The University of North Carolina at Chapel Hill

Department of Anesthesiology Annual Research Report 2013-14





Dear Reader:

Welcome to our 2013-2014 UNC Department of Anesthesiology Annual Research Report. I hope that this summary provides you with a better understanding of our work and gives you some sense of our research environment.

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 and commitment of the university to provide service to our citizens through excellence as one of the world's great research universities. Dr. Zvara has provided the infrastructure and leadership necessary for transformative research, even during very challenging economic times.

I would encourage you to check back often and keep up with our department research activities via monthly updates at 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 <u>smclean@aims.unc.edu</u>.

Sincerely,

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



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Areas of Departmental Research Focus

1. TRYUMPH Program:

Trauma RecoverY: Understanding Mechanism and Promoting Healing

A. 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 1,000 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 3rd year of funding in 2013-2014. An updated listing of abstracts and manuscripts from R01AR060852 is available at: <u>http://www.med.unc.edu/anesthesiology/research/tryumph-research-group-1/tryumph-studies/african-american-project-crash</u>

2013-2014 abstracts and publications related to above R01 AR060852, as well as recently completed R01 AR056328 that enrolled a sister cohort of 948 European Americans, are shown below

R01 AR060852 abstracts (African American Cohort)

Dr. Sarah Linnstaedt's outstanding work in genetics and pain was recognized with the Junior Investigator Award at the 2014 Annual Meeting of the American Pain Society. Congratulations Sarah!!!

Linnstaedt SD, Walker MG, Parker JS, Sons RL, Velilla MA, Pearson C, O'Neil BJ, Zinny E, Lewandowski CL, Damiron K,



Hendry PL, Barnes S, Rosenber M, Hammond SM, McLean SA. Circulating microRNA evaluated in the early aftermath of motor vehicle collision predict widespread pain development in African Americans and provide potential pathogenic insights: results of a preliminary analysis. 2014 Annual Meeting of the American Pain Society, Tampa FL, May 2014.

R01 AR056328 abstracts (European American Cohort)



Bermudez AL, Hu J, Bortsov AV, Soward AC, Swor RA, Peak DA, Jones JS, Rathlev NK, Lee DC, Domeier RM, Hendry PL, Linnstaedt SD, McLean SA. Obesity increases the risk of persistent moderate or severe neck pain 6 months after motor vehicle collision. Annual Meeting of the American Pain Society, Tampa, FL, May 2014.

Bortsov AV, Swift-Scanlan T, Diatchenko L, Swor RA, Peak DA, Jones JS, Rathlev NK, Lee DC, Domeier RM,

Hendry PL, McLean SA. Variable DNA methylation in genes involved in immune response is a potential predictor of chronic widespread pain after motor vehicle collision. Annual Meeting of the American Pain Society, Tampa, FL, May 2014.

Bortsov AV, Miller WC, Soward AC, Swor RA, Peak DA, Jones JS, Rathlev NK, Lee DC, Domeier RM, Hendry PL, McLean SA. Derivation of an emergency department-based clinical prediction tool to identify individuals at increased risk of chronic musculoskeletal pain development after motor vehicle collision. Annual Meeting of the American Pain Society, Tampa, FL, May 2014.





Hu J, Bortsov AV, Soward AC, Swor RA, Peak DA, Jones JS, Rathlev NK, Lee DC, Domeier RM, Hendry PL, Platts-Mills TF, Linnstaedt SD, McLean SA. Most widespread pain present 1 year after motor vehicle collision (MVC) begins in the early aftermath of the MVC: results of a multicenter prospective cohort study. Annual Meeting of the American Pain Society, Tampa, FL, May 2014.



Linnstaedt SD, Walker MG, Bortsov AV, Swor RA, Jones JS, Lee DC, Peak DA, Domeier RM, Rathlev NK, McLean SA. The ADRA2A genetic variant rs3750635 influences extent and severity of acute pain after motor vehicle collision and may do so by regulating microRNA function. Accepted for presentation at the Annual Meeting of the American Pain Society, Tampa, FL, May 2014.

