

Neurology



Listed from left to right. Front: Emily C. de los Reyes, Gloria M. Galloway. Middle: Ann Pakalnis, Pedro Weisleder, A. Latif Khuhro, Chang-Yong "Albert" Tsao. Back: E. Steve Roach, Samuel Dzodzomenyo, Khaled M. Zamel, Warren D. Lo. Not pictured: Roula Al-Dahhak, Geoffrey Heyer, John Kissel, Jerry Mendell, Zarife Sahenk, Jorge Vidaurre.

Staff Physicians and Faculty



E. Steve Roach, MD, Chief
Roula Al-Dahhak, MD
Emily C. de los Reyes, MD
Samuel Dzodzomenyo, MD
Geoffrey Heyer, MD*
Gloria M. Galloway, MD
A. Latif Khuhro, MD
John Kissel, MD
Warren D. Lo, MD
Jerry R. Mendell, MD
Ann Pakalnis, MD
Juliann M. Paolicchi, MD
Zarife Sahenk, MD, PhD
Chang-Yong "Albert" Tsao, MD
Jorge Vidaurre, MD
Pedro Weisleder, MD, PhD*
Khaled M. Zamel, MD

* New medical staff for 2008

The staff of the Division of Neurology cares for children through 21 years of age who have disorders of the central nervous system, peripheral nerves and muscles. In addition to a full array of inpatient and outpatient services, the Neurology Division offers subspecialty clinics in complex epilepsy, headache, neurodevelopmental delay, the ketogenic diet, childhood stroke and movement disorders.

In 2007, there were 9,585 outpatient visits to the Division of Neurology, an increase of 15 percent from 2006 and an increase of 32 percent from the number of 2005 visits. Neurologists in the division interpret most of the studies done by Nationwide Children's Hospital's neurodiagnostic laboratory. In 2007, the neurophysiology laboratory performed approximately 3,500 electroencephalograms

(EEGs) and more than 748 long-term EEG monitoring days, an increase of 66 percent compared to 2006. In addition, division neurologists provide continuous intra-operative physiologic monitoring for patients undergoing spine or brain procedures and interpret evoked potential studies, electromyography and nerve conduction studies.

Ongoing research includes the first human gene therapy trial for muscular dystrophy by Jerry Mendell, MD and the neuromuscular disease group. Members of the division also serve as consultants or co-investigators on National Institutes of Health-funded clinical studies of absence epilepsy, the genetics of human epilepsy and the prevention of stroke in sickle cell patients.

The division began a three-year child neurology residency program in 2004 in conjunction with The Ohio State University Neurology Department. Initially the program was approved to train one child neurologist per year and, in 2007, the first resident completed training. In 2007, the program was approved to increase the number of residents to two per year and all but one of the positions beginning through 2010 have been filled. We also offer an approved fellowship program in clinical neurophysiology.

In addition to residency training in child neurology, division members provide training in child neurology to pediatric residents from Nationwide Children's Hospital and to adult neurology residents from The Ohio State University Neurology Department. The division also offers fellowship training in clinical neurophysiology. The division's physicians and nurse practitioners teach Ohio State University medical students and nursing students from a number of local schools. Additionally, we offer elective rotations for students and residents from other programs around the country.

Clinical, Teaching and Research Interests

E. Steve Roach, MD, is Chief of the Division of Neurology at Nationwide Children's Hospital, an attending physician at both Nationwide Children's Hospital and the Ohio State University Medical Center and a Professor of Pediatrics and Neurology at The Ohio State University College of Medicine. Dr. Roach wrote the first textbook on cerebrovascular disorders in children and has written or co-authored five other books, along with more than 200 articles and book chapters on stroke and genetic disorders. Dr. Roach was awarded the 2002 Manuel Gomez Award by the Tuberous Sclerosis Alliance in Bethesda, Maryland, for his work to improve our understanding of tuberous sclerosis.

Roula Al-Dahhak, MD, is an attending physician at Nationwide Children's Hospital and an Assistant

Professor of Clinical Pediatrics and Clinical Neurology at The Ohio State University College of Medicine. She specializes in disorders of muscle and peripheral nerves.

