## Division Details

### Division Data Summary

#### Research and Training Details

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
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<td>Number of Faculty</td>
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<td>Peer Reviewed Publications</td>
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#### Clinical Activities and Training

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<tr>
<td>Number of Clinical Staff</td>
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<td>Number of Other Students</td>
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<td>Outpatient Encounters</td>
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### Division Photo

Row 1: B Wong, D Gilbert, J Vannest, J Xiang, A Hershey  
Row 2: M Williams, D Krueger, K Wesselkamper, J Tenney, T Glauser  
Row 3: C Vorhees, D Franz, C Thomas, M Skelton

### Significant Accomplishments

#### Headache Center

The Headache Center celebrated its 15th year with continued growth in the management, treatment and understanding of children, adolescents and young adults. The multidisciplinary outpatient clinic, acute treatment center, young adult headache program and a focused inpatient service provide the basis for the research and educational activities, including an UCNS-certified Headache Medicine fellowship. Headache Center research includes clinical trials, outcome studies and understanding the molecular and neurophysiological basis of migraine. Recent blood genomic studies identified the gene expression patterns for medication overuse and menstrual-related migraine. An NIH-sponsored study of acute migraine has demonstrated cortical dysfunction in children during a migraine and has been extended to the effects of chronic migraine. In collaboration with the Division of Behavioral Medicine and Clinical Psychology, an NIH study examining the role of coping skills training in the management of chronic migraine will be completed this fall. We have entered into a significant additional collaborative effort with Scott Powers, PhD, Center for Clinical and Translation Research and the Department of Biostatistics and Clinical Trials Statistical and Data Management Center at the University of Iowa in launching our 40-site study investigating the comparative effectiveness of amitriptyline and topiramate in preventing pediatric and adolescent migraine (CHAMP) study.

#### Epilepsy Center
The Comprehensive Epilepsy Center includes multiple epilepsy clinics including New Onset Seizure (with separate clinics for infants and older children), Advanced Therapies, Epilepsy Surgery, Epilepsy and Sleep Clinic. Multiple clinical and translational research activities are underway, including investigation of the role of drug-gene interactions on the individual variation in anti-epileptic drug clinical response; observational and interventional adherence research; examination of the differential gene expression patterns in blood and brain; a study examining the effect of sleep medications on EEG patterns; research on the effect of spikes on language development; functional MRI/magnetoencephalographic imaging of generalized spike discharges; and application of advanced technologies to develop epilepsy clinical decision support algorithms.

There are six individual NIH-funded epilepsy researchers in the Comprehensive Epilepsy Center. The NIH-funded, 29-center U01 trial based out of Cincinnati Children's is the largest pediatric epilepsy trial ever funded in the United States. The study is designed to better identify the pharmacokinetic, pharmacodynamic and pharmacogenetic factors that impact response to therapy. The research on epilepsy adherence was recently published in *JAMA*. The varied research efforts continue to generate highly significant information on the management of children with epilepsy.

**Tuberous Sclerosis Program**

The Tuberous Sclerosis Program had another very productive year. Our clinic is the largest in the world, and the only one that manages every aspect of the disorder in both adults and children. We receive increasing numbers of referrals from throughout the United States and internationally. Research conducted here or led by our clinic physicians has resulted in a new FDA indication for renal tumors associated with condition, and has identified new therapies for epilepsy, cognitive impairments, lung disease, and skin tumors. mTOR inhibition, the main focus of our research, is also applicable to non-TSC patients with epilepsy, movement disorders, autism, sporadic lymphangioleiomyomatosis and Alzheimer's disease. Darcy Krueger, MD, PhD, received two RO1 grants from the National Institutes of Health last year, totaling more than 15 million dollars. One of these grants, which received a perfect score from reviewers, will form an autism research network based at Cincinnati Children's using TSC as paradigm. Our research has been accepted by numerous high profile publications, including the *New England Journal of Medicine, The Lancet,* and *Annals of Neurology*. We also offer unique social and emotional support to patients and families, the highlight of which is our TSC summer camp, the first and only one of its kind in the world.

