual Meeting and International Science Symposium, Washington, DC, May 2017

Conrad N, Halweg P, Cobb B, McNaull P. Emergency intubation in the setting of a critical airway and no venous access: anesthetic challenges and the importance of interdisciplinary communication. American Society of Anesthesiologists, Chicago, IL, October 2016

Conrad N, Pittenger S. Neurosurgical emergency and subsequent cardiac arrest in a postoperative Fontan patient; challenges for the anesthesiologist. American Society of Anesthesiologists, Chicago, IL, October 2016

Conrad N, Ross E, Lupa C. Dexmedetomidine is Associated With More Postoperative Respiratory Events and Prolonged Recovery Time in Pediatric Patients Undergoing Adenotonsillectomy. American Society of Anesthesiologists, Chicago, IL, October 2016

Hertz, Bortsov, Woody. scientific abstract "Predictors of Unplanned Hospital Admission in Ambulatory Surgery Patients". Presented 10/22/2016.

Hobbs, G., Chen F., Stiegler, M., Isaak, R., 1200 Evaluations in 45 Hours: An Efficient Logistical Operations Model for Large-Scale Simulation-Based ACMGE Milestones Assessments. Program Innovation Abstract Poster Presentation presented at: International Meeting for Simulation in Healthcare. Orlando, FL January 29, 2017

Isaak, R., Chen F., Stiegler, M., Arora, H., Financial Analysis and Cost-Saving Strategy for a Large-Scale Objective Structured Clinical Exam for Residents. Scientific Research Abstract Poster Presentation presented at: International Meeting for Simulation in Healthcare. Orlando, FL January 29, 2017.

Laks S, Kolarczyk LM, Strassle P, Isaak RS, Hance L, Kim HJ. Enhanced Recovery after Surgery (ERAS) for Pancreatectomy: Increased Intraoperative Vasopressor Use Does Not Increase Pancreatic Fistula Rates. Society of Surgical Oncology (SSO) Annual Cancer Symposium. March 15-18, 2017. Seattle, Washington

Linnstaedt SD, Jung LS, Zhou CY, Mauck MC, Kurz M, Zimny E, Pearson C, Hendry PL, McLean SA. Genetic variants in the circadian rhythm pathway predict PTSD symptoms following trauma exposure. Accepted for Poster Presentation at the 2017 Annual Society for Biological Psychiatry Meeting, San Diego, May 2017.

Linnstaedt SD, Riker KD, Kutchko KM, Lackey L, Kurz M, Lewandowski C, Pearson C, Hendry PL, Laederach A, McLean SA. FKBP5 variant rs3800373 alters FKBP5 RNA secondary structure and prevents stress-induced microRNA-320a downregulation of FKBP5, resulting in glucocorticoid resistance and increased vulnerability to chronic posttraumatic pain. Selected for Oral Presentation at the 2017 Annual Society for Biological Psychiatry Meeting, San Diego, May 2017.

Linnstaedt SD, Rueckeis CA, Riker KD, Yu S, Chen C, King T, Lewandowski C, Hendry PL, Pearson C, Kurz M, Damiron K, Domeier R, Liberzon I, McLean SA. microRNA -19b acts as a sex-dependent regulatory hub for PTSD and chronic widespread pain development following trauma exposure. Accepted for Poster Presentation at the 2017 Annual Society for Biological Psychiatry Meeting, San Diego, May 2017.

Linnstaedt SD, Yu S, Chen C, Kurz M, Pearson C, Hendry PL, Lewandowski C, Domeier R, Damiron K, McLean SA. Expression levels of XIST RNA predict PTSD and chronic pain outcomes in women experiencing motor vehicle collision. Accepted for Poster Presentation at the 2017 Annual Society for Biological Psychiatry Meeting, San Diego, May 2017.

Martinelli, S. M., Chen, F., Arora, H., Zvara, D., Connolly, A. (accepted, 2017). Implementing a Technology-based Cognitive Aid for Feedback in Accordance with ACGME Milestone Competencies in Anesthesiology Poster to be presented at Society for Education in Anesthesia Spring Annual Meeting, Jacksonville, FL.

McLean SA, Wu A, Gonzalez M, Harmon E, Zimny E, Lewandowski C, Hendry PL, Damiron K, Pearson C, Velilla MA, Swor R, Domeier R, Linnstaedt SD. The influence of microRNA on chronic pain development after motor vehicle collision may be sex-dependent. Poster presentation at the 2016 Bi-Annual Meeting of the International Association for the Study of Pain, Yokohama, Japan, September 2016

McQueen, J., Chen F., Stiegler, M., Isaak, R., An Innovative Three-Stage Training Program for Standardized Patient and Clinician Actors in High Stakes Objective Clinical Skills Exams. Scientific Research Abstract Poster Presentation presented at: International Meeting for Simulation in Healthcare. Orlando, FL January 29, 2017.

