

**Division Photo**



*First Row: J. Wu, G. Istaphanous, V. Chidambaran, C.D. Kurth, M. Baker, K. Vicars, S. Kennedy*

*Second Row: K. Goldschneider, J. McAuliffe, A. Mueller, C. Opdycke, S. Vargo, M. Bryant.*

*Third Row: J. Harrington, I.S. Lee, L. Hosu, A. Gruber, M. Linker, M. Patino.*

*Fourth Row: L. Pfaff, J. Sapeth, J. Estes, A. Loepke, J. Gunter, M. Everhart, D. Moore*

*Fifth Row: J. Beiersdorfer, J. Tomasson, M. Konig, E. Wittikugel, S. Sadhasivam, M. Everhart*

**Division Data Summary**

**Research and Training Details**

Number of Faculty	43
Number of Joint Appointment Faculty	3
Number of Research Students	2
Number of Support Personnel	13
Direct Annual Grant Support	\$150,000
Peer Reviewed Publications	9

**Clinical Activities and Training**

Number of Clinical Staff	88
Number of Clinical Fellows	10
Number of Clinical Students	43
Inpatient Encounters	15,935
Outpatient Encounters	29,579

**Faculty Members**

**C. Dean Kurth, MD**, Professor ; *Anesthesiologist-in-Chief and Chair, Department of Anesthesiology*

**Elena Adler, MD**, Adjunct Associate Professor ; *Medical Director, Anesthesia Supply Chain*

**Nancy Andersen, MD**, Adjunct Associate Professor

**Lori Aronson, MD**, Assistant Professor

**Anne Boat, MD**, Assistant Professor  
**Mary Brown, MD**, Adjunct Associate Professor  
**Yvon Bryan, MD**, Associate Professor  
**Steve Danzer, PhD**, Assistant Professor  
**Kenneth Goldschneider, MD**, Associate Professor ; *Director, Division of Pain Management*  
**Joel Gunter, MD**, Professor  
**Nancy Hagerman, MD**, Assistant Professor  
**Elizabeth Hein, MD**, Adjunct Assistant Professor ; *Co-Medical Director, Same Day Surgery and Pre-Anesthesia Consultation Clinic*  
**Clifford Hoffmann, MD**, Associate Professor  
**Liana Hosu, MD**, Assistant Professor  
**Susan Hussein, MD**, Assistant Professor  
**George Istaphanous, MD**, Assistant Professor  
**Fay Jou, MD**, Assistant Professor  
**Thomas Kabalin, MD**, Associate Professor  
**Michael "Jack" Kibelbek, MD**, Associate Professor  
**Matthias Konig, MD**, Assistant Professor  
**Ik Lee, MD**, Associate Professor ; *Clinical Director, Division of Anesthesia*  
**Andreas Loepke, MD, PhD**, Associate Professor  
**Mohamed Mahmoud, MD**, Assistant Professor  
**John McAuliffe, MD, MBA**, Associate Professor ; *Director, Research*  
**Mark Meyer, MD**, Assistant Professor ; *Director, Procedure Management, Division of Pain Management*  
**David Moore, MD**, Associate Professor  
**Jacquelyn Morillo-Delerme, MD**, Associate Professor ; *Transplant Director, Division of Anesthesia*  
**Joseph Previte, MD**, Associate Professor ; *Director, Information Technology Services*  
**Marnie Robinson, MD**, Assistant Professor ; *Director, Fetal Surgery Anesthesia, Division of Anesthesia*  
**Senthilkumar Sadhasivam, MD**, Assistant Professor  
**Paul Samuels, MD**, Associate Professor ; *Director, Education*  
**Thomas "Mike" Shackelford, MD**, Assistant Professor  
**Ximena Soler, MD**, Assistant Professor  
**James Spaeth, MD**, Associate Professor ; *Director, Cardiac Anesthesia, Division of Anesthesia*  
**Theodore Striker, MD**, Professor ; *Director, Outpatient Mason, Division of Anesthesia*  
**Alexandra Szabova, MD**, Assistant Professor  
**Jon Tomasson, MD**, Assistant Professor  
**Kevin Tomfohrde, MD**, Assistant Professor  
**Anna Varughese, MD, MPH**, Associate Professor ; *Associate Director, Quality, Division of Anesthesia*  
**Deborah Vermaire, MD**, Associate Professor ; *Director, Quality, Division of Pain Management*  
**Norbert Weidner, MD**, Associate Professor ; *Director, Palliative Care, Division of Pain Management*  
**Eric Wittkugel, MD**, Associate Professor ; *Co-Medical Director, Same Day Surgery and Pre-Anesthesia Consultation Clinic*  
**Junzheng Wu, MD**, Assistant Professor