Emily C. de los Reyes, MD, is an attending physician at Nationwide Children's Hospital and an Associate Professor of Clinical Pediatrics at The Ohio State University College of Medicine. She initiated a multidisciplinary clinic for the assessment and management of neuro-developmental delay and has clinical interests in autism and neurodevelopmental delay. Her clinical research interest centers on the epidemiological studies of La Crosse encephalitis and on autism.

Samuel Dzodzomenyo, MD, is an attending physician at Nationwide Children's Hospital and a Clinical Assistant Professor of Pediatrics and Neurology at The Ohio State University College of Medicine. He is board certified in sleep medicine and in child neurology. His clinical interests include childhood sleep disorders. He is the neurological consultant for the Columbus site of a National Institutes of Health sponsored multi-center study for the prevention of stroke in sickle cell disease.

Gloria M. Galloway, MD, is the Director of the Evoked Potential Monitoring Program at Nationwide Children's Hospital and a Professor of Clinical Neurology and Clinical Pediatrics at The Ohio State University College of Medicine. Her interests are in clinical neuromuscular disease, electromyography and clinical neurophysiology.

A. Latif Khuhro, MD, is an attending physician at Nationwide Children's Hospital and a Clinical Assistant Professor of Pediatrics and Neurology at The Ohio State University College of Medicine. He developed a subspecialty clinic for the assessment and treatment of movement disorders in children and has a special interest in Tourette's syndrome.

John Kissel, MD, is a member of the Division of Neurology at Nationwide Children's Hospital and a Professor of Neurology at The Ohio State University College of Medicine. His clinical and research interests include spinal muscle atrophy in children.

Warren D. Lo, MD, is an attending physician at Nationwide Children's Hospital and at the Ohio State University Medical Center and an Associate Professor of Pediatrics and Neurology at The Ohio State University College of Medicine. His clinical and research interests center on stroke in infants and children, and he began the Stroke Clinic at

Nationwide Children's Hospital in 2007. His clinical research is designed to characterize the social and cognitive defects that result from stroke and document the recovery after stroke.

Jerry R. Mendell, MD, is the Director of the Center for Gene Therapy at The Research Institute at Nationwide Children's Hospital, Professor of Pediatrics and Pathology at The Ohio State University (OSU) College of Medicine, and Co-Director of the MDA supported muscle disease clinic at OSU. Dr. Mendell was among the first to test muscle cell transplantation for Duchenne muscular dystrophy in the early 1990s and is the first person to study viral mediated gene therapy for muscular dystrophy in humans. Dr. Mendell has made fundamental contributions in clinical research and in the molecular genetics of neuromuscular disease. He has published major textbooks on the disorders of muscle and peripheral nerves along with more than 250 scientific articles and book chapters. In 2004, Dr. Mendell was awarded the S. Mouchly Small Scientific Achievement Award from the Muscular Dystrophy Association in recognition of his significant contributions to neuromuscular disease research.

Ann Pakalnis, MD, is Director of the Headache Clinic at Nationwide Children's Hospital and an Associate Professor of Clinical Pediatrics and Clinical Neurology at The Ohio State University College of Medicine. Her primary clinical and research interests involve the diagnosis and management of headache and the identification of co-morbid disorders linked to migraine. She is the principal investigator on a number of industry sponsored studies of medication treatment of childhood migraine.

Juliann M. Paolicchi, MD, is an attending physician at Nationwide Children's Hospital and an Associate Professor of Clinical Pediatrics and Clinical Neurology at The Ohio State University College of Medicine. Her clinical and research interests focus on the treatment of complicated epilepsy. She is the principal investigator on a number of industry sponsored studies of the treatment of epilepsy. She is co-investigator on a National Institutes of Health-sponsored clinical study of childhood absence epilepsy.

Zarife Sahenk, MD, PhD, is the Director of Clinical and Experimental Neuromuscular Pathology at The Research Institute at Nationwide Children's Hospital and a Professor of Pathology and Pediatrics at The Ohio State University College of Medicine. Her research aims to define the anatomical and

molecular basis of hereditary peripheral neuropathies, emphasizing the role of trophic factors secreted by Schwann cells in regeneration-associated myelination. The role of neurotrophin-3 in nerve regeneration in patients and animal models of Charcot-Marie-Tooth (CMT) is currently under investigation. These studies are relevant to understanding the mechanism of axonal loss and impaired regeneration in CMT disorders and developing rational therapies to promote nerve repair.

