Division Data Summary

Research and Training Details

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Clinical Activities and Training

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Significant Publications


This study demonstrated the effectiveness of everolimus in reducing subependymal giant-cell astrocytomas and with a single study lead to the FDA approval for this indication.


This study demonstrated the usefulness of multiple imaging techniques to identify the area of the brain for surgical resection when a classically defined lesion has not been identified.


This study demonstrated the significant problem with AED adherence in children with epilepsy and the potential impact on treatment response.

Skelton MR, Schaefer TL, Graham DL, deGrauw TJ, Clark JF, Williams MT, Vorhees CV. Creatine transporter (CrT; Slc6a8) knockout mice as a model of human CrT deficiency. PLoS One. 6(1) 1-10 (e16187). 2011.

This is the first animal model of human creatine deficiency syndrome and was developed by our laboratory in mice using a floxed targeting strategy. The model shows the major biochemical and neurobehavioral phenotype of the human disorder and provides an opportunity to investigate the pathophysiology of this poorly understood disorder and to investigate treatment approaches that might someday be translated to
This study demonstrates a unique genomic profile in subjects with daily headaches and medication overuse that responded to cessation of overused medication from those subjects that did not respond to cessation of these agents, suggesting a unique molecular susceptibility to overuse of medication.

Division Highlights

**Movement Disorders Clinics/Tourette Syndrome Clinics**

The Movement Disorder studies patients with tics, Tourette syndrome, dystonia, chorea, tremor, ataxia, and psychogenic movement disorders as well as ADHD and Stroke. Ongoing research includes studies of the neurological basis for ADHD and Tourette symptoms using Transcranial Magnetic Stimulation (TMS), as well as treatment studies for Tourette Syndrome, ADHD, and Stroke.

**Comprehensive Epilepsy Program**

The Comprehensive Epilepsy Program includes New Onset Seizure Clinics and Intractable Epilepsy Clinics. A major focus of the clinical research activities is the investigation of the role of drug-gene interactions on the individual variation in anti-epileptic drug clinical response. Research is under way examining both the role that genetic variation in drug metabolizing enzymes, drug transporters and drug receptors play in clinical response and the impact of medication on gene expression and the resulting relationship between gene expression and drug response. A NIH UO1 grant is a 32-center trial based out of Cincinnati Children’s Hospital Medical Center and is the largest pediatric epilepsy trial ever funded in the United States continues to generate highly significant information on the management of children with epilepsy with recent highlights in medication adherence. The study is designed to better identify the pharmacokinetic, pharmacodynamic and pharmacogenetic factors that impact response to therapy.

**Tuberous Sclerosis Program**

This multispecialty program follows hundreds of patients with tuberous sclerosis but also patients with related disorders such as lymphangioleiomyomatosis (LAM). Through the pharmacological research efforts on everolimus and the understanding of the molecular nature of mTOR, research from the Tuberous Sclerosis Clinic lead to the FDA approval of everolimus for subependymal giant-cell astrocytomas and continues to build on the use of agents involved in mTor pathways for the treatment of neurological conditions.

**Headache Center**

Research in the Headache Center continues with emphasis on clinical trials and outcome studies. The blood genomic study on pediatric migraine is ongoing with publication of the effects of medication overuse and recent completion of studies on the menstrual effects of gene expression patterns in adolescents with menstrual-related migraine. Through combination with the MEG Center, a NIH sponsored study on the cortical effects of acute migraine has been developed with initial results demonstrating of cortical dysfunction toward complex task in children with migraine. In collaboration with the Division of Behavioral Medicine and Clinical Psychology, an NIH study investigation is near completion examining the role of coping skills training in the management of chronic migraine. Over the past year, a significant effort in collaboration with the Division of Behavioral Medicine and Clinical Psychology and Center for Clinical and Translation Research (Dr. Powers) and the Department of Biostatistics and Clinical Trials Statistical and Data Management Center at
the University of Iowa has resulted in the development of a multi-site study investigating the comparative effectiveness of amitriptyline and topiramate in the prevention of pediatric migraine.

**Comprehensive Neuromuscular Center**

The Comprehensive Neuromuscular Center has developed an interdisciplinary research program that integrates clinical, translational and basic research strategies. Our specialists participate in clinical trials, working to identify improved therapies. In one such study, our neuromuscular team collaborates with specialists from Endocrine division, to study the effects of Insulin Growth Factor 1 (IGF-1) on the muscle function of boys with Duchenne Muscular Dystrophy.