**Division Highlights**

**Neuromuscular Program**

The Pediatric Neuromuscular program assumed overall coordination and direction of the Comprehensive Neuromuscular Care Center in July 2011. The following accomplishments are noted with increase in total number of outpatient visits and encounters (with 60% of all neuromuscular families and 80% of DMD families from outside Cincinnati Children's service areas – i.e. other states and cities in the US and other countries):

1. Establishment of an interdisciplinary cardiac-pulmonary clinic for the extended neuromuscular evaluations
2. Provision of additional DMD/BMD carrier clinics with Cardiology, ophthalmology evaluations, health psychologist and neuromuscular neuropsychology services
3. Initiation of muscle and nerve ultrasound services in the outpatient clinic is expected in the fall 2012

The pediatric NM clinic was one of the 3 (with Asthma and Rheumatology) clinics at Cincinnati Children's to successfully engage in the EHR process for review of history and Peds QL, thereby laying the infrastructure for
efficient use of electronic medical records for monitoring patient outcomes.

**Preclinical neuroscience**

**Skelton lab**: The development of a brain specific CrT knockout mouse to understand CNS specific effects of the loss of Cr has demonstrated that female carrier mice did not have learning and memory deficits despite having significantly lower Cr than WT, providing insight into the necessary levels of Cr for proper brain function. CrT knockout mice were found to have an exaggerated response to serotonin releasing drugs, expanding the role of Cr in serotonin signaling.

**Vorhees lab**: Hypothesizing that inhibiting the serotonin reuptake transporter would prevent the adverse effects of MDMA (Ecstasy), the selective serotonin reuptake inhibitor (SSRI) antidepressant, citalopram caused long-term reductions in hippocampal 5-HT and impairments in learning and memory for both allocentric and egocentric abilities. Animals were exposed during a stage of brain development approximating human 3rd trimester, raising concerns about the safety of antidepressants when used during pregnancy.

**Williams lab**: Focusing on understanding the brain regions involved in egocentric learning and memory, specific dopaminergic lesions in rats demonstrated that lesions in the lateral portion of the dorsal striatum, but not the medial portion dorsal striatum lesions produced 30-40% increases in errors during egocentric learning with increases in latency to escape, improving our understanding of regional specificity for egocentric learning and memory.

**Neonatal Neurology Program**

The Neonatal Neurology team provides consultation services to Newborn Intensive Care Units at Cincinnati Children’s Hospital, Good Samaritan Hospital and University Hospital of Cincinnati for the acute management of seizures and other neurological disorders of the newborn. We have worked closely with neonatology to develop protocols for EEG monitoring and treatment of neonatal seizures. We are in the process of expanding neonatal electrophysiology services to neonatal intensive care units in Dayton and Northern Kentucky.

We have also created and continue to expand a multi-disciplinary follow up clinic including participants from Occupational Therapy, Speech Therapy, Nutrition, Neonatology and Neurology which provides subsequent care for these infants following discharge from the Neonatal Intensive Care Unit and continuing through the first several years of life. This consistent and comprehensive outpatient care facilitates longitudinal identification of risk factors for poor neurologic development and areas where targeted interventions may improve long term outcomes.

Using lessons learned from our experiences creating multi-disciplinary care for patients from the neonatal intensive care period through early childhood, we are also working with Cardiology to develop similar cardiac intensive care protocols and outpatient follow up for survivors of complex congenital heart disease requiring cardiac surgery.

**Movement Disorder and Tourette Syndrome Program**

The Movement Disorders and Tourette Syndrome Clinic has a regional and national reputation and we see referrals from multiple states in the region for second opinions. The clinic program offers a full spectrum of pharmacological services for movement disorders, collaboration with and referral to neurosurgery for deep brain stimulation, and collaboration with psychology for behavioral treatments for Tourette Syndrome. Clinic director Donald Gilbert is a member of the NIH taskforce on Pediatric Movement Disorders and of the Medical Advisory Board for the Tourette Syndrome Association. He has also been a visiting professor and speaker at conferences on Movement Disorders in Children in Minneapolis, Savannah, and Boston. The clinic is active in
multiple phases of research, with 14 publications in the last year and with two clinical trials of new medications for Tourette Syndrome. The research program includes studies of the physiology of motor cortex and brain neuroplasticity in children and adults. We currently have 3 NIH grants active for studies in Tourette Syndrome and ADHD.

**Division Publications**


2. Austin JK, Perkins SM, Johnson CS, Fastenau PS, Byars AW, deGrauw TJ, Dunn DW. *Behavior problems in children at time of first recognized seizure and changes over the following 3 years.* Epilepsy Behav. 2011; 21:373-81.


