

2014 Research Annual Report

Neurology



Division Summary

RESEARCH AND TRAINING DETAILS

Number of Faculty	37
Number of Joint Appointment Faculty	1
Number of Research Fellows	3
Number of Research Students	6
Number of Support Personnel	33
Direct Annual Grant Support	\$5,323,535
Direct Annual Industry Support	\$2,101,424
Peer Reviewed Publications	79

CLINICAL ACTIVITIES AND TRAINING

Number of Clinical Staff	122
Number of Staff Physicians	2
Number of Staff Psychiatrists	0
Number of Clinical Fellows	4
Number of Clinical Students	0
Number of Other Students	0
Inpatient Encounters	5,435
Outpatient Encounters	23,802

Division Photo



Row 1: M Williams, R Arya, I Rybalsky, C Tian, J Xiang, C Venkatesan, C Gross, A Byars, J Kacperski, J Capal, L Timchenko, S Standridge
Row 2: A DeSena, D Kadis, M Taylor, H Greiner, A Hershey, B Wong, D Rose, T Arthur, P Horn
Row 3: M Skelton, B Hallinan, J Tenney, D Morita, C Vorhees, D Gilbert, T Glauser, D Krueger, K Wesselkamper, M Schapiro, K Holland, E Broomall, C Thomas

Significant Accomplishments

Tuberous Sclerosis

The division continues to grow, both in clinical care and research. In 2013, the clinicians in the Tuberous Sclerosis Clinic (TSC) evaluated more than 650 unique patients and welcomed five new specialists: Janet Boyle, MD, (Adult Nephrology), **Stuart Goldstein, MD**, (Pediatric Nephrology); **Jens Goebel, MD**, (Pediatric Neurology); **Elizabeth Gosnell, DMD, MS**, (Pediatric Dentistry); and **Jamie Capal, MD**, (Pediatric Neurology and Neurodevelopmental Disabilities). The TSC continues to be the largest, most comprehensive clinic of its kind in the world. In research, **Brian Siroky, PhD**, joined the clinic team with joint faculty appointment in Nephrology and Neurology. Results from the 2012 International TSC Consensus Conference, chaired by **Darcy Krueger, MD, PhD**, included one of 14 manuscripts published by the research team in 2013. Three new funded projects were added in 2013.

Movement Disorder and Tourette Syndrome

The Movement Disorder and Tourette Syndrome Clinic sees children with tics, stereotypies, dystonia, tremor, chorea, ataxia, functional movement disorders, and drug-induced movement disorders at the base and several satellite locations. Our program has a national reputation and regularly gets referrals from other states for second opinions. The Dystonia and Complex Movement Disorder clinic provides pharmacological treatment, botulinum toxin, and Deep Brain Stimulation. Pre- and post-operative management is multidisciplinary.

Program highlights include publication of the first study of a novel agent for tic suppression in Tourette Syndrome; lead site for phase 2 study in children and adolescents; NIH funding for studies in Tourette genetics, and ADHD brain physiology.

Neonatal Neurology

The Neonatal Neurology team provides consultation services for the acute management of seizures and other neurological disorders in newborns at Cincinnati Children's Hospital, Good Samaritan Hospital and University Hospital of Cincinnati. We provide fetal consultations for brain disorders as part of a multidisciplinary team at the Cincinnati Children's Hospital Fetal Care Center. We continued to expand a combined neurology/neonatology follow-up clinic that treats children for their first several years of life. This outpatient care involves longitudinal identification of risk factors for poor neurologic development. The team is expanding services via Telemedicine to Kettering, Ohio, and plans to add a faculty member to accommodate the growth.

Comprehensive Epilepsy Program

For the third consecutive year, clinical volume increased by 20 percent at the epilepsy surgery program. Ten peer-reviewed publications on epilepsy surgery were published from several different first authors in the multidisciplinary group. Work continues on two institutional grants. The epilepsy Advanced Therapies clinic saw a greater than 50 percent increase in clinical volume for the third consecutive year.