**Neurobehavioral Animal Core (Vorhees and Williams lab)**

During the past year we reported data showing for the first time that the Neuropeptide S receptor (NPSR1) in brain is the sole receptor mediating the anxiety, activity, and stress modulating effects of Neuropeptide S, an endogenous peptide that modulates mood and represents a target for the development of new therapeutics that may help correct mood disorders.

**Division Collaboration**

**Human Genetics; Behavioral Medicine and Clinical Psychology; Psychiatry » Dr. T.A. Burrow; Dr. W. Lopez; Dr. E. Harris**

Movement Disorders Clinic/Tourette's Disorder Clinic

**Behavioral Medicine and Clinical Psychology; Neurosurgery; Pediatric Neuroimaging Research Consortium; Human Genetics; Radiology; Social Services » Drs. A. Modi, Shanna Guilfoyle; Dr. F. Mangano; Dr. S. Holland; Drs. G. Zhang, G. Grabowski, M. Keddache; Dr. J. Leach; M. Meyer, S. Fletcher**

Comprehensive Epilepsy Program

**Pulmonary Medicine; Nephrology; Plastic Surgery; Radiology; Neurosurgery; Cardiology; Human Genetics; Psychiatry » Drs. L. Young, F. McCormack; Dr. J. Bissler; Dr. C. Gordon; Drs. M. Care, J. Leach; Dr. K. Crone; Dr. T. Knilans; Dr. B. Schorry; Dr. D. Nelson**

Tuberous Sclerosis Program

**Behavioral Medicine and Clinical Psychology » Drs. S. Powers, A Lynch-Jordan, L. Crosby, S. Slater**

Headache Center

**Cardiology; Developmental and Behavioral Pediatrics; Nutrition; Human Genetics; Gastroenterology; Endocrinology; Orthopedics; Speech Therapy; Rehabilitative Medicine; Pulmonary; Physical Therapy; Pathology; Pediatric Surgery; Anesthesia & Palliative Care; Pain Services; Social Services; Translational Research; Nephrology » Drs. J. Towbin, JL Jefferies, R. Spicer, L. Cripe; Dr. D. Schonfeld; B. Godshall, D. Boutwell; M. Walker genetic counselor; Drs. A Kaul, N. Yazigi, A. Miethke; Drs. M. Rutter, S. Rose; Drs. J. McCarthy, V. Jain, P. Sturm; J. Linck; Dr. M. McMahon; Drs. R. Amin, H. Sawnani, J. Crisalli; A. McCormick, M. McGuire; Drs. L. Miles, K. Bove; Drs. R. Brown, T. Inge; Dr. N. Weidner, M. Meyer; Dr. K. Goldschneider; L. Demosthenes; Dr. J. Molkentin; Dr. E. Jackson**

Comprehensive Neuromuscular Center

**Sport Medicine; Physical Medicine & Rehabilitation » Drs. J. Divine, N. Edwards, M. Shaffer; B. Kurowski**

Concussion Clinic

**Neonatology & Pulmonary Biology » Drs. B. Haberman, T. Cahill, S. Merhar, T. Korfhagen, V. Narendran**

Neonatal Follow-up Clinic
Pulmonary » Drs. N. Simakajornboon, M. Ednick, J. Crisalli, H. Sawnani, G. McPhail
Sleep Clinic

Human Genetics; Allergy & Immunology; Anesthesiology; Developmental Biology; Experimental Hematology » Drs. G. Grabowski, Y. Sun; Drs. M. Rothenberg, H. Zhu; Dr. S. Danzer, A. Lepke; Drs. K. Campbell, M. Nafafuku; Drs. R. Waclaw, L. Ehrman
Neurobehavioral Animal Core (Vorhees and Williams lab)

Rehabilitative Medicine » Drs. D. Pruitt, L. Michaud
Pediatric Demyelinating Disease Clinic

Speech Pathology; Pediatric Neuroimaging Research Consortium; Biomedical Informatics; Radiology; UC Neurology » Dr. E. Redle; Drs. S. Holland, V. Schmithorst; Dr. M. Wagner; Dr. Jean Tkach; Dr. Jerzy Szaflarski
Neuroimaging of Childhood Apraxia of Speech,
Cincinnati MR Imaging of Neural Development-(C-MIND study)

Faculty Members
Antonius DeGrauw, MD, PhD, Professor
Director Neurology Division
Research Interests Neurodevelopment, mitochondrial disorders

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
Director Tuberous Sclerosis program
Research Interests Tuberous sclerosis