Chang-Yong “Albert” Tsao, MD, is an attending physician at Nationwide Children’s Hospital and a Professor of Clinical Pediatrics and Clinical Neurology at The Ohio State University College of Medicine. Dr. Tsao’s clinical research interest is mitochondrial disorders and neuromuscular disease such as muscular dystrophy, peripheral neuropathy, myasthenia gravis, Charcot-Marie Tooth disease, Friedreich’s ataxia and myopathies. Dr. Tsao was named the Nationwide Children’s Hospital Physician of the Year in 2007.

Jorge Vidaurre, MD, is Director of the Nationwide Children’s Hospital Comprehensive Epilepsy Center and a Clinical Assistant Professor of Pediatrics at The Ohio State University College of Medicine. Dr. Vidaurre joined the division in 2006 after completing a neurology residency at State University of New York and a clinical neurophysiology fellowship at Albert Einstein Montefiore Medical Center. He is board certified in child neurology. His clinical and research interests focus on the treatment of complicated epilepsy and on clinical neurophysiology.

Khaled M. Zamel, MD, is an attending physician at Nationwide Children’s Hospital and an Assistant Professor of Clinical Pediatrics and Clinical Neurology at The Ohio State University College of Medicine. Dr. Zamel is a member of the International Pediatric Stroke Study (IPSS) and helped establish the Ohio pediatric stroke registry. He has clinical and research interest in epilepsy, intraoperative monitoring and pediatric stroke. His current research includes clinical applications of transcranial magnetic stimulation and neurophysiologic changes in patients with Chiari malformation undergoing cranial decompression. He is board certified in both neurology and clinical neurophysiology.

Research Funding (Over \$50,000)

Jerry R. Mendell, MD

Diverse Strategies to Correct the Dystrophin Gene Using Vascular Delivery, National Institute of Neurological Disorders and Stroke

Gentamicin Trial in Duchenne and Limb Girdle Muscular Dystrophies, National Institute of Neurological Disorders and Stroke

Implementing Newborn Screening for Duchenne Muscular Dystrophy to the Community, Centers for Disease Control and Prevention

Phase I Study of Mini-Dystrophin Gene in AAV, Anonymous/Muscular Dystrophy Association, Inc.

Early Screening and Diagnosis of Duchenne Muscular Dystrophy, Centers for Disease Control and Prevention

Clinical Thresholds and Gene Transfer in DMD and LGMD, University of Pittsburgh/National Institutes of Health

Study for Patients with Becker, Fascioscapulohumeral and Limb-Girdle Muscular Dystrophy, Anonymous

Study of Mini-Dystrophin Gene in AAV, Anonymous/Muscular Dystrophy Association Inc.

Vascular Approach to Gene Therapy for Muscular Dystrophy, Children’s National Medical Center/Department of Defense

Immunogenicity of Golden Retrievers and Normal Dogs to rAAV Vectors Carrying Mini-Dystrophin, Muscular Dystrophy Association

Transfer of Alpha-Sarcoglycan Gene to LGMD2D Patients, Muscular Dystrophy Association, Inc.

Ann Pakalnis, MD

Long-Term Migraine Treatment Study in Adolescents, Anonymous

Multi-Center Study with Open-Label Trexima in Adolescent Migraine, Glaxo-Smith-Kline,

Zarife Sahenk, MD, PhD

Evaluating the Potential Efficacy of trkB, trkC Receptor Agonists and Their Combination in a Mouse Model of Charcot-Marie-Tooth Disease, Anonymous

Khaled M. Zamel, MD

Childhood Absence Epilepsy: Rx, PK-Pd-Pharmacogenetics, Cincinnati Children’s Hospital Medical Center/National Institutes of Health

Publications

Acharyya S, Villalta SA, Bakkar N, Janssen PM, Carathers M, Li ZW, Beg AA, Ghosh S, **Sahenk Z**, et al. Interplay of IKK/NF-kappaB signaling in macrophages and myofibers promotes muscle degeneration in Duchenne muscular dystrophy. *Journal of Clinical Investigation* 117: 889-901, 2007.