Nichols J, Hu J, Soward AC, Swor RA, Peak DA, Jones JS, Rathlev NK, Lee DC, Domeier RM, Hendry PL, Liberzon I, McLean SA. Not so great expectations: characteristics associated with negative expectations of physical and emotional recovery in the hours after motor vehicle collision. Annual Meeting of the American Pain Society, Tampa, FL, May 2014.



2013-2014 Publications Related to Above Studies

Bortsov AV, Diatchenko L, McLean SA. Complex multilocus effects of catechol-Omethyltransferase haplotypes predict pain and pain interference 6 weeks after motor vehicle collision. *Neuromolecular Med.* 2014 Mar;16(1):83-93.

Bortsov AV, Platts-Mills TF, Peak DA, Jones JS, Swor RA, Domeier RM, Lee DC, Rathlev NK, Hendry PL, Fillingim RB, McLean SA. Pain distribution and predictors of widespread pain in the immediate aftermath of motor vehicle collision. *Eur J Pain.* 2013 Sep;17(8):1243-51.

Bortsov AV; Smith JE; Diatchenko L; Soward AC; Ulirsch JC; Rossi C; Swor RA; Hauda WE; Peak DA; Jones JS; Holbrook D; Rathlev NK; Foley KA; Lee DC; Collette R; Domeier RM; Hendry PL; McLean SA. Polymorphisms in the glucocorticoid receptor co-chaperone FKBP5 predict persistent musculoskeletal pain after traumatic stress exposure. *Pain*, 2013 Aug; 154(8):1419-26. doi: 10.1016/j.pain.2013.04.037.

Bortsov AV, Platts-Mills TF, Peak DA, Jones JS, Swor RA, Domeier RM, Lee DC, Rathlev NK, Hendry PL, Fillingim RB, McLean SA. Effect of pain location and duration on life function in the year after motor vehicle collision, Pain, 2014 June, online.

Lewis GC, Platts-Mills TF, Swor R, Peak D, Jones J, Rathlev N, Lee D, Domeier R, Hendry P, McLean SA. Incidence and Predictors of Acute Psychological Distress and Dissociation after Motor Vehicle Collision: a Cross-Sectional Study. Accepted Journal of Trauma & Dissociation February 2014

McLean SA, Ulirsch JC, Slade GD, Soward AC, Swor RA, Peak DA, Jones JS, Rathlev NK, Lee DC, Domeier RM, Hendry PL, Bortsov AV, Bair E. Incidence and Predictors of Neck and Widespread Pain after Motor Vehicle Collision among US Litigants and Non-Litigants. Pain 155(2), 309-321, 2014.

B. Older Adult CRASH

Persistent Pain in Older Adults after Motor Vehicle Collision (K23 AG038548, PI Platts-Mills)



The Older Adult CRASH study is the first prospective study to examine the incidence, predictors, and etiology of persistent pain among independently living older adults who come to the emergency department for care after motor vehicle collision and are discharged to home. The study enrolls patients 65 and older at eight study sites, and it has enrolled over 100 patients from these eight sites. This project was supported by Dr. Platts-Mills' KL2 career development award funded by the National Center for Research Resources through UNC's Translational and Clinical Sciences Institute. In May of 2013, Dr. Platts-Mills received a K23 career development award from the National Institute on Aging to continue this study and to examine the contributions of fear of movement and

PTSD symptoms to the development of persistent pain and functional decline after MVC. An updated listing of abstracts and manuscripts from this project is available at:

http://www.med.unc.edu/anesthesiology/research/tryumph-research-group-1/tryumphstudies/older-adult-project-crash

Related Abstracts 2013-2014

Platts-Mills TF, Pereira G, Isenberg E, Weaver M, Swor RA, Jones JS, Lee DC, Peak DA, Domeier RM, Rathlev NK, Hendry PL, McLean SA. Older adults with persistent musculoskeletal pain after motor vehicle collision are at increased risk of functional decline: a prospective longitudinal study. Annual Meeting of the American Pain Society, Tampa, FL, May 2014.