## **Joint Appointment Faculty Members**

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**Susmita Kashikar-Zuck, PhD**, Associate Professor  
Behaviorial Medicine & Clinical Psychology  
**Anne Lynch-Jordan, PhD**, Assistant Professor

## **Trainees**

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- **Leah Bhatki, MD**, PGY-IV, UCSF Department of Anesthesia
- **Arvind Chandrakantan, MD**, PGY-IV, University of Southwestern
- **Renee Kreeger, MD**, PGY-IV, University of Cincinnati
- **Kristy Luong, MD**, PGY-IV, University of Texas Southwestern
- **Mario Patino, MD**, PGY-IV, Cleveland Clinic
- **Kasia Rubin, MD**, PGY-IV, Metro Health, CWRU
- **Nancy Samol, MD**, PGY-IV, University of Cincinnati
- **Wade Smith, MD**, PGY-IV, University of Arizona
- **Denise Sullivan, MD**, PGY-IV, UC, San Francisco
- **Tana Tyler, MD**, PGY-IV, University of Virginia

## **Significant Accomplishments in FY08**

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### **Division of Anesthesia**

In the Division of Anesthesia, our emphasis in FY 2008 centered on safety and quality initiatives.

In FY 2008, the Department continued to place emphasis on reducing serious events. We experienced a reduction in the serious event rate in the latter half of the year due to improvement in our reporting system, analyses of events and communication within the Department regarding such events. Lastly and more importantly, we have developed standard operating procedures (SOPs) in those areas susceptible to these events.

A key initiative of Perioperative Clinical Systems Improvement (CSI) team is optimization of the ENT perioperative/surgical care through standardization of pre-, intra-, and post-operative processes. A crucial component of starting on time is timely anesthesia pre-medication. To that end, the Department set a goal of 95% on-time pre-medication for the first cases of the day. Our baseline data in June 2007 indicated we were only 56% successful in administering timely, pre-anesthesia medications. Over the course of the year, we modified our workflow and developed an algorithm to help drive early decisions for pre-medication. Through strong and sustained improvement efforts we achieved our goal of 95% success with timely pre-medication. For FY 2009, we will focus on spreading this process flow to the subsequent cases.

### **Division of Pain Management**

The Pediatric Palliative and Comfort Care Team (PACT), and the Procedural Management section of the Division have blossomed into crucial aspects of care at CCHMC. Patients of the Hematology-Oncology Division have come to rely of the services of the Palliative Care team for comfort both as inpatients, as well as at the end of life. A small, tightly-knit inpatient team provides supportive continuity of care with the pharmacologic and therapeutic expertise found only in those with extensive experience in the care of this patient population. When these patients undergo diagnostic and therapeutic procedures, many of which are painful, the Procedure Management team provides sedation and anesthesia to get the patients through these frequent and distressing procedures. Family and primary service feedback has been very positive. In fact, the services provided by the Division are cited by families as among the reasons they have transferred their care to CCHMC from outside institutions. The interdisciplinary efforts between the Divisions of Hematology-Oncology and Pain Management are exemplary in their productivity, efficiency, collegiality and family focus.

Without assessment and documentation, services can not be improved. To ensure the highest level of clinical efficacy and safety, the Division of Pain Management has developed a Quality Assurance scorecard, to assess all four sections of the Division (Chronic Pain Clinic, Acute Pain Service, Procedure Management and PACT). The data that is collected is used for continuous improvement, and is being prepared for publication. The Pain and Anesthesia literatures have little QA-based data, and the Division is positioning itself to take a leadership role nationally in this area of practice management.

### **Division of Neurobiology**

#### **Laboratory Research**

In Fiscal Year 2008, Steve Danzer, PhD continued his work examining how neurological and genetic lesions disrupt brain development, specifically the development and integration of hippocampal dentate granule cells. His laboratory will further this research in the coming year through collaboration with the arrival of Dave Richards, PhD, who brings an additional perspective to already successful research.