Au KS, Williams AT, **Roach ES**, et al. Genotype/phenotype correlation in 325 individuals referred for a diagnosis of tuberous sclerosis complex in the United States. *Genetic Medicine* 9: 88-100, 2007.

de los Reyes EC, McJunkin JE, Glauser TA, Tomsho M, O’Neal J. Periodic lateralized epileptiform discharges in La Crosse encephalitis, a worrisome subgroup: clinical presentation, electroencephalogram (EEG) patterns, and long-term neurologic outcome. *Journal of Child Neurology* (Epub, December 26, 2007).

Elsheikh BH, Bollman E, Peruggia M, King W, **Galloway G**, **Kissel J**. Pilot trial of diltiazem in facioscapulohumeral muscular dystrophy. *Neurology* 68: 1428-1429, 2007.

Jan JC, Klein A, Boltshauser E, Cartwright MS, **Roach ES**. Prolonged hemiplegic episodes in children due to mutations in ATP1A2. *Journal of Neurology Neurosurgery & Psychiatry* 78: 523-526, 2007.

King WM, Ruttencutter R, Nagaraja HN, Matkovic V, Landoll J, Hoyle C, **Mendell JR**, **Kissel JT**. Orthopedic outcomes of long-term daily corticosteroid treatment in Duchenne muscular dystrophy. *Neurology* 68: 1607-1613, 2007.

Lo W, **Zamel K**, Ponnappa K, Allen A, Chisolm D, Tang M, Kerlin B, Yeates KO. The cost of pediatric stroke care and rehabilitation. *Stroke* (E-pub, November 2007).

Lo WD, **Roach ES**. The degree of risk: multiple factors promote perinatal stroke (editorial). *Pediatric Neurology* 37(2): 152-3, 2007.

Pakalnis A, Kring D, Meier L. Levetiracetam prophylaxis in pediatric migraine - an open-label study. *Headache* 47: 427-430, 2007.

Pakalnis A. Current Therapies in Childhood and Adolescent Migraine. *Journal of Child Neurology* 22: 1288-1292, 2007.

Pakalnis A. Preventive therapies of pediatric migraine. *Drug Development Research* 68: 350-354, 2007.

Pakalnis A, Butz, C, Splaingard D, Kring D, Fong J. Emotional Problems and Prevalence of Medication Overuse in Pediatric Chronic Daily Headache. *Journal of Child Neurology* 22: 1356-359, 2007.

Terry D, **Paolicchi J**, Karn M. Acceptance of the use of diazepam rectal gel in school and day care settings. *Journal of Child Neurology* 22: 1135-1138, 2007.

Tsao CY, Lo WD, Rusin JA, Henwood M, Boue D. Isolated neurosarcoidosis presenting as headache and multiple brain and spinal cord lesions mimicking central nervous system metastasis. *Brain & Development* 29: 514-518, 2007.

Tsao CY, Mendell JR. Autistic disorder in two children with mitochondrial disorder. *Journal of Child Neurology* 22: 1121-1123, 2007.

Raju T, Nelson K, Ferriero D, Lynch J, and the **NIH Perinatal Stroke Working Group.** Ischemic Perinatal Stroke: Summary of a Workshop Sponsored by the National Institute of Child Health and Human Development and the National Institute of Neurological Disorders and Stroke. *Pediatrics* 120: 609-616, 2007.

Roach ES. Is neuromyelitis optica a distinct entity? *Archives of Neurology* 64: 906, 2007.

Roach ES. Treating ocular myasthenia gravis with inadequate evidence. *Archives of Neurology* 64: 1794-1795, 2007.

Roach ES. Both postsynaptic and presynaptic dysfunction contribute to Parkinson disease: any mechanism will not do. *Archives of Neurology* 64: 143, 2007.

Rodino-Klapac LR, Janssen PM, Montgomery CL, Coley BD, Chicoine LG, Clark KR, **Mendell JR.** A translational approach for limb vascular delivery of the micro-dystrophin gene without high volume or high pressure for treatment of Duchenne muscular dystrophy. *Journal of Translational Medicine* 5: 45, 2007.