C. The BURN Experiences Study (Jaycee Burn Center Foundation, PI McLean)

The BURN Experiences Study is a prospective longitudinal pilot study examining the recovery process after major thermal burn injury. Participants requiring tissue autograft surgery after major thermal burn injury are enrolled at the time of initial admission and followed prospectively for one year. The study is being conducted at a network of burn centers including the Jaycee Burn Center at The University of North Carolina at Chapel Hill, the Nathan Speare Regional Burn Treatment Center at Crozer-Chester Medical Center, and the Burn Center at MedStar Washington Hospital Center. Data collected are being used to demonstrate study feasibility and to collect pilot data for a large scale trial. An up-to-date listing of abstracts and manuscripts from this project is available at:



http://www.med.unc.edu/anesthesiology/research/tryumph-research-group-1/tryumphstudies/burn-experiences

Related Abstracts 2013-2014

Liu AY, Bermudez AL, Hu J, Jones S, Hwang J, Smith JE, Ballina LE, Patel A, Tran T, Karlnoski T, Smith DJ, Cairns B, McLean SA. African Americans Are at Increased Risk of Developing Chronic Pain and Itch at the Site of Tissue Autograft Following Major Thermal Burn Injury. Annual Meeting of the American Pain Society, Tampa, FL, May 2014.

D. The HELP PAIN Trial (Mayday Fund, PI McLean)

The HELP PAIN Trial is an Emergency Department-based, randomized controlled trial. The purpose of this first-in-kind study is to assess the potential efficacy of venlafaxine in reducing acute pain and the transition to



persistent pain in high-risk patients that present to the ED following a motor vehicle collision. Patients presenting to the ED post-MVC with severe musculoskeletal neck pain will be randomized to receive either venlafaxine or placebo. Data from this pilot study is being used to assess study feasibility and to design a large-scale RCT trial.

E. Linnstaedt Lab



Dr. Sarah Linnstaedt and her team are interested in determining molecular mechanisms that contribute to chronic pain development after trauma. This work is critical to inform hypotheses regarding novel therapeutic approaches. In order to identify novel mediators of pain development, we use two main approaches. These approaches are focused around our central hypothesis that microRNA (miRNA) are involved in the transition between acute and chronic pain. The first approach is to determine which miRNA, out of more than 2000 identified, are associated with chronic pain development. The second approach is to define specific examples of miRNA regulating genes

involved in pain signaling.

miRNA are small non-coding RNA molecules that regulate protein expression in all known mammalian systems. They have also been shown to play major roles in a variety of diseases, yet their role in post-trauma pain has not been elucidated. During exploratory, proof-of-concept studies, we recently showed that 11 miRNA circulating in the blood at the time of motor vehicle collision (MVC) trauma are associated with 6 week axial pain outcomes after MVC and that another set of 11 miRNA are associated with 6 week widespread pain outcomes after MVC. This study was in a small number of individuals (n = 75), so in the future we would like to expand this cohort, and also look at miRNA associated with pain following other types of trauma.

In other analyses, we have shown that genetic variants in two key neuroendocrine genes, ADRA2A and FKBP5, are associated with pain following trauma and that the reason for this association is likely because the variant affects miRNA binding (and thus its regulation). In a series of statistical and molecular studies, we have shown that miR-34a, an miRNA that has been shown to be upregulated after stress exposure and is associated with pain, can bind and regulate ADRA2A. In a similar set of experiments, we have shown that miR-320 can regulate FKBP5. Interestingly, these two



miRNA, miR-34a and miR-320 are predicted to regulate a number of other transcripts thought to be involved in post-trauma pain development. Therefore, future research in the lab will examine the ability of these miRNA (along with those defined in cohort studies) to act as regulatory hubs in the transition between acute and chronic pain. If the studied miRNA do turn out to be major mediators of pain development, they could serve as promising therapeutic targets for the treatment and prevention of pain following trauma.