Division Publications

1. Agricola K, Tudor C, Krueger D, Franz DN. **Nursing implications for the lifelong management of tuberous sclerosis complex.** *J Neurosci Nurs.* 2013; 45:226-42.
2. Arya R, Holland KD. **In response to comments on Adverse events related to extraoperative invasive EEG monitoring with subdural grid electrodes: a systematic review and meta-analysis.** *Epilepsia.* 2014; 55:195-6.
3. Arya R, Jain SV. **Sleep Walking in Children and Adolescents.** In: S Kothare, A Ivanenko, eds. *Parasomnias - Clinical Characteristics and Treatment.* New York: Springer; 2013:97-113.
4. Athanasiou Y, Zavros M, Arsali M, Papazachariou L, Demosthenous P, Savva I, Voskarides K, Deltas C, Pierides A, Feriozzi S, Perrin A, West M, Nicholls K, Sunder-Plassmann G, Torras J, Neumann P, Cybulla M, Fabry Outcome Survey Renal Working G, Cofiell R, Kukreja A, Bedard K, Yan Y, Mickle A, Ogawa M, Bedrosian C, Faas S, Meszaros K, Pruess L, Gondan M, Ritz E, Schaefer F, Testa A, Spoto B, Leonardis D, Sanguedolce MC, Pisano A, Parlongo MR, Tripepi G, Mallamaci F, Zoccali C, Group OBOTMW, Trujillano D, Bullich G, Ballarin J, Torra R, Estivill X, Ars E, Kleber ME, Delgado G, Grammer TB, Silbernagel G, Kraemer BK, Maerz W, Riccio E, Pisani A, Abdalla AA, Malone AF, Winn MP, Goodship T, Cronin C, Conlon PJ, Casserly LF, Nishio S, Sakuhara Y, Matsuoka N, Yamamoto J, Nakazawa D, Nakagakaki T, Abo D, Shibazaki S, Atsumi T, Mazinghi B, Giglio S, Provenzano A, Becherucci F, Sansavini G, Ravaglia F, Roperto RM, Murer L, Lasagni L, Materassi M, Romagnani P, Schmidts M, Christou S, Cortes C, McInemey-Leo A, Kayserili H, Zankl A, Peter S, Duncan E, Uk1ok C, Wicking C, Beales PL, Mitchison H, Magestro M, Vekeman F, Nichols T, Kamer P, Duh MS, Srivastava B, Van Doorn-Khosrovani SB, Zonnenberg BA, Musetti C, Quaglia M, Ghiggeri GM, Fogazzi GB, Settanni F, Boldorini RL, Lazzarich E, Airoidi A, Izzo C, Giordano M, Stratta P, Garrido P, Fernandes JC, Ribeiro S, Belo L, Costa EC, Reis F, Santos-Silva A, Youssef DM, Alshal AS, Salah K, Rashed AE, Kingswood JC, Jozwiak S, Belousova E, Frost M, Kuperman R, Bebin EM, Korf B, Flamini JR, Kohrman MH, Sparagana S, Wu JY, Berkowitz N, Miao S, Segal S, Ridolfi A, Bissler JJ, Franz DN, Oud MM, Van Bon BW, Bongers EM, Hoischen A, Marcelis CL, De Leeuw N, Mol SJ, Mortier G, Knoers NV, Brunner HG, Roepman R, Arts HH, Van Eerde AM, Van Der Zwaag B, Lilien MR, Renkema KY, De Borst MH, Van Haaften G, Giles RH, Navis

