Welcome

Are you ready to be a future leader in child neurology? If so, all of us at the Child Neurology Residency Training Program and the Neurodevelopmental Disabilities Resident training program at Boston Children’s Hospital look forward to meeting you.

As the pediatric teaching hospital of Harvard Medical School, Boston Children’s is committed to providing the very best clinical training in child neurology. Preparing physicians for fulfilling careers is part of our core training mission. We offer an unparalleled breadth and depth of exposure to subspecialties in child neurology, one of the world’s most diverse patient populations, and unique opportunities to engage in basic, clinical and translational neuroscience.

Since its founding in 1967, the Program has grown to six residents per year and has become one of the most desired residency programs in child neurology in the United States.

Throughout this brochure, you will hear from current residents and recent graduates of the Program. We choose our residents carefully—not just on the basis of their academic credentials, but also on their human qualities. Many of our graduates report that it was the people who made their three years in training most worthwhile.

Please don’t hesitate to reach out to either one of us if you have any questions about the Program.

Yours sincerely,

Scott I. Pomeroy, MD, PhD
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2017
CHILD NEUROLOGY RESIDENCY TRAINING PROGRAM

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Breadth. Depth. Variety. Collaboration. Mentorship. Opportunity. These are a few words we hear again and again from our current and former Child Neurology and Neurodevelopmental Disabilities residents. Each year new residents come to Boston Children’s Hospital to become the child neurologists of tomorrow.
The Child Neurology Residency Program

The three-year Child Neurology residency program at Boston Children’s Hospital provides broad, rigorous medical training across an unusually varied spectrum of patients and subspecialties, applying the latest technology and digital innovations.

All residents receive strong mentorship and career planning advice, so our graduates are well-positioned to receive NIH funding and other grants (see chart on page 22) and publish their work in high-impact journals (see page 21 for a list of recent publications).

The Department of Neurology currently accepts six new residents into its training program each year. Please check out our How to Apply section on page 29 for full details on this year’s application process.

Why train at Boston Children’s Hospital?

- close relationships with clinical leadership
- broad and deep subspecialty training
- large, diverse patient population
- one-on-one consult rotations in intensive care units
- international rotations
- outstanding research opportunities (basic, translational, clinical)
- cutting-edge research facilities
- digital tools—personal tablet devices and a shared wiki
- interpersonal skills practice with trained actors
- collegial, family-friendly training environment

“The people I worked with were humble and gracious despite being some of the biggest names in their fields. This is a program where hard work is rewarded in spades, where opportunities to see and do are everywhere around you. It’s definitely a place where any type of person can find their niche and flourish.”

— Jeff Waugh, MD, PhD, Assistant Professor of Neurology, UT Southwestern; 2012 graduate
The Child Neurology curriculum is designed to hone residents’ skills in a variety of settings—from the ICU to our many subspecialty clinics. Expect to see a diverse mix of cases, while learning to navigate difficult conversations. Research, travel and teaching opportunities abound.
Rotations

Rotations expose child neurology residents to all aspects of adult and child neurology. Residents work closely, sometimes one-on-one, with attending physicians while pursuing abundant research opportunities in both clinical and basic neuroscience.

Electives allow residents to delve deeply into subspecialties of interest, caring for diverse populations of patients. During all rotations (except international rotations), residents continue to see patients in our weekly outpatient clinics.

Adult Neurology Rotations
YEARS 1 & 2
To satisfy board certification requirements, each child neurology resident at Boston Children’s spends 12 months on adult neurology rotations at our affiliated hospitals.

YEAR 1 Residents spend approximately nine months at the Partners Program (Massachusetts General Hospital and Brigham and Women’s Hospital) and the Harvard Neurology Program (Beth Israel Deaconess Medical Center) training in the inpatient ward, Neurosurgery and adult ICU.

YEAR 2 Adult neurology training concludes on the neurology consult service in the Harvard Neurology Program.

Child Neurology Rotations
YEARS 1, 2 & 3
Child neurology clinical training is carried out entirely at Boston Children’s with a breadth of inpatient and outpatient training experiences and electives in a wide variety of subspecialties.

EEG/EPILEPSY ROTATION (YEAR 1) Residents spend one month on the inpatient Epilepsy Service, gaining exposure to long-term EEG monitoring, EEG reading, epilepsy surgical planning and surgeries and sophisticated neuroimaging techniques such as SPECT and MEG scans.