F. Bortsov Epigenetics Research: Pilot study evaluating association between DNA methylation and persistent pain after motor vehicle collision



Dr. Andrey Bortsov is currently involved in evaluating the association between DNA methylation and persistent pain after motor vehicle collision. Increasing evidence suggests that DNA methylation can have an important influence on gene expression and phenotype. DNA methylation refers to the chemical modification of DNA (adding a methyl group to cytosine in the dinucleotide sequence CpG) without altering the genetic code. This "epigenetic" mechanism influences gene transcription by interfering with the binding of transcription factors to their DNA sites in gene regulatory regions (promoters and enhancers) and by altering chromatin organization. Supporting the potential influence of DNA methylation on disease vulnerability, studies have shown remarkable variability in DNA methylation patterns between

individuals. These variable DNA methylation patterns may be inherited and/or may result from a wide spectrum of environmental factors. Dr. Bortsov's feasibility study is comparing genomewide DNA methylation patterns at single CpG-site resolution among a small sample of individuals who develop persistent pain after motor vehicle collision (MVC) and a small sample of individuals who do not develop persistent pain after MVC. Data for these analyses come from a large longitudinal prospective cohort study (n=948, R01AR056328, PI Dr McLean) of post-MVC pain outcomes. We have identified statistically significant association signals located on chromosome 6 within the major histocompatibility complex (MHC). Bioinformatic analyses demonstrated that association regions are located in important regulatory regions (promoters and enhancers) of specific MHC class I and class II genes responsible for antigen presentation. Our preliminary results suggest that differential methylation in genes coding for proteins that play a critical role in immune regulation may influence the development of chronic widespread pain after MVC. Further large-scale studies are needed to confirm these preliminary findings and to identify specific pathways and mechanisms.

2. Academic Clinical Trials

A. PeriOperative ISchemic Evaluation-2 Trial (POISE-2) (Population Health Research Institute, Site PIs Kumar/Arora)



Primary Investigators Dr. Priya Kumar and Dr. Harendra Arora are currently investigating whether or not the administration of small doses of certain medications can prevent heart attacks and deaths related to heart problems around the time of major surgery. Major surgeries not involving the heart are common, and heart problems during or after such surgeries represent a large population health problem. Few treatments to prevent heart problems around the time of surgery have been tested. There is encouraging data suggesting that small doses of two medications, Acetyl-Salicylic Acid (ASA) and Clonidine, given

individually for a short period before and after major non-cardiac surgeries, may prevent heart problems. The POISE-2 Trial is a large international study to test if ASA and Clonidine can prevent heart attacks and deaths from heart problems around the time of surgery.

B. Perioperative Cognitive Protection - Dexmedetomidine and Cognitive Reserve (Mount Sinai School of Medicine/National Institute on Aging, Site PI Arora)



Primary Investigator Dr. Harendra Arora is currently investigating the efficacy of Dexmedetomidine as a cognitive preservative for elderly patients undergoing surgery. Elderly patients who undergo anesthesia in order to have non-cardiac surgery are at risk for deterioration of brain function, including the development of postoperative delirium (PD) and postoperative cognitive dysfunction (POCD). These disorders cause disability and distress for both patients and their families. In addition, these disorders are associated with other medical complications and account for significant additional health care costs. We currently use

relatively primitive approaches to preventing and treating PD and POCD. Dexmedetomidine is a drug used for sedation in critically ill patients that provides analgesia and controls the body's response to stress. The sedation produced by dexmedetomidine appears more similar to natural sleep than any other drug used for anesthesia and postoperative sedation. Data suggests that dexmedetomidine can prevent delirium following non-cardiac surgery; this study will test this hypothesis.

3. 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 industrysponsored 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 fulltime 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.

A. A Multi-Center Study of the Efficacy, Pharmacokinetics (PK) and Pharmacodynamics (PD) of IV



Acetaminophen for the Treatment of Acute Pain in Pediatric Patients (Cadence Pharmaceuticals, Site PI McNaull) This study, under the direction of site Primary Investigator Dr. Peggy McNaull, seeks to demonstrate the efficacy and safety of Intravenous (IV) acetaminophen plus rescue opioids for the relief of moderate to severe acute pain in neonates and infants (age < 2 years) compared to placebo plus standard of care rescue opioids, as well as to characterize the concentrationeffect relationship (PK/PD) of the intravenous acetaminophen as compared to the control group.