- GJ, Knoers NV, Lu KC, Su SL, Gigante M, Santangelo L, Diella S, Argentiero L, Cianciotta F, Martino M, Ranieri E, Grandaliano G, Giordano M, Gesualdo L, Fernandes J, Ribeiro S, Garrido P, Sereno J, Costa E, Reis F, Santos-Silva A, Chub O, Aires I, Polidori D, Santos AR, Brito Costa A, Simoes C, Rueff J, Nolasco F, Calado J, Van Der Tol L, Biegstraaten M, Florquin S, Vogt L, Van Den Bergh Weerman MA, Hollak CE, Hughes DA, Lachmann RH, Oliveira JP, Ortiz A, Svarstad E, Terryn W, Tondel C, Waldek S, Wanner C, West ML, Linthorst GE, Kaesler N, Brandenburg V, Theuwissen E, Vermeer C, Floege J, Schlieper G, Kruger T, Xydakis D, Goulielmos G, Antonaki E, Stylianoy K, Sfakianaki M, Papadogiannakis A, Dafnis E, Mdimagh S, Ben Hadj Mbarek-Fredj I, Moussa A, Omezzine A, Zellama D, Mabrouk S, Zouari N, Hassayoun S, Chemli J, Achour A, Bouslama A, Abroug S, Spoto B, Leonardis D, Politi C, Pisano A, Cutrupi S, Testa A, Parlongo RM, D'Arrigo G, Tripepi G, Mallamaci F, Zoccali C, Group OBOTMW, Mdimagh S, Ben Hadj Mbarek-Fredj I, Moussa A, Omezzine A, Mabrouk S, Zouari N, Hassayoun S, Chemli J, Zellama D, Achour A, Bouslama A, Abroug S, Hohenstein-Scheibenecker K, Schmidt A, Stylianou KG, Kyriazis J, Androvitsanea A, Tzanakakis M, Maragkaki E, Petrakis J, Stratakis S, Poulidaki R, Vardaki E, Petra C, Statigis S, Perakis K, Daphnis E, Cybulla M, West M, Nicholls K, Torras J, Neumann P, Sunder-Plassmann G, Feriozzi S, Fabry Outcome Survey Renal Working G, Metzinger-Le Meuth V, Taibi F, M'Baya-Moutoula E, Louvet L, Massy Z, Metzinger L, Mani LY, Sidler D, Vogt B, Nikolskaya N, Cox JA, Kingswood JC, Smirnov A, Zarayski M, Kayukov I, Karunnaya H, Sipovski V, Kukoleva L, Dobronravov V.
- Genetic diseases and molecular genetics.** *Nephrol Dial Transplant.* 2014; 29 Suppl 3:iii339-iii350.
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 6. Cudzilo CJ, Szczesniak RD, Brody AS, Rattan MS, Krueger DA, Bissler JJ, Franz DN, McCormack FX, Young LR. **Lymphangioliomyomatosis screening in women with tuberous sclerosis.** *Chest.* 2013; 144:578-85.
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19. Horowitz-Kraus T, Vannest JJ, Holland SK. **Overlapping neural circuitry for narrative comprehension and proficient reading in children and adolescents.** *Neuropsychologia.* 2013; 51:2651-62.
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64. Tian C, Gilbert DL. **Association between performance on neurology in-training and certification**

- examinations.** *Neurology*. 2013; 81:1102.
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Faculty, Staff, and Trainees

Faculty Members

Andrew Hershey, MD, PhD, Professor

Leadership Division Director; Director Headache Center; Endowed Chair of Neurology

Research Interests Migraine, blood genomics

Todd Arthur, MD, Assistant Professor

Research Interests Brain concussion

Ravindra Arya, MD, DM, Assistant Professor

Research Interests Language mapping, electrocorticography, epilepsy surgery, clinical epidemiology

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

Christina Gross, PhD, Assistant Professor

Research Interests Molecular mechanisms of Fragile X syndrome, epilepsy and autism spectrum disorders

Barbara Hallinan, MD, PhD, Assistant Professor

Research Interests CSF steroid profiles

Katherine Holland-Bouley, MD, PhD, Associate Professor

Research Interests Ion channels and epilepsy

Paul Horn, PhD, Professor

Research Interests Data analysis, reference ranges

Sejal Jain, MD, Assistant Professor

Research Interests Epilepsy, sleep

Marielle A Kabbouche, MD, Associate Professor

Research Interests Migraine

Joanne Kacperski, MD, Assistant Professor

Research Interests Pediatric headaches, chronic post-traumatic headaches

Darren Kadis, PhD, Assistant Professor

Research Interests Neuroimaging and MEG of language

Darcy Krueger, MD, PhD, Associate 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

