

Division Data Summary

Research and Training Details

Number of Faculty	48
Number of Joint Appointment Faculty	2
Number of Research Fellows	1
Number of Research Students	3
Number of Support Personnel	55
Direct Annual Grant Support	\$765,735
Direct Annual Industry Support	\$39,960
Peer Reviewed Publications	18

Clinical Activities and Training

Number of Clinical Staff	103
Number of Clinical Fellows	9
Number of Clinical Students	136
Number of Other Students	36
Inpatient Encounters	16,931
Outpatient Encounters	32,297

Division Photo



Row 1: M Kibelbek, A Tucker, V Chidambaran, M Baker, A Mueller, A Loepke, D Kurth, J McAuliffe III
 Row 2: K Goldschneider, K Lewellyn, M Patino, B Hugus, J Spaeth
 Row 3: S Danzer, J Estes, L Roeder, K Beutel, K Franic-Everhart, M Konig
 Row 4: K Vicars, J Kondik, S Kennedy, J Moeller, K Callahan, N Andersen, R Blackledge, J Beiersdorfer, C Opdycke
 Row 5: P Samuels, L Pfaff, M Linker, S Sadhasivam, G Istaphanous, C Ward

Significant Publications

Boat A, Mahmoud M, et al. **Supplementing desflurane with intravenous anesthesia reduces fetal cardiac dysfunction during open fetal surgery.** *Paediatr Anaesth.* 20(8): 748-756. 2010.

The study objective was to lower the incidence and severity of fetal cardiovascular depression during maternal fetal surgery under general anesthesia. The hypothesis states that SIVA technique would minimize prolonged fetal exposure to deep inhalational anesthetics and significant intraoperative fetal cardiovascular depression. It was discovered that adequate uterine relaxation was achieved with about 1.5 MAC of desflurane in the SIVA group compared to about 2.5 MAC in the desflurane only anesthesia group. More fetuses in the high-dose desflurane group compared to the SIVA group developed moderate-severe left ventricular systolic dysfunction over time intraoperatively. Furthermore, 61% of fetuses in the high-dose desflurane group received fetal resuscitative interventions compared to 26% of fetuses in the SIVA group. In conclusion, SIVA as described provides adequate maternal anesthesia and uterine relaxation, and it allows for decreased use of desflurane during open fetal surgery. Thus a decreased use of desflurane may better preserve fetal cardiac function.

Istaphanous GK, Howard J, et al. **Comparison of the neuroapoptotic properties of equipotent anesthetic concentrations of desflurane, isoflurane, or sevoflurane in neonatal mice.** *Anesthesiology.* 114(3): 578-587. 2011.

Neuronal cell death after prolonged exposure to isoflurane in developing animals has raised serious concerns regarding its safe use in children. Using newborn mice, the study established the respective potencies of

desflurane, isoflurane, and sevoflurane and then compared equipotent doses of these anesthetics regarding their effects on cortical neuroapoptosis. Experiments indicate that , in neonatal mice, equipotent doses of the three commonly used inhaled anesthetics demonstrated similar neurotoxic profiles, suggesting that developmental neurotoxicity is a common feature of all three drugs and cannot be avoided by switching to newer agents.

McDole JR, **Danzer SC**, et al. **Rapid formation of extended processes and engagement of Theiler's virus-infected neurons by CNS-infiltrating CD8 T cells.** *Am J Pathol.* 177(4): 1823-1833. 2010.

A fundamental question in neuroimmunology is the extent to which CD8 T cells actively engage virus-infected neurons. In the Theiler's murine encephalomyelitis virus (TMEV) model of multiple sclerosis, an effective central nervous system (CNS)-infiltrating antiviral CD8 T cell response offers protection from this demyelinating disease. However, the specific CNS cell types engaged by these protective CD8 T cells in TMEV-resistant strains remains unknown. Using live tissue imaging, it was determined that these T cell-extended processes (TCEPs) could be rapidly formed and were associated with migratory behavior through CNS tissues. These studies provide evidence that antiviral CD8 T cells have the capacity to engage virus-infected neurons in vivo and are the first to document and measure the rapid formation of TCEPs on these brain-infiltrating lymphocytes using live tissue imaging.