- B. Safety, Pharmacokinetics (PK), and Efficacy of Buprenorphine Transdermal System (BTDS) in Children (Purdue Pharma LP, Site PI Kopp) The purpose of this study is to characterize the safety, PK, and efficacy of BTDS in patients ages 7 to 16 years.
- C. Femoral Nerve Block With Liposome Bupivacaine for Postsurgical Analgesia Following Total Knee Arthroplasty (Pacira Pharmaceuticals, Inc., Site PI Hardman) Dr. David Hardman of UNC Anesthesiology is a site Primary Investigator and participant in Part 2 of this two part study. The



primary objective of Part 2 is to compare the magnitude and duration of the analgesic effect of single injection femoral nerve block of a single dose level of liposome bupivacaine (selected from Part 1) with placebo (preservative-free normal saline). In Part 2 of the study, approximately 180 subjects (randomized 1:1, resulting in approximately 90 liposome bupivacaine subjects and 90 placebo subjects) will receive a single dose injection femoral nerve block with the selected dose level of liposome bupivacaine (i.e., 67, 133, or 266 mg) or placebo in 20 mL under ultrasound guidance. D. A Phase IV Study to Evaluate the Pharmacokinetics and Safety of Oxycodone Oral Solution in Pediatric and Adolescent Subjects (VistaPharm, Inc. and Lehigh Valley Technologies, Inc., Site PI Valley) The study seeks to determine if IV Acetaminophen plus standard of care rescue opioids can reduce opioid consumption in neonates and infants less than 2 years of age for relief of moderate to severe acute pain.

4. Faculty Research Studies

A. Post-Curriculum Evaluation of Novel Health Policy Curriculum for PGY-4 Anesthesia Residents, PI Martinelli



The primary hypothesis of Dr. Susan Martinelli and her team is that a novel health policy curriculum will increase health policy knowledge among senior residents. They are also investigating the resident attitude with regard to the curriculum; specifically, if the curriculum leads to changes in policy views and increased personal engagement in these issues. This study aims to evaluate the effect of this health policy curriculum on knowledge acquisition compared to baseline knowledge; to evaluate the resident attitude toward health policy curriculum, and to evaluate the effect of this curriculum on policy viewpoints.

Since the inception of the Accreditation Council for Graduate Medical Education core competencies and subsequent milestones for resident training, system-based practice (SBP) has become a fundamental component of medical education. Central topics of the SBP competency include health care policy, reform, and economics, but these concepts have been poorly addressed in both undergraduate and graduate medical education curricula. Most recently, the intricacies of the Patient Protection and Affordable Care Act have further emphasized both the importance and ever-evolving nature of SBP. Despite this generally accepted requisite in physician training, no standardized curricula for health policy exist. In response to this gap in our residency training program, our PGY-4 anesthesia residents will participate in a novel health policy curriculum. Designed as a multidisciplinary curriculum, the course will consist of eight weekly sessions led by physician, business, and public health leaders. An interactive small group structure will provide an intimate forum which encourages discussion between the residents and experts. Sessions will be preceded by a small amount of preparatory readings selected by session leaders to build a foundation for this dialogue. A needs assessment conducted previously within our department revealed that 100% of residents and fellows believe that as practicing physicians they should be aware of and involved in health policy decisions. However, a large majority demonstrated a poor understanding of various aspects of these same issues. We developed 28 multiple-choice questions that will be validated and serve as the pre and post-test for assessment of knowledge acquisition. In addition, all residents will be surveyed before and after the course to determine if there are perceived changes in understanding of the material or policy viewpoints as well as to determine resident opinion of the course. We believe that this course could fill a knowledge gap in many residency training programs.