Matthew Skelton, PhD, Assistant Professor

Research Interests Neurobehavioral and neurometabolic

Shannon Standridge, DO, Assistant Professor

Research Interests Outcomes study, epilepsy

Mary Sutton, MD, Associate Professor

Research Interests Neuro-oncology

Jonathan Taylor, MD, Assistant Professor

Research Interests Arteriopathy and outcomes in pediatric stroke

Jeffrey Tenney, MD, PhD, Assistant Professor

Research Interests Neurophysiology and genesis of absence epilepsy

Cameron Thomas, MD, Assistant Professor

Research Interests Neonatal neurology

Lubov Timchenko, PhD, Professor

Research Interests Translate knowledge of the molecular pathobiology into development of the therapeutic treatments for diseases caused by non-coding RNA repeats

Jennifer Vannest, PhD, Associate 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

Jonathan Wilson, PhD, Assistant Professor

Research Interests Neurophysiology and engineering

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

Joint Appointment Faculty Members

Michael Miles, PhD, Professor (Pathology)

Clinical Staff Members

- **Irina Rybalsky, MD**,
Duchenne's Muscular Dystrophy;
- **Jamie Capal, MD**,
Neurodevelopment and neurobehavior

Trainees

- **Haneul Lee, MD**, PGYVI, Yonsei University
- **Sarah Weatherspoon, MD**, PGYVI, University of Texas Southwestern
- **Katrina Peariso, MD**, PGYVI, University of New Mexico
- **Thomas Dye, MD**, PGYVI, St. Louis University
- **Gewalin Aungaroon, MD**, PGYV, Faculty of Medicine Ramathibodi
- **Dror Kraus, MD, PhD**, PGYV, Hebrew University
- **Michael Oldham, MD, MPH**, PGYV, George Washington University
- **Cuixia Tian, MD**, PGYV, Medical Center of Fudan University
- **Vinita Knight, MD, MPH**, PGYIV, Eastern Virginia Medical School
- **Kelly Kremer, MD**, PGYIV, University of Cincinnati
- **Michael Sweeney, MD**, PGYIV, Medical College of Wisconsin
- **Marissa Vawter, MD**, PGYIV, Indiana University
- **Andrew Knox, MD, MS**, PGYIII, Rush University College of Medicine
- **Staci King, MD**, PGYIII, University of Illinois - Chicago
- **Robert Blake, MD**, PGYIII, Baylor College of Medicine
- **Jennifer O'Malley, MD, PhD**, PGYIII, University of Cincinnati

Division Collaboration

Adolescent/Young Adult Epilepsy Pregnancy Clinic

(Dr. Shannon Standridge)

Behavioral Medicine & Clinical Psychology » Dr. K. Junger

Comprehensive Epilepsy Program

(Dr. Anna Byars, Dr. Tracy Glauser, Dr. Hans Greiner, Dr. Barb Hallinan, Dr. Katie Holland, Dr. Diego Morita, Dr. Jeff Tenney)

Anesthesiology » Dr. V. Busso, Dr. J. McAuliffe, and Dr. S. Danzer

Behavioral Medicine and Clinical Psychology » Dr. A. Modi and Dr. J. Epstein

Biomedical Informatics » Dr. J. Pestian

Biostatistics & Epidemiology » Dr. M. Altaye
Radiology » Dr. S. Holland, Dr. M. Gelfand, and Dr. J. Leach
Neurosurgery » Dr. F. Mangano
Human Genetics » Dr. E. Schorry
Clinical Pharmacology » Dr. S. Vinks
Pathology & Laboratory Medicine » Dr. L. Miles
Developmental & Behavioral Pediatrics » Dr. D. Murray

Comprehensive Neuromuscular Center

(Dr. James Collins, Dr. Irina Rybalsky, Dr. Brenda Wong)