INPATIENT CHILD NEUROLOGY ROTATION (YEARS 1 AND 3) In the third year, the child neurology resident acts as the chief resident of our large, active inpatient Neurology Service, working with adult neurology residents and pediatric residents assigned to neurology inpatient, epilepsy and consult rotations.

CONSULT ROTATION (YEAR 2) The consult service interfaces with almost all other services in the hospital. The second-year resident is responsible for all non-ICU neurology consults, one of the most visible and influential jobs in the Department of Neurology. The resident presents new consults and rounds on active consults with the attending child neurologist.

OUTPATIENT NEUROLOGY ROTATION (YEAR 2) Residents spend two- to three-month blocks of time evaluating and following a wide range of cases in a variety of ambulatory settings. Subspecialty clinics include learning disabilities, Rett syndrome, neurofibromatosis, tuberous sclerosis, pediatric multiple sclerosis, mitochondrial disease and many more.

ICU/Critical Care Rotation (YEAR 2) Working closely with the attending physician in critical care neurology, residents provide rapid and comprehensive patient care in Boston Children’s cardiac, medical/surgical and neonatal intensive care units, as well as the NICUs at Brigham and Women’s and Beth Israel hospitals.
PATHWAYS WITHIN THE RESIDENCY PROGRAM
While you may not choose to follow one of the pathways described below, for individuals with a clear sense of their interest and direction within child neurology, these pathways offer the opportunity to pursue an interest from early on in your training.

All pathways share some common elements: quarterly meetings/journal clubs, in which readings and exposure to leaders in these areas are offered. One can begin to attend these during the PGY-1 and PGY-2 years in general pediatrics.

We have call-free elective time for career exploration, offered to everyone but with some very clear experiences for people in various pathways. These are divided as one month in PGY-3, two months in PGY-4, and three months in PGY-5 (save for the Laboratory and Clinical Research pathway, in which it is an option to do 2 months in PGY-3 and 1 month in PGY-4).

LABORATORY AND CLINICAL RESEARCH
This pathway permits individuals with clear goals towards a career in laboratory or clinical investigation to continue to pursue this throughout their training, without the interruption in continuity that a neuroscience year produces (i.e., a system where one has a concentrated 12 months for research, and then no opportunities to return to research over the ensuing 36 months). It is anticipated that the PGY-3 experience would allow for sampling of various labs in the department and the surrounding institutions, to find a “fit”, and then begin to pursue a research path.

We anticipate that many individuals in this pathway will pursue the R25 research program, in which we collaborate with the Beth Israel Deaconess Medical Center Department of Neurology. We have a strong track record of individuals being successful in their R25 applications, given the mentoring and support we can provide.

Dr. Mustafa Sahin is the key faculty member for this pathway, aided by Dr. Sarah Spence.

GLOBAL NEUROLOGY
We have a strong global neurology program. Individuals inclined to this work can begin to travel to our various sites and ongoing engagements during their PGY-2 years, but it is anticipated that most of the time on site will be during the above-noted call-free electives.

We have a vibrant videoconferencing relationship with several programs globally and have shared clinical conferences bimonthly with our partners.

Dr. Archana Patel is the key faculty member for this track, aided by Dr. Maitreyi Mazumdar.

PUBLIC POLICY AND HEALTH SERVICES RESEARCH
We have a strong presence in this sphere, with ongoing faculty projects in health care delivery to children with significant medical complexity, the development of new models of shared care for children with complex needs, and outreach to community health centers in urban and rural settings (the latter through our partnership with Baystate Medical Center).

Individuals in this pathway have already presented their work at national and international meetings.

Dr. Karen Spencer is the key faculty member in this pathway, aided by Dr. Richard Antonelli from the Care Integration Office at BCH, an internationally recognized authority on care of children with medical complexity.

MEDICAL EDUCATION
While we anticipate that the vast majority of our graduates will go on to careers in academic medicine, based on previous experience, and therefore will be involved in medical education and teaching, we recognize that for some people this will be the hallmark of their academic career and development.

This pathway allows one to hone teaching skills, develop curriculum, and engage in the beginnings of educational research in child neurology.

It is anticipated that most people in this pathway will apply for the Harvard-Macy medical educator training program, which can readily be incorporated into the call-free elective time noted, as well as pursue membership in the Boston Children’s Hospital Academy of Teaching and Educational Innovation and Scholarship.