B. Enhanced Recovery after Surgery (ERAS): A multidisciplinary perioperative protocol to improve outcomes for patients undergoing pancreatic surgery, PI Kolarczyk



The primary objective of Dr. Lavinia Kolarcyzk and her team is to determine if the Enhanced Recovery After Surgery (ERAS) pathway can improve the quality of care of pancreatic surgery patients at UNC. ERAS is a set of well-established best practice guidelines for patients undergoing a variety of intra-abdominal surgeries. The goals of the ERAS guidelines are to maintain normal physiologic function and to facilitate early postoperative recovery. These goals are met through a variety of interventions throughout the perioperative period, including: decreased use of preoperative bowel preps, carbohydrate drinks on the day of

surgery, thoracic epidural analgesia, intraoperative goal directed fluid therapy, standardized anesthetic protocols, thromboembolic prophylaxis, early mobilization and oral intake in the postoperative period, and the limited use of urinary catheters and nasogastric tubes. ERAS protocols allow for standardization of best practice perioperative care, which ultimately improves the quality of care delivered, accelerates recovery and safety, and optimizes utilization of health care resources.

ERAS protocols for colorectal and pancreatic surgeries have shown to decrease 30 day morbidity by over 50% and reduce length of stay by 2.5 days. What has not yet been well studied is the application of an ERAS protocol for upper gastrointestinal surgery. Our plan is to introduce a perioperative ERAS protocol for major gastrointestinal surgeries at UNC Hospitals. Through a multidisciplinary, team-based approach, we will create, implement, and study our own ERAS protocol. The goals of our project are to: 1) improve patient outcomes and satisfaction through standardization of perioperative care, 2) accelerate patient recovery, and 3) establish a vehicle for future projects.

5. Resident Team-Based QI/Research Projects

The Anesthesiology Research Department at UNC Chapel Hill is committed to engaging our residents in a variety of ways. During the 2013-2014 academic year, all of our clinical anesthesia residents participated in Team-based Quality Improvement (QI) project. Each team was comprised of one resident from each residency class and a faculty mentor. The CA-2 resident served as the team leader and was responsible for developing the project and carrying it through to completion. The department implemented these team-based projects because we recognize that continuous quality improvement must be a core component of any contemporary academic training program and health care organization. These projects also have increased resident participation at regional and national conferences, led to academic publications, and led to improved patient care. All of the team-based projects from the 2013-2014 academic year were presented at the Resident Symposium on April 12, 2014.



1st Place Intravenous Dexmedetomidine in Dental Rehabilitation: Cost-Effectiveness Issues Adam M. Suchar, MD, Drew Karenz, MD, Bradley Sumrow, MD, Ann Bailey, MD

2nd Place Default Anesthesia Machine Ventilator Settings at UNC Deliver Excessive Tidal Volumes in Adults Arun Ganesh, MD, Blair Herndon, MD, John Berry, MD, Anthony Passannante, MD





3rd **Place** A Checklist for ICU Intubation: Development and Initial Implementation **Gabe M. Rice, MD,** Amy Penwarden, MD, Julie Joseph, MD, Greg Balfanz, MD

Departmental Research Products

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

Adam M. Suchar, M.D., Bradley J. Sumrow, M.D., Drew Karenz, M.D., Ann G. Bailey, M.D. Intravenous Dexmedetomidine in Dental Rehabilitation: Cost-Effectiveness Issues Society of Pediatric Anesthesia, March 2014 Meeting

Asgarian CD, Martinelli SM, Kumar PA. A drainage dilemma. Society of Cardiovascular Anesthesiologists Annual Meeting, New Orleans, LA, March 2014

Asgarian, C, Martinelli SM, Kumar PA. Partial anomalous hepatic venous return: a systematic intraoperative exclusion of other serious diagnoses. Society of Cardiovascular Anesthesiologists 36th Annual Meeting. March 2014; New Orleans, LA. Solicited.

Bermudez AL, Hu J, Bortsov AV, Soward AC, Swor RA, Peak DA, Jones JS, Rathlev NK, Lee DC, Domeier RM, Hendry PL, Linnstaedt SD, McLean SA. Obesity increases the risk of persistent moderate or severe neck pain 6 months after motor vehicle collision. Annual Meeting of the American Pain Society, Tampa, FL, May 2014.