Faculty Members

C. Dean Kurth, MD, Professor

Anesthesiologist-in-Chief and Chair, Department of Anesthesia

Research Interests

Elena Adler, MD, Adjunct

Medical Director, Anesthesia Supply Chain, Division of Anesthesia

Research Interests

Nancy Andersen, MD, Adjunct

Research Interests

Lori Aronson, MD, Adjunct

Research Interests

Anne Boat, MD, Assistant Professor

Director, Fetal Surgery Team, Division of Anesthesia

Research Interests

Vidya Chidambaran, MD, Assistant Professor

Research Interests

Smokey Clay, MD, Assistant Professor

Research Interests

Steve Danzer, PhD, Assistant Professor

Research Interests

Charles Eastwood, MD, Assistant Professor

Research Interests

Hilary Flint, DO, Assistant Professor

Research Interests

Lisa Francis, DO, Assistant Professor

Research Interests

Kenneth Goldschneider, MD, Associate Professor
Director, Medical Pain Service and Chronic Pain Clinic

Research Interests

Joel Gunter, MD, Professor

Research Interests

Nancy Hagerman, MD, Adjunct
Co-Medical Director, Same Day Surgery and Pre-Anesthesia Consultation Clinic, Division of Anesthesia

Research Interests

Elizabeth Hein, MD, Adjunct

Research Interests

Liana Hosu, MD, Adjunct

Research Interests

George Istaphanous, MD, Assistant Professor

Research Interests

Fay Jou, MD, Assistant Professor

Research Interests

Thomas Kabalin, MD, Associate Professor

Research Interests

Michael "Jack" Kibelbek, MD, Associate Professor

Research Interests

Matthias Konig, MD, Assistant Professor

Research Interests

Renee Kreeger, MD, Adjunct

Research Interests

Ik Lee, MD, Associate Professor
Director, Division of Anesthesia

Research Interests

Erica Lin, MD, Assistant Professor

Research Interests

Andreas Loepke, MD, PhD, Associate Professor

Research Interests

Mohamed Mahmoud, MD, Assistant Professor

Research Interests

Judy Margolis, MD, Adjunct

Research Interests

Alexander Matveevskii, MD, PhD, Associate Professor

Research Interests

John McAuliffe, MD, MBA, Associate Professor
Director, Research; Interim Director, Division of Neurobiology

Research Interests

Mark Meyer, MD, Assistant Professor

Director, Procedure Management, Division of Pain Management

Research Interests

David Moore, MD, Associate Professor

Clinical Coordinator, Anesthesia Fellow Pain Management Education, Division of Pain Management

Research Interests

Jacquelyn Morillo-Delerme, MD, Associate Professor

Director of Anesthesia, Liberty Campus, Division of Anesthesia

Research Interests

Mario Patino, MD, Assistant Professor

Research Interests

Jayant "Nick" Pratap, MD, Assistant Professor

Research Interests

Joseph Previte, MD, FAAP, Associate Professor

Director, Information Technology Services, Division of Anesthesia

Research Interests

David Richards, PhD, Assistant Professor

Research Interests

Senthilkumar Sadhasivam, MD, Associate Professor

Director, Perioperative Pain Management

Research Interests

Nancy Samol, MD, Adjunct

Research Interests

Paul Samuels, MD, Associate Professor

Director, Education, Department of Anesthesia

Research Interests

Ximena Soler, MD, Adjunct

Director, Liver Transplant Surgery Team, Division of Anesthesia

Research Interests

James Spaeth, MD, Associate Professor

Associate Chief, Division of Anesthesia; Director, Cardiac Anesthesia Team, Division of Anesthesia

Research Interests

Theodore Striker, MD, Adjunct

Research Interests

Alexandra Szabova, MD, Adjunct

Research Interests

Jon Tomasson, MD, Assistant Professor

Medical Director, Post Anesthesia Care Unit, Division of Anesthesia

Research Interests

Anna Varughese, MD, MPH, Associate Professor

Associate Chief, Division of Anesthesia; Director, Quality, Division of Anesthesia; Medical Director, Same Day Surgery and Pre-Anesthesia Consultation Clinic, Division of Anesthesia

Research Interests

Christopher Ward, MD, Assistant Professor

Research Interests

Norbert Weidner, MD, Associate Professor

Director, Palliative Care and Comfort Team

Research Interests

Eric Wittkugel, MD, Associate Professor

Research Interests

Junzheng Wu, MD, Assistant Professor

Research Interests

Joint Appointment Faculty Members

Susmita Kashikar-Zuck, PhD, Associate Professor

Behavioral Medicine & Clinical Psychology

Anne Lynch-Jordan, PhD, Assistant Professor

Behavioral Medicine & Clinical Psychology

Clinical Staff Members

- Jasleen Goel, MD, Sedation Pediatrician
- Clifford Hoffmann, MD, Staff Anesthesiologist