Dr. Miya Bernson-Leung is the key faculty member for this pathway, assisted by Dr. David Urion.
Electives

Electives span the full spectrum of experiences in child neurology. Many residents spend elective time in the EEG and electromyography (EMG) laboratories at Boston Children’s Hospital and affiliated adult institutions or pursue opportunities in one of the many Boston Children’s subspecialty clinics. Advanced training and research opportunities in both clinical and basic neuroscience are abundant during elective time. Education electives provide residents with opportunities for mentored teaching, neuroanatomy lab tutoring at Harvard Medical School, curriculum design, and more to prepare graduates for careers in academic medical centers.

A DAY IN THE LIFE

The ICU/Critical Care Rotation

“The Critical Care Neurology Consulting Service is one of the most demanding and rewarding rotations we do during our training, working alongside senior neurology attending physicians. A typical day begins with your co-resident around 7 a.m. with pre-rounds, assessing overnight events and beginning to formulate plans for the day. Attending rounds start around 8:30 a.m., often with a review of new neuroimaging studies and visits to the most acutely ill patients. Expect to be included in management decisions, and look forward to educational pearls at the bedside.

After a flurry of late-morning note writing and checking in with ICU teams, the noon conference is a chance to grab lunch and regroup. In early afternoon, we divide up new consults and issues needing follow-up, all the while triaging patients according to acuity. Often, we need to dig deep into the literature and discuss cases with consultants as we investigate a diagnostic challenge.

The afternoon concludes with abbreviated rounds to review the day’s events and make further management recommendations for our patients. While your co-resident heads home, you wrap up the late consult and make contingency plans for the night. Overnight, on home call, you may field a few calls, ask an in-house neurology resident to check on a patient and possibly make a late night trip into the hospital to aid the ICU team in assessing a patient. Before going to bed, you may find yourself taking one more look at the literature, hoping to find the answer for another diagnostic mystery.”

— Réjean Guerriero, DO, Assistant Professor of Neurology, Washington University School of Medicine, Director, ICU-EEG program, St. Louis Children’s Hospital, 2014 graduate

Electives include:

- general pediatric neurology
- neonatal neurology
- brain malformations
- electrophysiology
- epileptology
- learning disability clinic
- neurocardiology
- neuro-epidemiology
- neuro-imaging
- neuro-oncology
- neuromuscular clinic
- neurogenetics
- neuro-intensive care
- neuropathology
- neurorehabilitation
- psychiatry
Residents interested in global child neurology have many opportunities to train, practice and conduct research projects abroad during elective time. The Residency Program has strong connections with the Global Health Pediatrics program at Boston Children’s Hospital, Harvard Medical School, Harvard School of Public Health, Partners in Health and Boston Children’s Hospital’s affiliated adult Neurology programs.

Opportunities range from observerships to structured rotations to projects of the resident’s own creation. In addition to clinical rotations and clinical research projects for residents interested in global health, we have affiliations with very strong educational programs abroad, such as neurometabolic training at Chile’s National Institute of Metabolic Diseases and training in pediatric neuropathies at the Institute for Neuroscience and Muscle Research in Sydney, Australia. Boston Children’s is one of just a handful of hospitals to offer this wealth and depth of international learning opportunities to its residents.

“With the many connections the attendings have, you can literally go anywhere in the world you choose. I have been fortunate enough to do an epilepsy observership in Bolivia, as well as develop my own research project in Tanzania, with plans to expand into Zambia. I also travelled with several other residents to Brazil to attend the International Child Neurology Conference, where we met neurologists from around the world and made connections for future projects.”

— Archana Patel, MD, MPH, Assistant in Neurology; 2014 graduate

International training locations

To date, Boston Children’s Neurology residents have trained in Australia, Bolivia, Brazil, Chile, Haiti, India, Liberia, Rwanda, South Africa, Tanzania and Zambia. More countries are added to this map as we forge new relationships.
Research projects
During elective time, second- and third-year residents can opt to do research projects, working alongside investigators at Boston Children’s, affiliated Boston hospitals or at the Harvard and MIT Neuroscience programs. (For residents in the Neurodevelopmental Disabilities (NDD) program, six months of research time is required.)

The research program in Neurology at Boston Children’s is the largest and most accomplished in a pediatric facility in the world. Across the street, Boston Children’s F.M. Kirby Neurobiology Center provides virtually infinite opportunities for training in molecular and developmental neuroscience and cross-fertilization between basic research and clinical medicine (see more on page 12).

See the Resident Publications list on page 21 for examples of research projects undertaken during residency elective time.