Berry JB, Mayer DC, Kolarczyk L. Acute hypoxemic cardiopulmonary arrest in a parturient with severe preeclampsia and cardiomyopathy: anesthetic management for unanticipated emergent cesarean delivery. ASA Medically Challenging Cases, ASA Annual Meeting, San Francisco, October 2013

Berry J, Dalal N, Kumar PA, Stansfield W, Martinelli SM. Left atrial dissection secondary to coronary sinus cannulation: evaluation, evolution, and treatment. American Society of Anesthesiologists Annual Meeting. October 2013; San Francisco, CA. Solicited.

Bialas, R, McFarlane, C. Utilization of iPhone Face-time Application to Facilitate Intra-operative Ultrasound Guided Arterial Line Placement (Lecture). American Society of Anesthesiologists Annual Conference San Francisco, CA, October 2013 (Invited).

Bortsov AV, Swift-Scanlan T, Diatchenko L, Swor RA, Peak DA, Jones JS, Rathlev NK, Lee DC, Domeier RM, Hendry PL, McLean SA. Variable DNA methylation in genes involved in immune response is a potential predictor of chronic widespread pain after motor vehicle collision. Annual Meeting of the American Pain Society, Tampa, FL, May 2014.

Bortsov AV, Linnstaedt SD, Swor RA, Peak DA, Rathlev NK, Lee DC, Domeier RM, Hendry PL, Jones JS, McLean SA. Genetic variants affecting CRH-binding protein predict pain persistence after trauma exposure. 2013 American Society of Anesthesiologists meeting, October 12-16, 2013, San Francisco, CA.

Bortsov AV, Miller WC, Soward AC, Swor RA, Peak DA, Jones JS, Rathlev NK, Lee DC, Domeier RM, Hendry PL, McLean SA. Derivation of an emergency department-based clinical prediction

tool to identify individuals at increased risk of chronic musculoskeletal pain development after motor vehicle collision. Annual Meeting of the American Pain Society, Tampa, FL, May 2014.

Candra R. Bass, MD, Camellia Asgarian, MD, Priya A. Kumar, MD. Continuous Popliteal and Femoral Nerve Catheters in a Patient with Refractory Lower Extremity CRPS. (Abstract and Exhibit). Given at: American Society of Anesthesiologists, San Francisco, CA. October 2013

Dalal NS, Kolarczyk LM. "Challenges of One-Lung Ventilation in an Adult Patient with Fontan Physiology." Society of Cardiovascular Anesthesiologists 36th Annual Meeting. March 2014. New Orleans, Louisiana.

Dicus Brookes C, Anderson, J (last author: PI), Berry J, Rich J, Golden B, Blakey G, Turvey T, Kopp V, Phillips C. Multimodal Protocol Reduces Incidence of Postoperative Nausea & Vomiting in Patients Undergoing Maxillary Osteotomy: A preliminary report (Abstract Presentation). AAOMS National Meeting, Orlando, FL, October 2013 (Invited).

Dicus Brookes C, Anderson, J (last author: PI), Berry J, Rich J, Golden B, Turvey T, Phillips C. Postdischarge Nausea & Vomiting Remains Frequent After LeFort I Osteotomy Despite Implementation of Multimodal Protocol Effective in Reducing Post-operative Nausea & Vomiting (Abstract Presentation). IARS Annual Meeting, Montreal, Canada, May 2014 (Invited).

Dicus BC, Berry J, Kopp VJ, Rich J, Golden B, Blakey III G, Turvey TA, Phillips C, Anderson J. Postdischarge nausea and vomiting after orthognathic surgery remains frequent despite implementation of a multimodal protocol effective in reducing post-operative nausea and vomiting. International Anesthesia Research Society 2014 Annual Meeting, Montréal, Canada, May 2014

Dicus BC, Berry J, Rich J, Golden B, Blakey III G, Turvey TA, Kopp VJ, Phillips C, Anderson J. Multimodal protocol reduces incidence of post-operative nausea and vomiting in patients undergoing maxillary osteotomy. American Association of Oral and Maxillofacial Surgeons Annual Meeting, Orlando, FL, October 2013

Ditto J, Lupa MC, McNaull PP, Phelps JR, Pittenger S, Ricketts K. Pediatric Moderate Sedation with Intranasal Dexmedetomidine and Versed. Society of Pediatric Anesthesia Winter Meeting, March 2014 (Solicited).