Drs. Andreas Loepke and George Istaphanous, with the support of the Foundation for Anesthesia Education and Research (FAER), focus on the detection and prevention of neonatal brain injury with special emphasis on congenital heart disease, as well as anesthesia-induced developmental neuroapoptosis. Their utilization of many tools and techniques, such as transgenic animals and confocal microscopy allow them to produce international results.

### **Clinical Research**

After receiving approval of his Investigational New Drug (IND) application, Dr. Mohamed Mahmoud began investigating the pharmacology of Dexmedetomidine in specialized applications in the MRI setting, particularly how to optimize the anesthetic regime that is used in children and adolescents that have a history of obstructive sleep apnea. Furthermore, Dr. Mahmoud is using his IND to understand the effects of Dexmedetomidine on neuromonitoring techniques. Each of these studies can identify a unique way to utilize the drug that will lead to a positive outcome for the patient and procedure results.

Drs. John McAuliffe and Senthilkumar Sadhasivam received a Trustee Award to investigate the relationship between an individual's genotype and their analgesic requirements following a painful procedure and the likelihood of side-effects following treatment of pain with narcotic analgesics, specifically morphine. This study also looks at two new possible procedures for measuring pain through 1) pupil dilation readings which are proven to correlate well with narcotic levels and 2) CO<sub>2</sub> readings to monitor respiratory depression and its relationship to narcotic levels.

Dr. Senthilkumar Sadhasivam's Foundation for Anesthesia Education and Research (FAER) study aims at developing and validating the Preoperative Adult Child Behavioral Interaction Scale (PACBIS) assessment tool. This is a real-time tool that will help clinicians better understand how behavioral factors affect postoperative outcomes in children following outpatient surgery.

## **Significant Publications in FY08**

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**Walter C, Murphy BL, Pun RYK, Spieles-Engemann AL and Danzer SC (2007) Pilocarpine-induced seizures cause selective time-dependent changes to adult-generated hippocampal dentate granule cells. *Journal of Neuroscience*, 27(28):7541-52.**

We demonstrated that adult-born cells contribute to brain pathology in epilepsy.

**Loepke AW, Soriano SG: An Assessment of the Effects Of General Anesthetics on Developing Brain Structure and Neurocognitive Function. *Anesth Analg* 2008; 106: 1681-1707**

Brain cell death following anesthetic exposure, as observed in animal models, has led to serious questions regarding the safety of pediatric anesthesia. This article reviews the pertinent data available in animal models, it examines the possible evidence for this phenomenon occurring during human anesthesia practice, and critically discusses the applicability of experimental models to clinical pediatric anesthesia. Despite abundant evidence for anesthesia-induced neurotoxicity in animals, only anecdotal evidence exists for neurological impairment in children following exposure to surgery and anesthesia early in life. Significant differences exist between the experimental conditions and clinical anesthesia practice.

**Varughese AM, Nick TG, Gunter J, Wang Y, Kurth CD. "Factors Predictive of Poor Behavioral Compliance During Inhalational Induction in Children." *Anesthesia & Analgesia* 2008, 107(2): 413-421.**

Preoperative factors predicting poor behavioral compliance on anesthetic mask induction may identify children who could benefit from interventions in the preoperative clinic to reduce anxiety. Age, history of previous anesthesia, preoperative tour attendance, preoperative preparation time and anxiety state levels in preoperative clinic demonstrated a strong relationship to poor behavioral compliance on induction. Race, gender, type of procedure, ASA class, midazolam premedication, and number of hours fasted demonstrated no relationship to poor behavioral compliance.

**McAuliffe JJ, Joseph B, Vorhees CV. Isoflurane-delayed preconditioning reduces immediate mortality and improves striatal function in adult mice after neonatal hypoxia-ischemia. *Anesth Analg*. 2007 104:1066-77**

The volatile anesthetic Isoflurane when administered 24-hours prior to a hypoxic ischemic insult provides protection to certain circuits in the brain. In addition, it can also reduce the immediate mortality that normally follows such an

insult.

**Lynch AM, Kashikar-Zuck, S, Goldschneider, KR, and Jones BA: Sex and Age Differences in Coping Styles Among Children with Chronic Pain. J Pain Symptom Manage33(2): 206-216, 2007.**

Little is known about how children of either gender cope with chronic pain. We demonstrated the early emergence of sex- and aged-based preferences in coping strategies among children and adolescents with chronic pain. Boys use more distraction-type modalities while girls utilize social support mechanisms, while cognitive strategies emerge during adolescence. These findings establish a basis for further research on early social influences in the development of pain coping styles in males and females.