Rodino-Klapac LR, Chicoine LG, Kaspar BK, **Mendell JR.** Gene therapy for Duchenne muscular dystrophy: expectations and challenges. *Archives of Neurology* 64: 1236-41, 2007.

Yapici Z, Dortcan N, Baycan BB, Okan F, Baycal C, Eraksoy M, **Roach S.** Neurological aspects of tuberous sclerosis in relation to MRI/MMR spectroscopy findings in children with epilepsy. *Neurological Research* 29: 449-454, 2007.

Presentations and Teaching Activities

Gloria M. Galloway, MD

Practice Management Course, Director, American Academy Neurology Winter Conference, January 2007

Diagnosis, Medical and Surgical Treatment of Common Spine Conditions, Course Director, American Academy of Neurology, Boston, Massachusetts, May 2007

The Accreditation Application: Electrodiagnostic Laboratory Accreditation Basics, AANEM, October 20, 2007

Warren D. Lo, MD

Treatment of Cerebrovascular Disorders in Children, American Academy of Neurology, Boston, Massachusetts, May 2007

The Changing Spectrum of Non-traumatic Intracranial Hemorrhage (ICH) in Children, Co-Presenter, Child Neurology Society, Quebec, Canada, October 2007

Ann Pakalnis, MD

Pediatric Migraine, Symposium on Functional Abdominal Pain, North American Society of Pediatric Gastroenterology, Salt Lake City, Utah, October 2007

E. Steve Roach, MD

Cerebrovascular Disorders in Children, Course Director and Speaker, American Academy of Neurology, Boston, Massachusetts, May 2007

The Changing Spectrum of Non-traumatic Intracranial Hemorrhage (ICH) in Children, Co-Presenter, Child Neurology Society, Quebec, Canada, October 2007

Awards and Honors

Emily C. de los Reyes, MD

Editorial Board, *Journal of Child Neurology*

Executive Committee, Southern Child Neurology Society

Gloria M. Galloway, MD

Councilor, American Academy of Neurology Section on Clinical Neurophysiology

Member, American Academy of Neuromuscular and Electrodiagnostic Medicine Council on Electrodiagnostic Medicine Laboratory Accreditation

Member, American Academy of Neuromuscular and Electrodiagnostic Medicine Professional Practice Committee

Secretary, American Academy of Neurology Committee on Sections Executive Committee

Topic Chair Reviewer, *Clinical Neurophysiology Abstracts*, American Academy of Neurology

Warren D. Lo, MD

Listed, Best Doctors in America

E. Steve Roach, MD

Associate Editor, *Archives of Neurology*

Certification Council, United Council of Neurological Specialties

Chair, Writing Group: Evidence based guidelines for childhood stroke, American Heart and Stroke Association

Child Neurology Topic Work Group, Education Committee, American Academy of Neurology

Editorial Board, *Journal of Child Neurology*

Editorial Board, *Journal of Clinical Neurology and Neurosurgery*

Editorial Board, *Journal of Neurological Sciences*

Editorial Board, *Journal of Stroke and Cerebrovascular Diseases*

Editorial Board, *Pediatric Neurology*

Executive Committee, American Academy of Neurology Committee on Sections

Listed, Best Doctors in America

Chang-Yong "Albert" Tsao, MD

Listed, Best Doctors in America

Nationwide Children's Hospital Physician of the Year Award, January 2007

Notable Nationwide Children's Hospital Employee for Asian Pacific American Heritage Month, May 2007

Fast Facts

Inpatient Discharges: 754

Observation Discharges: 114

Total Discharges: 868

Average Length of Stay*: 2.6

Average Daily Census*: 5.5

Patient Days*: 1,992

Inpatient Consults: 720

*excludes observation patients

Neurology Clinic Visits: 6,947

Dublin Neurology: 2,019

Northeast Neurology: 275

Total Neurology Clinic Visits: 9,241

Neuromuscular Disorders

Neuromuscular Disorders Clinic Visits: 747

Northeast Neuromuscular Disorders: 1,077

Total Neuromuscular Disorders Clinic Visits: 1,824

EEG Monitoring Discharges: 748

Electroencephalography: 3,400