Erpelding TJ. Lucas WJ. Kolarczyk LM. "Perioperative Blood Transfusion Considerations for a Patient With IgA Deficiency Presenting for Cardiac Surgery." Medically Challenging Case Presentation. American Society of Anesthesiologists Annual Meeting 2013. San Francisco, California.

Ferrero NA, Teeter EG, Arora H, Martinelli SM, Kolarczyk LM, Bortsov AV, Zvara DA, Kumar PA. Simulator training enhances resident performance in transesophageal echocardiography. Society of Critical Care Anesthesiologists Annual Meeting. October 2013; San Francisco, CA. Solicited.

Hemanth A. Baboolal, MD, FRCA, Thoracoscopic repair of trachea-esophageal fistula, Society of Pediatric Anesthesia, March 2014

Hu J, Bortsov AV, Soward AC, Swor RA, Peak DA, Jones JS, Rathlev NK, Lee DC, Domeier RM, Hendry PL, Platts-Mills TF, Linnstaedt SD, McLean SA. Most widespread pain present 1 year after motor vehicle collision (MVC) begins in the early aftermath of the MVC: results of a multicenter prospective cohort study. Annual Meeting of the American Pain Society, Tampa, FL, May 2014.

Jennette MA. Kolarczyk LM. "Incidental Right-Sided Mass Discovered by Intraoperative TEE: Cardiac Hemangioma." Society of Cardiovascular Anesthesiologists 36th Annual Meeting. March 2014. Poster presentation. New Orleans, Louisiana.

Joseph JA, Kolarczyk LM. "Unanticipated Superior Vena Cava Resection during a Routine Right Upper Lobectomy." Society of Cardiovascular Anesthesiologists 3rd Annual Thoracic Anesthesia Symposium. March 2014. New Orleans, Louisiana.

Kopp V, Konig M. Anesthetic Considerations for a Six Year-old Male with Autism, Seizures, Obesity, and Family Language Communication Barriers Scheduled for Outpatient Dental Care. ESPA Congress in Geneva, September 2013.

Linnstaedt S, Walker M, Bortsov A, Sons R, Swor R, Jones J, Lee D, Peak D, Domeier R, Rathlev N, Hammond S, McLean S. A genetic variant in ADRA2A is associated with acute pain severity and is a determinant of miR-34a binding efficiency; RNA Silencing Meeting, February 2014

Linnstaedt SD, Walker MG, Borsov AV, Swor RA, Jones JS, Lee DC, Peak DA, Domeier RM, Rathlev NK, McLean SA. The ADRA2A genetic variant rs3750635 influences extent and seatt after motor vehicle collision and may do so by regulating microRNA function. Accepted for presentation at the Annual Meeting of the American Pain Society, Tampa, FL, May 2014.

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4. Grants and Grant Funding Salary Support

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 – 08/31/2016 Principal Investigator: Samuel McLean

Title: The HELP PAIN Trial: Healing with Venlafaxine after motor vehicle collision Sponsor: Mayday Fund Project Dates: 12/8/2010-12/31/2016 Principal Investigator: Samuel McLean

Title: The Influence of microRNA in chronic pain development Sponsor: Mayday Fund Project Dates: 7/1/2012-6/30/2014 Principal Investigator: Samuel McLean

Title: Grant Funding Salary Support for Co-Investigators: Evaluations of Genetic Variance Pathway Related Neurosteroids on Outcomes after MVC Sponsor: Department of Veteran Affairs Project Dates: 09/01/2013-8/31/2014 Co-Investigators: Sarah Linnstaedt and Andrey Bortsov The University of North Carolina at Chapel Hill Anesthesiology Research 101 Manning Drive CB# 7010 Chapel Hill, NC 27599

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