Teaching opportunities
Child neurology residents at Boston Children’s Hospital have many opportunities to hone their teaching skills. Senior residents partner with attending physicians to ensure that inpatient rounds address topics relevant to the resident members of the team and also supervise 36 to 48 fourth-year medical students, primarily from Harvard Medical School. Child neurology residents are also involved in the training of pediatric residents and fellows in behavioral and developmental medicine. Finally, 12 to 24 physicians, often from foreign countries, participate yearly in our teaching activities, primarily as observers.

Conferences and seminars
Residents attend a rich variety of weekly conferences and inpatient rounds (daily to several times a week) as well as a monthly journal club.

“During my residency, I discovered a love of teaching and curriculum development. I pursued subspecialty training in pediatric stroke and then a fellowship in education to launch a career that incorporates both clinical care and medical education. I chose Boston Children’s Hospital because of the breadth and depth of exposure across pediatric neurology, with mentors in every aspect of clinical practice and education.”

— Miya Bernson-Leung MD, EdM, Associate in Neurology, Associate Program Director, 2015 graduate

Rehearsing challenging conversations with families
Unique to Boston Children’s Hospital, Child Neurology and Neurodevelopmental Disabilities residents get hands-on practice in communication and relational skills through a curriculum supported by the hospital’s Institute for Professionalism and Ethical Practice (ipepweb.org).

Working with professional actors skilled at impersonating children and families, residents can learn how to navigate challenging conversations, such as delivering a difficult diagnosis or telling a family of a critically ill newborn that things are going from bad to worse.

The curriculum is being evaluated in a pilot study, funded by the American Academy of Neurology, that will interview families having difficult conversations with residents before and after the communication training.
Unlike many other pediatric neurology residencies, residents at Boston Children’s spend several rotations taking call in-house to care for neurology inpatients, and provide urgent and emergent consults overnight.

While this does mean nights in the hospital, it allows us to be our patients’ first responders and to see the evolution of neurologic disease—including stroke, status epilepticus and hypoxic ischemic injury—from the moment a patient arrives in the hospital.

From an educational perspective, this system provides first-year residents with amazing one-on-one teaching from a neurology senior resident and, during our second and third years, the opportunity to direct our teaching toward fellow neurologists.

We have other rotations where we take at-home call, including rotations as the supervising resident on the neurology floor and as the consulting resident to our six intensive care units. These give us the experience and confidence to assess and manage acute neurologic problems over the phone.

We know that our call system is often a source of questions and concerns for applicants, so please feel free to ask us about it during your interview.

—Fiona Baumer, MD, Instructor in Neurology, Stanford University; 2015 graduate
Spanning basic, clinical and translational investigation, the research program in Neurology at Boston Children’s is the largest at a pediatric facility in the world. Other rich neuroscience opportunities are close at hand elsewhere on our campus and with collaborating institutions such as Harvard and MIT.
Neurology and neuroscience research at Boston Children’s and beyond

Boston Children’s offers Child Neurology residents almost limitless opportunities to engage in basic and translational neuroscience, participate in neurology clinical trials and collaborate with cognitive neuroscience investigators.

Research in the Department of Neurology

Research training is supported by an R25 grant and a T32 grant from the National Institute of Mental Health.

Neurology residents have the opportunity to participate in a wide range of clinical trials, often in collaboration with basic scientists and clinicians in other departments and institutions. (See page 15 for a sampling of these trials.)

Collaborating with researchers across Boston Children’s, we have access to a wide range of tools: genome editing, zebrafish drug-screening platforms, neural stem cell assays, advanced neuroimaging, proteomics and many more. Many of our residents go on to complete postdoctoral research fellowships here after completing their clinical training.

Research around our campus

Just a block from the main hospital, the multidisciplinary F.M. Kirby Neurobiology Center has some 20 labs investigating all aspects of nervous system development with the goals of improving care and training the next generation of physicians and scientists in basic and translational neuroscience. See page 14 for a listing of research areas.

Down the street, the Laboratories of Cognitive Neuroscience are investigating brain and cognitive development in both typically developing infants and children and those diagnosed with or at risk for various developmental disorders.

Through our NIH-funded Intellectual and Developmental Disabilities Research Center (IDDRG), residents also have access to other Longwood Medical Area scientists, as well as neuroscience seminars given by visiting neuroscientists from around the world.

“Boston Children’s is extremely supportive and encouraging of resident research, and that’s one of the reasons I chose to come here.”