Cardiology » Dr. J. Towbin, Dr. I. Wilmot, Dr. J. Jefferies, Dr. C. Castleberry, Dr. A. Lorts, and Dr. C. Villa
Gastroenterology, Hepatology & Nutrition » Dr. A. Kaul
Otolaryngology » Dr. M. Rutter
Endocrinology » Dr. S. Rose
Orthopaedics » Dr. J. McCarthy, Dr. P. Sturm, and Dr. V. Jain
Physical Medicine & Rehabilitation » Dr. M. McMahon
Pulmonary Medicine » Dr. R. Amin and Dr. H. Sawnani
Pathology & Laboratory Medicine » Dr. L. Miles and Dr. K. Bove
Pediatric General & Thoracic Surgery » Dr. R. Brown and Dr. T. Inge
Anesthesiology » Dr. N. Weidner and Dr. K. Goldschneider
Molecular Cardiovascular Biology » Dr. J. Molkentin
Nephrology and Hypertension » Dr. E. Jackson

Concussion Clinic

(Dr. Todd Arthur)

Physical Medicine & Rehabilitation » Dr. B. Kurowski
Sports Medicine » Dr. P. Gubanich, Dr. K. Berz, and Dr. K. Logan

Headache Center

(Dr. Andrew Hershey, Dr. Marielle Kabbouche, Dr. Joanne Kacperski, Dr. Hope O'Brien)

Behavioral Medicine & Clinical Psychology » Dr. S. Powers
Radiology - Neuroimaging Research Consortium » Dr. S. Holland
Rheumatology » Dr. M. Barnes
Cardiology » Dr. T. Knilans

Magnetoencephalography (MEG) Research

(Dr. Douglas Rose, Dr. Jing Xiang, Dr. J. Adam Wilson)

Psychiatry » Dr. C. Erickson and Dr. E. Harris
Behavioral Medicine & Clinical Psychology » Dr. D. Beebe
Anesthesiology » Dr. J. McAuliffe
Physical Medicine & Rehabilitation » Dr. J. Vargus-Adams

Movement Disorders Clinic & Tourette Disorder Clinic

(Dr. Don Gilbert, Dr. Steve Wu)

Psychiatry » Dr. E. Pedapati, Dr. E. Harris, and Dr. C. Erickson

Behavioral Medicine & Clinical Psychology » Dr. W. Lopez, Dr. N. Zahka, and Dr. B. LeJeune

Human Genetics » Dr. D. Neilsen, Dr. R. Stottmann, Dr. T. Huang, and Dr. T. Burrow

Neurosurgery » Dr. E. Air

Radiology » Dr. K. Cecil

Neonatal Clinic

(Dr. Mark Schapiro, Dr. J. Michael Taylor, Dr. Cameron Thomas)

Radiology - Neurimaging Research Consortium » Dr. S. Holland and Dr. W. Yuan

Section of Neonatology, Perinatal and Pulmonary Biology » Dr. P. Kingma, Dr. S. Merhar, Dr. T. Cahill, and Dr. B. Haberman

Neurosurgery » Dr. K. Bierbrauer

Pediatric & Adolescent Gynecology » Dr. W. Polzin

Cardiology » Dr. P. Goldenberg and Dr. J. Anderson

Neurobehavioral Animal Core (Vorhees/Williams lab)

(Dr. Matt Skelton, Dr. Chip Vorhees, Dr. Michael Williams)

Human Genetics » Dr. Y. Sun and Dr. R. Stottmann

Developmental Biology » Dr. K. Campbell and Dr. Y. Yoshida

Critical Care Medicine » Dr. H. Wong

Experimental Hematology & Cancer Biology » Dr. D. Pan, Dr. N. Ratner, and Dr. R. Waclaw

Psychiatry » Dr. C. Erickson

Anesthesiology » Dr. A. Loepke and Dr. S. Danzer

Neurosurgery » Dr. F. Mangano

Radiology » Dr. D. Linquist and Dr. W. Yuan

Pediatric Neuroimaging Research Consortium

(Dr. Jennifer Vannest, Dr. Darren Kadis)

Radiology » Dr. S. Holland, Dr. J. Leach, Dr. G. Lee, Dr. W. Yuan, and Dr. M. DiFrancesco