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

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

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

Andrew Hershey, MD, Professor
Director Headache Center
Research Interests Migraine, blood genomics

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

Sarah Hopkins, MD, Assistant Professor
Research Interests White Matter Disease; Multiple Sclerosis
Sejal Jain, MD, Assistant Professor
  Research Interests Epilepsy, sleep

Marielle A Kabbouche, MD, Assistant Professor
  Research Interests Migraine

Milena Korostenskaja, PhD, Assistant Professor
  Research Interests Mismatch negativity evoked response; changes in electrocorticogram during cognitive testing

Darcy Krueger, MD, Assistant Professor
  Research Interests Tuberous Sclerosis

Ki Lee, MD, Associate Professor
  Director EEG lab, EMU
  Research Interests Epilepsy surgery

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

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

Douglas Rose, MD, Professor
  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
  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, Associate Professor
  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  
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
- Tanishia 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

Significant Accomplishments

**MEG Laboratory**
The Magnetoencephalography (MEG) Center, created in 2006, noninvasively measures magnetic fields created by the brain’s electrical activity and provides high spatiotemporal information about functional brain activity. MEG is now used to map epileptogenic foci and eloquent brain function for pre-operative evaluation of epilepsy surgery, and hundreds of patients have benefited. Researchers at the MEG Center have developed 17 collaborative projects including the study of language function of the developing brain, identification of neuromagnetic abnormalities in migraine and localization of epileptic foci with high-frequency oscillations. Supported by a Trustee Grant and two National Institutes of Health grants, the research team has published about 26 MEG papers in peer-reviewed journals. Within five years, our program has become one of the leading clinical MEG sites in the world. We have trained 10 MEG scientists, six of whom have become department or lab directors at their hospitals or institutions.

**Neuromuscular Program**
The Comprehensive Neuromuscular Care Center has distinguished itself as a center of excellence for the management and care of our patients. The center provides comprehensive interdisciplinary care for optimal outcomes in patients from all over the United States and other countries with pediatric neuromuscular disorders, in particular Duchenne muscular dystrophy.

Besides the teaching and education of pediatric and neurology resident staff, the program has also been successful in the training of pediatric neuromuscular specialists who are now working at other pediatric institutions. The program is active in translational and clinical neuromuscular research. In particular, it brings
together other specialties in collaborative research projects and clinical trials in Duchenne muscular dystrophy.

Division Publications


49. Wu SW, Gilbert DL. *Gilles de la Tourette Syndrome.* *Conn’s Current Therapy 2011.* Philadelphia: W.B.


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### Grants, Contracts, and Industry Agreements

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<tr>
<th>Grant and Contract Awards</th>
<th>Annual Direct / Project Period Direct</th>
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<td><strong>GILBERT, D</strong></td>
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| *The Role of SLITRK1 in Tourette and Related Disorders*  
National Institutes of Health (Yale University School of Medicine)  
R01 NS 056276  
09/01/06-08/31/11 | $21,206 |
| **GLAUSER, T**            |                                      |
| *Impact of Initial Therapy and Response on Long Term Outcome in Children with CAE*  
National Institutes of Health  
U01 NS 045911  
09/01/10-08/31/14 | $2,432,985 |
| *Epilepsy Phenome/Genome Project (EPGP)*  
National Institutes of Health (The Univ of California, San Francisco)  
U01 NS 053998  
07/01/10-06/30/11 | $115,911 |
| **HOLLAND-BOULEY, K**    |                                      |
| *Sodium Channel Gene Variation in the Treatment of Epilepsy*  
National Institutes of Health  
R01 NS 062756  
04/01/09-03/31/14 | $196,875 |
| **O’BRIEN, H**            |                                      |
| *AHS/Merck US Human Health Headache Specialty Fellowship*  
American Headache Society  
07/01/09-06/30/11 | $40,000 |
| **SCHIBLER, K**           |                                      |
| *NICHD Cooperative Multi-Center Neonatal Research Network*  
National Institutes of Health (RTI International)  
U10 HD 027853  
07/01/10-06/30/11 | $59,592 |
| **TENNEY, J**             |                                      |
| *Mapping the Epileptic Network of Childhood Absence Seizures*  
CURE Epilepsy  
02/01/11-01/31/12 | $100,000 |
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**Current Year Direct**  $3,608,381

**Industry Contracts**

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<td>FRANZ, D</td>
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**Current Year Direct Receipts**  $2,182,897

**Total**  $5,791,278