Phelps J, Conrad NM, Pittenger S, Torrice L, Hanley S, Corriher T. A retrospective review of anesthesia services and adverse events for pediatric MRI. International Anesthesia Research Society, Washington, D.C., May 2017.

Smith, M. , Devika Singh, Hemanth Baboolal, Kim Blasius, Fei Chen, Gene Hobbs, Rob Isaak, Benny Joyner, Chetta Lupa, Matt McDaniel. Implementation of an Advanced Level Milestone Assessment Program Utilizing High Fidelity Simulation. Scientific Abstract. International Meeting for Simulation in Healthcare. January 2017

Stiegler, M., Hobbs, G., Chen F., Martinelli, S., Arora, H., Isaak, R., Validity of Simulation-based Assessments for ACGME Milestone Achievement. Scientific Research Abstract Poster Presentation presented at: International Meeting for Simulation in Healthcare. Orlando, FL January 29, 2017.

2. Journal Articles (in alphabetical order of first author)

Beaudoin FL, Gutman R, Merchant RC, Melissa CA, Swor RA, Jones JS, Lee DC, Peak DA, Domeier RM, Rathlev NK, McLean SA. Persistent pain after motor vehicle collision: Comparative effectiveness of opioids versus non-steroidal anti-inflammatory drugs prescribed from the emergency department- A propensity matched analysis. *Pain*. 2017 Feb; 158(2): 289-295.

Boisen ML, Rao VK, Kolarczyk L, Hayanga HK, Gelzinis TA. The Year in Thoracic Anesthesia: Selected Highlights. *J Cardiothorac Vasc Anesth*. 2017 Jun;31(3):791-799

Chen F, Arora H, Martinelli SM, Teeter EG, Mayer D, Zvara D, Passannante A, Smith KA. The predictive value of pre-recruitment achievement on resident performance in anesthesiology. *Journal of Clinical Anesthesia*. 2017 Jun; 39: 139-144.

Chen F, Lui AM, Martinelli SM. A systematic review of the effectiveness of flipped classrooms in medical education. *Med Educ*. 2017: 51(6): 565-670.

Chen, Fei, Susan M. Martinelli, and Harendra Arora. "Overnight call and cognitive functioning: Will tablet-based assessment be the solution for safety check in residents?." (2017): 123-124. Print: August 2017, Published online: May 22, 2017

Christo Frangopoulos, M.D.; First Listen, Then Connect. *Anesthesiology* 2016;. doi: 10.1097/ALN.0000000000001346.

Clark A, Smith KA, Storey A. "Management of Opioid Dependence in Pregnancy". Society for Obstetric Anesthesiology and Perinatology (SOAP) Newsletter. September 2016. Pgs. 11-13.

Lele AV, Hoefnagel AL, Schloemerkemper N, Wyler DA, Chaikittisilpa N, Vavilala MS, Naik BI, Williams JH, Venkat Raghavan L, Koerner IP. Perioperative Management of Adult Patients With External Ventricular and Lumbar Drains: Guidelines From the Society for Neuroscience in Anesthesiology and Critical Care. *J Neurosurg Anesthesiol*. 2017. PMID: 28169966

Linnstaedt SD, Riker KD, Walker MG, Nyland JE, Zimny E, Lewandowski C, Hendry PL, Damiron K, Pearson C, Velilla MA, Jones J, Swor RA, Domeier R, McLean SA. microRNA-320a predicts chronic axial and widespread pain development following motor vehicle collision in a stress-dependent manner. *J Orthop Sports Phys Ther*. 2016;46(10):911-919, B1-B3.

Linnstaedt SD, Walker MG, Riker KD, Nyland JE, Hu JM, Rossi C, Swor RA, Jones JS, Diatchenko L, Bortsov AV, Peak DA, McLean SA. Genetic variant rs3750625 in the 3'UTR of ADRA2A affects

stress dependent acute pain severity after trauma and alters a microRNA-34a regulatory site. *Pain*. 2017 Feb;158(2): 230-239.

Mauck MC, Smith J, Liu AY, Jones SW, Shupp JW, Villard MA, Williams F, Hwang J, Karlnoski R, Smith DJ, Cairns BA, Kessler RC, McLean SA. Chronic Pain and Itch are Common, Morbid Sequelae among Individuals Who Receive Tissue Autograft after Major Thermal Burn Injury. *Clin J Pain*. 2017 Jul;33(7):627-634.

Mauck MC, Smith J, Shupp JW, Weaver MA, Liu A, Bortsov AV, Lateef B, Jones SW, Williams F, Hwang J, Karlnoski R, Smith DJ, Cairns BA, McLean SA. Pain and itch outcome trajectories differ among European American and African American survivors of major thermal burn injury. *Pain*. 2017 Nov;158(11):2268-2276. doi: 10.1097/j.pain.0000000000001029.