## Division Highlights

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**Anna M. Varughese, MD, MPH**

Comparison of Two interventions for Inhalational Induction in Children: A QA Improvement Study.

**Mohamed Mahmoud, MD**

Effects of Increasing Depth of Dexmedetomidine.

Susceptibility of Motor-Evoked Potentials To Varying Infusion Rates of Dexmedetomidine

**Junzheng Wu, MD**

A Qualitative comparison of Two Anesthetic Technique in Children Undergoing Magnetic Resonance Imaging.

**Michael Shackelford, DO**

Comparison of Sedation and Anesthesia Techniques for MRI in Infants.

**Senthilkumar Sadhasivam, MD, MPH**

PACBIS 3 - Correlating Postoperative Behavioral Outcomes with Perioperative Adult Child Behavioral Interaction Scale.

Personalizing Perioperative Morphine Analgesia in Children.

**Andreas W. Loepke, MD, PhD**

Neuroprotection of the Neonatal Brain

Mechanism of Developmental Isoflurane Neurotoxicity

**John J. McAuliffe, III, MD, MBA**

Improving Pediatric Pain Management with neuro genomics-understanding the genetic response to morphine following surgery using genetics.

**Steve Danzer, PhD**

Granule cell disruption in the development of epilepsy and autism.

## Mentions in Consumer Media

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- [Kenneth R. Goldschneider, MD Cited in Sugar, Breastmilk can Ease Vaccination Pain, distributed by Healthday News to US News and World Report, Washington Post.com, The Nigerian Tribune, The Tehran Times International Daily, Yeshiva World News, among others, February, 2008.](#) , Newspaper

## Division Publications

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1. Danzer SC, Kotloski RJ, Walter C, Hughes M, McNamara JO. [Altered morphology of hippocampal dentate granule cell presynaptic and postsynaptic terminals following conditional deletion of TrkB](#). *Hippocampus*. 2008; 18: 668-78.
2. Walter C, Murphy BL, Pun RY, Spieles-Engemann AL, Danzer SC. [Pilocarpine-induced seizures cause selective time-dependent changes to adult-generated hippocampal dentate granule cells](#). *J Neurosci*. 2007; 27: 7541-52.
3. Goldschneider KR, Weidner NJ, Racadio JM. [Celiac plexus blockade in children using a three-dimensional fluoroscopic reconstruction technique: case reports](#). *Reg Anesth Pain Med*. 2007; 32: 510-5.

4. Mahmoud M, Bryan Y, Gunter J, Kreeger RN, Sadhasivam S. [Anesthetic implications of undiagnosed late onset central hypoventilation syndrome in a child: from elective tonsillectomy to tracheostomy](#) . *Paediatr Anaesth*. 2007; 17: 1001-5.
5. Hosu L, Meyer MJ, Goldschneider KR. [Cerebrospinal fluid cutaneous fistula after epidural analgesia in a child](#) . *Reg Anesth Pain Med*. 2008; 33: 74-6.
6. Loepke AW, Soriano SG. [An assessment of the effects of general anesthetics on developing brain structure and neurocognitive function](#) . *Anesth Analg*. 2008; 106: 1681-707.
7. Malviya S, Voepel-Lewis T, Tait AR, Watcha MF, Sadhasivam S, Friesen RH. [Effect of age and sedative agent on the accuracy of bispectral index in detecting depth of sedation in children](#) . *Pediatrics*. 2007; 120: e461-70.
8. Weidner NJ. [Pediatric palliative care](#) . *Curr Oncol Rep*. 2007; 9: 437-9.
9. Weidner NJ, Meyer MJ. ["Palliative care for the primary pediatric practitioner."](#) *Pain in children : a practical guide for primary care*. Totowa, NJ: Humana Press; 2008: 221-231.

## Grants, Contracts, and Industry Agreements

### Grant and Contract Awards

### Annual Direct / Project Period Direct

#### Istaphanous, G

##### Anesthesia-Induced Neuronal Cell Death in the Developing Brain

Foundation for Anesthesia Education and Research

07/01/07 - 06/30/09

\$35,000 / \$85,000

#### Sadhasivam, S

##### Perioperative Child and Adult Behavioral Interactions

Foundation for Anesthesia Education and Research

07/01/07 - 06/30/09

\$115,000 / \$255,000

**Current Year Direct**

**\$150,000**

**Total \$150,000**