Trainees

- Diane Gordon, MD, PGY-IV, University of UTah, SLC
- Yul Kim, MD, PGY-IV, University of Minnesota
- Ania Linkiewicz-Gawel, MD, PGY-IV, University of Texas Southwestern
- David Martin, MD, PGY-IV, Duke University
- Sharif Mohamed, MD, PGY-IV, Cairo, University, Egypt
- Pornswan Ngamprasertwong, MD, PGY-IV, Chulalongkorn University
- Michael Pettei, MD, PGY-IV, Mount Sinai Hospital
- Ryan Rowberry, MD, PGY-IV, Mayo in Rochester, NY
- Caroline Ryan, MD, PGY-IV, Illinois Masonic Medical Center, Chicago
- Da Wang, MD, PGY-IV, UMDN-New Jersey Medical School

Significant Accomplishments

Exceptional Year for Education

Our education program had an exceptional year. Our pediatric anesthesia fellowship program, led by Paul Samuels, MD, received RRC-ACGME re-accreditation for five years, the maximum time possible. Kenneth Goldschneider, MD, FAAP, and Eric Wittkugel, MD, edited a book on pediatric anesthesia with a faculty in the pediatric anesthesia department in Melbourne, Australia; 32 faculty in our department were authors.

Twenty four faculty in our department presented 74 national and international lectures on pediatric anesthesia, pain management, and developmental neurobiology, an all-time high. John McAuliffe III, MD, MBA, initiated a monthly teleconference on intraoperative neurophysiological monitoring with the University of

Florida, the first such type of conference in the world.

Chronic Medical Pain Center

We launched a Chronic Medical Pain Center this year to expand a multidisciplinary clinic that had involved more than five divisions. The new center, led by Goldschneider and Alexandra Szabova, MD, also creates a basic science and clinical research program. The new center is better positioned to develop new therapies and offer improved in-patient service to children from throughout the Midwest with complex pain conditions.

Noteworthy Leadership

C. Dean Kurth, MD, was elected to the Board of the Society of Pediatric Anesthesia and to chair the Pediatric Anesthesia Leadership Council, the national body for our specialty. Paul Samuels, James Spaeth, MD, and Anna Varughese, MD, MPH, are members of the Pediatric Anesthesia Program Directors, Wake-up Safe Collaborative, and Quality Council, respectively, for the Society of Pediatric Anesthesia. John McAuliffe was elected to the Board of the American Board Neurophysiological Monitoring, the national body for this specialty. Meanwhile, Steve Danzer, PhD, and Andreas Loepke, MD, PhD, served on research study sections for the National Institute for Health and Society of Pediatric Anesthesia.

Division Publications

1. Boat A, Mahmoud M, Michelfelder EC, Lin E, Ngamprasertwong P, Schnell B, Kurth CD, Crombleholme TM, Sadhasivam S. **Supplementing desflurane with intravenous anesthesia reduces fetal cardiac dysfunction during open fetal surgery.** *Paediatr Anaesth.* 2010; 20:748-56.
2. Goldschneider K, Lucky AW, Mellerio JE, Palisson F, del Carmen Vinuela Miranda M, Azizkhan RG. **Perioperative care of patients with epidermolysis bullosa: proceedings of the 5th international symposium on epidermolysis bullosa, Santiago Chile, December 4-6, 2008.** *Paediatr Anaesth.* 2010; 20:797-804.
3. Goldschneider KR, Lucky AW. **Pain management in epidermolysis bullosa.** *Dermatol Clin.* 2010; 28:273-82, ix.
4. Hoffmann CO, Samuels PJ, Beckman E, Hein EA, Shackelford TM, Overbey E, Berlin RE, Wang Y, Nick TG, Gunter JB. **Insufflation vs intubation during esophagogastroduodenoscopy in children.** *Paediatr Anaesth.* 2010; 20:821-30.
5. Istaphanous GK, Howard J, Nan X, Hughes EA, McCann JC, McAuliffe JJ, Danzer SC, Loepke AW. **Comparison of the neuroapoptotic properties of equipotent anesthetic concentrations of desflurane, isoflurane, or sevoflurane in neonatal mice.** *Anesthesiology.* 2011; 114:578-87.
6. Istaphanous GK, Ward CG, Loepke AW. **The impact of the perioperative period on neurocognitive development, with a focus on pharmacological concerns.** *Best Pract Res Clin Anaesthesiol.* 2010; 24:433-49.
7. Lynch-Jordan AM, Kashikar-Zuck S, Goldschneider KR. **Parent perceptions of adolescent pain expression: the adolescent pain behavior questionnaire.** *Pain.* 2010; 151:834-42.
8. Mahmoud M, McAuliffe J, Kim HY, Mishra P, Salisbury S, Schnell B, Hirsch P, Arbabi S, Donnelly LF. **Oral contrast for abdominal computed tomography in children: the effects on gastric fluid volume.** *Anesth Analg.* 2010; 111:1252-8.
9. McAuliffe JJ, Bronson SL, Hester MS, Murphy BL, Dahlquist-Topala R, Richards DA, Danzer SC. **Altered patterning of dentate granule cell mossy fiber inputs onto CA3 pyramidal cells in limbic epilepsy.** *Hippocampus.* 2011; 21:93-107.
10. McDole JR, Danzer SC, Pun RY, Chen Y, Johnson HL, Pirko I, Johnson AJ. **Rapid formation of extended**