Biostatistics & Epidemiology » Dr. M. Altaye

Communication Science » Dr. T. Horowitz-Kraus, Dr. D. Moore, and Dr. L. Hunter

Anesthesiology » Dr. D. Kurth, Dr. J. Praytap, and Dr. V. Olbrecht

Biomedical Informatics » Dr. M. Wagner

Endocrinology » Dr. L. Dolan and Dr. A. Shah

Rett Syndrome/Related Spectrum Disorders Clinic

(Dr. Shannon Standridge)

Pulmonary Medicine » Dr. Amin

Adolescent & Transition Medicine » Dr. A. Nye

Orthopaedics » Dr. J. McCarthy

Gastroenterology, Hepatology & Nutrition » Dr. A. Kaul

Pediatric & Adolescent Gynecology » Dr. L. Breech

Sleep Clinic

(Dr. Sejal Jain)

Pulmonary Medicine » Dr. N. Simakajornboon, Dr. M. Ednick, Dr. G. McPhail, Dr. H. Sawnani, and Dr. J.

Crisalli

Psychiatry » Dr. L. Wink

Statistical Data Analysis & Reference Ranges

(Dr. Paul Horn)

Radiology » Dr. A. Merrow, Dr. T. Laor, and Dr. S. Serai

Psychiatry » Dr. C. Erickson and Dr. L. Wink

Radiology » Dr. C. Anton, Dr. K. Eaton, Dr. J. Leach, and Dr. H. Kim

Neurosurgery » Dr. F. Mangano and Dr. C. Stevenson

Pathology & Laboratory Medicine » Dr. L. Miles and Dr. P. Steele

Tuberous Sclerosis

(Dr. David Franz, Dr. Darcy Krueger)

Otolaryngology » Dr. L. Young

Anesthesiology » Dr. C. Gordon

Radiology » Dr. M. Care, Dr. J. Leach, Dr. W. Yuan, and Dr. S. Serai

Neurosurgery » Dr. K. Crone

Cardiology » Dr. T. Knilans

Human Genetics » Dr. E. Schorry

Psychiatry » Dr. D. Nelson

Developmental & Behavioral Pediatrics » Dr. D. Murray and Dr. N. Bing

Grants, Contracts, and Industry Agreements

Grant and Contract Awards

Annual Direct

GILBERT, D

2/2-Anomalous Motor Physiology in ADHD

National Institutes of Health

R01 MH 095014	05/15/12-04/30/17	\$175,000
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4/8-Collaborative Genomic Studies of Tourette Disorder

National Institutes of Health

R01 MH 092520	09/15/11-06/30/15	\$50,000
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GLAUSER, T

Cincinnati Neuroscience Clinical Trials Research Center

National Institutes of Health(University of Cincinnati)

U10 NS 077311	09/30/11-08/31/18	\$100,000
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Epilepsy Phenome/Genome Project (EPGP)

National Institutes of Health(The University of California, San Francisco)

U01 NS 053998	05/01/08-04/30/14	\$37,938
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Impact of Initial Therapy and Response on Long Term Outcome in Children with CAE

National Institutes of Health

U01 NS 045911	09/01/10-08/31/15	\$754,283
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Pediatric Status Epilepticus Research Group