Faculty, Staff, and Trainees

Faculty Members
Andrew Hershey, MD, PhD, Professor

Leadership Interim Division Director; Director Headache Center
Research Interests Migraine, blood genomics

Todd Arthur, MD, Assistant Professor
Research Interests Brain concussion

Anna W Byars, PhD, Associate Professor
Research Interests Cognitive effects of epilepsy

James Collins, MD, PhD, Assistant Professor
Research Interests Congenital Muscular Dystrophy; Neuromuscular Disease

David Franz, MD, Professor
Leadership Director Tuberous Sclerosis program
Research Interests Tuberous sclerosis

Donald Gilbert, MD, Professor
Leadership Director Movement Disorders program; Director Neurology Residency Program
Research Interests Tourette syndrome, Transcranial Magnetic Stimulation (TMS)

Tracy A Glauser, MD, Professor
Leadership Director Comprehensive Epilepsy program
Research Interests Epilepsy, pharmacology

Hansel Greiner, MD, Assistant Professor
Research Interests Epilepsy

Barbara Hallinan, MD, PhD, Assistant Professor
Research Interests CSF steroid profiles

Katherine Holland-Bouley, MD, PhD, Assistant Professor
Research Interests Ion channels and epilepsy

Sejal Jain, MD, Assistant Professor
Research Interests Epilepsy, sleep

Marielle A Kabbouche, MD, Assistant Professor
Research Interests Migraine

Darcy Krueger, MD, PhD, Assistant Professor
Research Interests Tuberous Sclerosis

Diego Morita, MD, Assistant Professor
Research Interests Epilepsy, pharmacology

Hope O'Brien, MD, Assistant Professor
Research Interests Headaches

Douglas Rose, MD, Professor
Leadership Director, MEG lab
Research Interests Magneto-Encephalography (MEG)

Mark Schapiro, MD, Professor
Research Interests Neurodevelopmental disorders

Mary Sutton, MD, Assistant Professor
Research Interests Neuro-oncology
Shannon Standridge, DO, Assistant Professor
  **Research Interests** Outcomes study, epilepsy

Cameron Thomas, MD, Assistant Professor
  **Research Interests** Neonatal neurology

Jennifer Vannest, PhD, Assistant Professor
  **Research Interests** Speech and language development

Charles Vorhees, PhD, Professor
  **Leadership** Director Animal Neurobehavior Core
  **Research Interests** Drugs/toxicants and brain development

Kristen Wesselkamper, MD, Assistant Professor
  **Research Interests** Improvement science

Michael Williams, PhD, Associate Professor
  **Research Interests** Drugs/toxicants and brain development

Brenda Wong, MD, Professor
  **Leadership** Director Neuromuscular program
  **Research Interests** Duchenne’s Muscular Dystrophy, Spinal Muscular Atrophy

Steve Wu, MD, Assistant Professor
  **Research Interests** Movement Disorder; Transcranial Magnetic Stimulation (TMS)

Jing Xiang, MD, PhD, Associate Professor
  **Leadership** Director MEG Research program
  **Research Interests** MEG

**Clinical Staff Members**
  - Irina Rybalsky, MD

**Trainees**
  - Alice Lawrence, MD, PGYVI, Milton S. Hershey Medical Center
  - Jan-Mendelt Tillema, MD, PGYV, St. Radboud University Nijmegen, The Netherlands
  - Laura Lehman, MD, PGYV, University of Cincinnati
  - Jeffrey Tenney, MD, PGYV, University of Massachusetts Medical School
  - Jamie Capal, MD, PGYV, Albany Medical College
  - Holly Hoenes, MD, PGYIV, Mercer University
  - Andrea Pardo, MD, PGYIV, Universidad del Rosario
  - John Pugh, MD, PGYIV, Boston University
  - Tanisha Williams, MD, PGYIV, University of Medicine & Dentistry of New Jersey
  - Thomas Dye, MD, PGYIII, St. Louis University
  - Nina Natarajan, MD, PGYIII, University of Cincinnati
  - Katrina Peariso, MD, PGYIII, University of New Mexico
  - Sarah Weatherspoon, MD, PGYIII, University of Texas Southwestern

**Grants, Contracts, and Industry Agreements**
## Grant and Contract Awards

### Annual Direct

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<th>Institution</th>
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<td>National Institutes of Health (University of Cincinnati)</td>
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<td>Impact of Initial Therapy and Response on Long Term Outcome in Children with CAE</td>
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<td>Outcome in Pediatric Status Epilepticus</td>
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<td>University of Cincinnati (National Headache Foundation)</td>
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<td>HERSHEY, A / POWERS, S</td>
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**Current Year Direct**: $7,001,275
### Industry Contracts

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<td>FRANZ, D</td>
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<td>DART Therapeutics, LLC</td>
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**Current Year Direct Receipts**: $234,375

**Total**: $7,235,650