processes and engagement of Theiler's virus-infected neurons by CNS-infiltrating CD8 T cells. *Am J Pathol.* 2010; 177:1823-33.

11. Murphy BL, Danzer SC. **Somatic translocation: a novel mechanism of granule cell dendritic dysmorphogenesis and dispersion.** *J Neurosci.* 2011; 31:2959-64.
12. Murphy BL, Pun RY, Yin H, Faulkner CR, Loepke AW, Danzer SC. **Heterogeneous integration of adult-generated granule cells into the epileptic brain.** *J Neurosci.* 2011; 31:105-17.
13. Newton PO, Harms Study Group. **Anesthesia in Scoliosis Surgery.** *Idiopathic scoliosis : the Harms Study Group treatment guide.* New York: Thieme; 2010.
14. Spaeth JP, Loepke AW. **Anesthesia for Left-Sided Obstructive Lesions.** *Anesthesia for congenital heart disease.* Chichester, West Sussex ; Hoboken, NJ: Wiley-Blackwell; 2010.
15. Szabova A, Sadhasivam S, Wang Y, Nick TG, Goldschneider K. **Comparison of postoperative analgesia with epidural butorphanol/bupivacaine versus fentanyl/bupivacaine following pediatric urological procedures.** *J Opioid Manag.* 2010; 6:401-7.
16. Tokuda S, Mahaffey CL, Monks B, Faulkner CR, Birnbaum MJ, Danzer SC, Frankel WN. **A novel Akt3 mutation associated with enhanced kinase activity and seizure susceptibility in mice.** *Hum Mol Genet.* 2011; 20:988-99.
17. Varughese AM, Hagerman NS, Kurth CD. **Quality in pediatric anesthesia.** *Paediatr Anaesth.* 2010; 20:684-96.
18. Wise-Faberowski L, Loepke A. **Anesthesia during surgical repair for congenital heart disease and the developing brain: neurotoxic or neuroprotective?.** *Paediatr Anaesth.* 2011; 21:554-9.

Grants, Contracts, and Industry Agreements

Grant and Contract Awards Annual Direct / Project Period Direct

DANZER, S

Contributions of Aberrant Granule Cells Integration to the Development of Epilepsy

National Institutes of Health

R01 NS 062806 08/05/09-07/31/14 \$216,563

Selective Disruption of Hippocampal Dentate Granule Cells in Autism: Impact of PT

National Institutes of Health

R01 NS 065020 05/01/09-04/30/14 \$225,000

NGAMPRASERTWONG, P

Effects of Maternal Anesthesia on Fetal Outcomes

Fdn for Anesthesia Education & Research

07/01/10-06/30/11 \$75,000

RICHARDS, D

Regulation and Mechanisms of Synaptic Vesicle Exocytosis

National Institutes of Health

R01 NS 054750 11/09/08-06/30/12 \$216,563

SAMUELS, P

Pediatric Airway Skills

Cardinal Health

07/01/10-06/30/11 \$32,609

Current Year Direct **\$765,735**

Industry Contracts

KURTH, D

Masimo Corporation

\$39,960

Current Year Direct Receipts

\$39,960

Total

\$805,695