Neice AE, Behrends M, Bokock MP, Seligman KM, Conrad NM, Larson MD. Prediction of Opioid Analgesic by Measurement of Pupillary Unrest. *Anesth Analg*. 2017 Mar; 124(3): 915-921.

Rosenkrans DJ, Kolarczyk LM. Intraoperative Hyperkalemia and Ventricular Arrhythmia During Parathyroidectomy: A Case Report. 2017 Jun 15. doi: 10.1213/XAA.0000000000000539.

Singh A, Kumar PA, Duncan AE et al. Brachial arterial pressure monitoring during cardiac surgery rarely causes complications. *Anesthesiology* 2017 Jun;126(6):1065-76.

Smeltz A, Kumar PA. Angiotensin axis blocking drugs in the perioperative period: a review. *Anesthesiology News Special Edition* Oct. 2016

Teeter, Emily G. Brian P. Barrick, Priya A. Kumar, Benjamin E. Haithcock, Andrew R. Karenz, Susan M. Martinelli. Anesthetic Management of a Patient With Situs Inversus for Bilateral Orthotopic Lung Transplantation. *Journal of Cardiothoracic and Vascular Anesthesia* , Volume 30 , Issue 6 , 1641 – 1644

Wang YY, Harit D, Subramani DB, Arora H, Kumar PA, Lai SK. Influenza-binding antibodies immobilize influenza viruses in fresh human airway mucus. *Eur Respir J*. 2017 Jan 25; 49(1). Pii:1601709.

Welsby IJ, Krakow EF, Heit JA, Williams EC, Arepally GM, Bar-Yosef S, Kong DF, Martinelli S, Dhakal I, Liu WW, Krischer J, Ortel TL. The association of anti-platelet factor 4/heparin antibodies with early and delayed thromboembolism after cardiac surgery. *Rare Thrombotic Disorders Consortium. J Thromb Haemost*. 2016 Oct 7. doi: 10.1111/jth.13533. PMID: 27714919 [PubMed]

Willie C, Chen F, L. JB, Blasius K. Using high-fidelity simulation for critical event training. *Med Educ*. 2016;50(11):1161-1161. doi:10.1111/medu.13182

3. Books

Martinelli SM, Bowe EA. The Interactive Classroom. In: Bowe EA, Schell RM, DiLorenzo A eds. Education in Anesthesia: How to Provide the Best Learning Experience. 1st ed. Cambridge University Press

Nancy Wilkes, MD. Submitted October 14th Kartageners Syndrome. In Fleisher LA, Roizen MF(eds):Essence of Anesthesia Practice, Fourth Edition. St. Louis, Elsevier.

Nancy Wilkes, MD. Submitted October 24th Diverticulosis . In Fleisher LA, Roizen MF (eds). Essence of Anesthesia Practice, Fourth Edition . St. Louis, Elsevier.

4. Grants and Grant Funding Salary Support

Title: Longitudinal Assessment of Post-traumatic Syndromes

Award Number: U01MH110925

Sponsor: NIMH

Project Dates: 9/23/2016-07/31/2021

Principle Investigator: Samuel McLean

Title: Applying the Biopsychosocial Model to Post-MVC Pain Development in African Americans

Award Number: R01AR060852

Sponsor: National Institute of Arthritis Musculoskeletal Skin Disease

Project Dates: 09/15/2011 – 08/31/2017

Principal Investigator: Samuel McLean

Title: Influence of PTSD Symptoms on Chronic Pain Development after Sexual Assault

Award Number: R01AR064700

Sponsors: NIAMS, NINDS, OD, NINR, NIMH, NICHD

Project Dates: 2014-2019

Principle Investigator: Samuel McLean

Title: Diversity Supplement for Influence of PTSD Symptoms on Chronic Pain Development after Sexual Assault

Award Number: 3R01AR064700-03S1

Project Dates: 2016-2017

Principal Investigator: Samuel McLean

Title: Decision Support to Prevent Premature Closure and Delayed Diagnosis

Award Number: 15016441

Sponsor: Greater Kansas City Community Foundation

Project Dates: 09/01/2015-08/31/2017

Principal Investigator: Marjorie Stiegler

Title: Medtronic Pain Fellowship 2016-2017
Award Number: 33703
Sponsor: Medtronic, Inc.
Project Dates: 07/01/2016-06/30/2017
Principal Investigator: Manoj Wunnava

Title: Boston Scientific Fellowship 2016-2017
Award Number: NM_23210
Sponsor: Boston Scientific Neuromodulation
Project Dates: 07/01/2016-06/30/2017
Principal Investigator: Manoj Wunnava