Epilepsy Foundation of America (Children's Hospital Boston)	01/01/13-12/31/14	\$10,000
Pediatric Trials Network, Task Order No. HHSN27500009		
National Institutes of Health (Duke University)		
HHSN2752010000031	09/01/12-09/14/14	\$18,082
GROSS, C		
Selective Targeting of PI3K to Restore Higher Cognitive Function in FXS		
National Institutes of Health		
R21 MH 103748	06/24/14-04/30/16	\$181,913
HERSHEY, A / POWERS, S (MPI)		
Amitriptyline and Topirimate in the Prevention of Childhood Migraine		
National Institutes of Health		
U01NS076788	09/30/11-08/31/16	\$2,310,925
KRUEGER, D		
Early Biomarkers of Autism Spectrum Disorders in Infants with Tuberous Sclerosis (Fixed Costs)		
National Institutes of Health(Children's Hospital Boston)		
U01 NS 082320	09/01/12-08/31/17	\$151,870
Early Biomarkers of Autism Spectrum Disorders in Infants with Tuberous Sclerosis (Per capita)		
National Institutes of Health(Children's Hospital Boston)		
U01 NS 082320	09/01/12-08/31/17	\$60,570
Potential EEG Biomarkers and Antiepileptogenic Strategies for Epilepsy in TSC		
National Institutes of Health(University of Alabama-Birmingham)		
P20 NS 080199	09/01/12-08/31/15	\$19,814
Tuberous Sclerosis Complex Natural History Database Project		
Tuberous Sclerosis Alliance		
2013DB18	01/01/14-12/31/14	\$17,500
ROSE, D		
Development of Analysis Tools to Enhance Fetal Neurological Assessment		
National Institutes of Health (University of Arkansas)		
R01 EB 007826	9/5/12-8/31/15	\$11,011
SKELTON, M		
Generation and Validation of CrT Deficient Mice		
National Institutes of Health(Leidos Biomedical Research, Inc.)		
13XS064	05/16/13-12/12/14	\$9,735
TIMCHENKO, L		
The Toxicity of the RNA CGG Repeats in FXTAS		
National Institutes of Health		

R21 NS 078659	06/01/14-08/31/15	\$90,289
Myotonic Dystrophy Type 2		
National Institutes of Health		
R01 AR 052791	06/01/14-05/31/16	\$220,264
VANNEST, J		
FMRI in Anterior Temporal Epilepsy Surgery		
National Institutes of Health(Medical College of Wisconsin)		
R01 NS 035929	01/01/14-05/31/15	\$38,121
Imaging the Effect of Centrotemporal Spikes and Seizures on Language in Children		
National Institutes of Health		
R01 NS 065840	09/15/11-06/30/16	\$388,286
VORHEES, C		
Annual Meeting of the Neurobehavioral Teratology Society		
Food and Drug Administration		
R13 FD 004852	07/01/13-06/30/18	\$5,000
Latrophilin-3 and ADHD: A New Potential Mechanism		
National Institutes of Health		
R21 MH 101609	07/01/13-06/30/15	\$125,000
Prenatal Antidepressants and Autism Spectrum Disorder		
Department of Defense		
W81XWH-13-1-3036	09/01/13-08/30/15	\$50,000
Training Grant in Teratology		
National Institutes of Health		
T32 ES 07051	07/01/77-06/30/17	\$288,214
Transgenerational Inheritance of Epigenetic Effects of Polychlorinated Biphenyls		
National Institutes of Health(University of Cincinnati)		
R21 ES 023319	08/29/13-07/31/16	\$84,720
XIANG, J		
Aberrant Neuromagnetic Signatures with Chronic Migraine		
National Institutes of Health		
R21 NS 081420	09/30/13-08/31/15	\$125,000
Current Year Direct		\$5,323,535
Industry Contracts		
FRANZ, D		
Novartis Pharmaceuticals		\$888,033
GILBERT, D		
AstraZeneca Pharmaceuticals		\$21,386

Covance, Inc.	\$43,420
KABBOUCHE, M	
Allergan, Inc.	\$14,572
KRUEGER, D	
Michigan Strategic Fund	\$16,000
Novartis Pharmaceuticals	\$128,734
University of Texas Health and Science Center	\$2,805
Children's Hospital Boston	\$115,703
MORITA, D	
Eisai Medical Service	\$33,392
UCB Biosciences, Inc.	\$21,916
VORHEES, C	
Council for the Advancement Pyrethroid	\$240,737
WONG, B	
GlaxoSmithKline LLC	\$183,228
Halo Therapeutics, Inc.	\$121,169
Lilly USA, LLC	\$73,249
PTC Therapeutics, Inc	\$54,845
Genethon	\$63,269
Prosensa Therapeutics	\$78,966
Current Year Direct Receipts	
\$2,101,424	
Total	
\$7,424,959	