— Christopher J. Yuskaitis, MD, PhD, Assistant in Neurology; former Neurogenetics fellow and a neurologist in the Epilepsy Genetics Program at Boston Children’s
Research beyond Boston Children’s

Next door at the Harvard Medical School’s Department of Neurobiology, residents can collaborate with scientists exploring the interactions between genetics and neuronal activity. Across the Charles River in nearby Cambridge, opportunities abound to collaborate with scientists at the Massachusetts Institute of Technology. Boston Children’s has regular partnerships with MIT’s Department of Brain and Cognitive Science, the Broad Institute and the Picower Center for Learning and Memory.

Research support

The Neurology Department provides staff support to help residents in their research development, including preparing research proposals and study designs, and reviewing case reports and publications. Additionally, Boston Children’s Clinical Research Program aids residents with grants, study protocols, case report forms, surveys, research databases, data or project management, data analysis and education in clinical research methods and practice.

Core labs

Biosample Repository

Led by Mustafa Sahin, MD, this Core provides a standardized neurological disease database and bio-specimen bank for translational research, as well as clinically and/or genetically defined patients for outcome studies and trials at Boston Children’s, utilizing a common IRB protocol. Phenotype data and samples are available to residents and other researchers who propose translational and clinical studies.

Neurodevelopmental Behavioral Core

Launched by the Intellectual and Developmental Disabilities Research Center (IDDRC) at Boston Children’s and led by Michela Fagiolini, PhD, this Core provides novel assays for characterization of complex behaviors in mouse models of neurodevelopmental disorders. The Core’s comprehensive battery of tests can assess specific social, emotional and cognitive behaviors as well as motor, auditory and visual functions. The Core also provides a means to test therapeutic interventions and assess safety. Small-animal imaging is also available.

Basic and Translational Research: A snapshot

Todd Anthony, PhD
Genetic dissection of neural circuits that control stress-induced behavioral states

Larry Benowitz, PhD
Optic nerve regeneration and CNS reorganization after injury

Chinfei Chen, MD, PhD
Synaptic plasticity

Michael Crickmore, PhD
Neurobiology of motivational states

Elizabeth Engle, MD
Congenital eye-movement disorders

Michael Do, PhD
Regulation of physiology and behavior by light

Michela Fagiolini, PhD
Experience-dependent visual plasticity; neurodevelopmental disorders, including Rett syndrome

Gwenaëlle Geleoc, PhD
Functional development of sensory hair cells in the inner ear

Xi He, PhD
Cell-cell communication; early nervous system development; Wnt family of secreted morphogens and signaling; cancer, skeletal and neurologic diseases

Zhigang He, PhD, BM
Axon regeneration

Takao Hensch, PhD
Critical periods in brain development

Jeffrey Holt, PhD
Molecular basis of sensory signals in hearing and deafness

Gabriel Kreiman, PhD
Computations in the brain and the functional architecture of neuronal circuits

Jonathan Lipton, MD, PhD
Circadian rhythms, neurological disease, translation

Annapurna Poduri, MD
Epilepsy genetics

Scott Pomeroy, MD, PhD
Molecular and cellular biology of brain tumors

Paul Rosenberg, MD, PhD
Physiology and pathophysiology of glutamate transporters in the central nervous system; molecular mechanisms of brain injury; mechanisms of homeostatic sleep regulation

Alexander Rothenberg, MD, PhD
Noninvasive brain stimulation; epilepsy; traumatic brain injury

Thomas Schwarz, PhD
Neurotransmitter secretion, membrane trafficking, synapse development, axonal transport; Parkinson’s disease

Mustafa Sahin, MD, PhD
Neuronal wiring and neurological disease

Judith Steen, PhD
Neurodegenerative diseases, proteomics and bioinformatics

Beth Stevens, PhD
Neuron-glia signaling; synapse development and plasticity

Hisashi Umemori, MD, PhD
Wiring the functional brain

Clifford Woolf, MD, BCh, PhD
Pain, formation of neural circuits, regeneration
Clinical Research: A sampling of current studies

Boston Children’s is a focal point for neurology research. We are a member site in two NIH consortia for clinical trials, NeuroNEXT and NIH StrokeNet. Below is just a selection of some of our other current studies.

**Genetics of severe early onset epilepsies**
This long-term study, led by Annapurna Poduri, MD, seeks to identify genetic alterations that cause severe early-onset epilepsies, focusing on epileptic encephalopathies and Ohtahara syndrome in particular, with the goal of improving diagnosis and treatment.

**Advanced seizure tracking and warning systems**
Seizures frequently are not identified by patients and families. This trial, led by Tobias Loddenkemper, MD, tests novel, portable epilepsy monitoring sensors and tools that can detect seizures by means of autonomic nervous system features, patient movement and other vital signs and parameters. The devices allow for rescue measures and tracking of less severe seizures and treatment responses, and may help patients gain better control over seizures.

**Rett syndrome**
The Rett Syndrome Research Program at Boston Children’s Hospital, led by Mustafa Sahin, MD, PhD and David Lieberman, MD, PhD, is committed to advancing our understanding of Rett syndrome and MECP2-related disorders by running clinical trials and research studies. We are also developing innovative biomarkers that can be used to assess severity and treatment effectiveness in current and future clinical trials.

**PTEN Hamartoma Tumor Syndrome (PTEN)**
The Multi-Disciplinary PTEN program, led by Mustafa Sahin, MD, PhD, in collaboration with the Developmental Synaptopathies Consortium, is conducting a Phase I/II clinical trial of the mTOR inhibitor, everolimus (Afinitor, Novartis Pharmaceuticals) in children and adolescents with PTEN mutations (U54NS092090). The primary aim of the study is to evaluate the safety of everolimus in this population of patients. Secondary outcomes include the short-term efficacy of everolimus on neurocognition and behavior, electrophysiological responses, dermatological features, and the microbiome of individuals with PTEN mutations.

**Pediatric Status Epilepticus Research Group (pSERG)**
pSERG is an international consortium coordinated out of Boston Children’s Hospital and lead by Dr. Tobias Loddenkemper. This consortium is developing a registry of refractory status epilepticus episodes with the goal of investigating outcomes of prolonged seizures that are resistant to at least two lines of anti-epileptic rescue medications.

**Autism spectrum disorder with epileptiform activity**
Nicole Baumer, MD, MEd, is the principal investigator at Boston Children’s for a Phase II study of ROS285119 (Roche Pharmaceuticals) in children and adolescents with ASD. The purpose of this trial is to look at the safety and effectiveness of the investigational medication, which may help with social interaction and communication symptoms.

**Tuberous sclerosis complex (TSC)**
The Multi-Disciplinary Tuberous Sclerosis Program, led by Mustafa Sahin, MD, PhD, is currently conducting a clinical trial of the antiepileptic vigabatrin (Sabril, Lundbeck Pharmaceuticals). The primary objective of the study is to test whether early treatment versus delayed treatment with vigabatrin in infants with TSC will have a positive impact of developmental outcomes at 24 months of age. A second objective is to determine if early intervention will prevent or lower the risk of the child developing infantile spasms and refractory seizures.

**Duchenne muscular dystrophy**
The Neuromuscular Program at Boston Children’s, led by Basil Darras, MD, is conducting a series of clinical trials in patients with neurofibromatosis. Recent trials have included testing the MEK inhibitor PD-0325901 and Cabozantinib in neurofibromatosis type 1 (NF-1) and bevacizumab in NF-2. Ullrich is also national study chair for a randomized, placebo-controlled trial of modafinil to reverse cognitive deficits in survivors of pediatric brain tumors. Sponsored by the Children’s Oncology Group, the study is using a computerized neuro-cognitive battery to assess the treatment intervention.

**Neurofibromatosis and pediatric brain tumors**
Nicole Ullrich, MD, PhD, Director of Neuro-Oncology, is a founding member of a national collaborative group currently conducting a Phase III study of Ataluren (PTC124) in the hope that the drug will restore production of dystrophin in children with DMD. A related study is investigating electrical impedance myography and ultrasound as biomarkers of DMD.

**Spinal muscular atrophy**
The Spinal Muscular Atrophy Program is part of Phase I and II trials testing the safety and tolerability of ISIS-smnRx as a potential treatment for all types of SMA. The drug works by altering the splicing of the SMN2 gene, leading to the increased production of fully functional SMN protein. The SMA Program also has an ongoing natural history study and is collecting specimens for a biorepository.
CURRENT RESIDENTS AND LEADERSHIP

Colleagues, advisors, lifelong friends. That’s how our residents describe each other and the Child Neurology faculty—many of whom were residents at Boston Children’s themselves.
First-Year Residents

1. Milena Andzelm M.D., Ph.D.
   Harvard Medical School and Massachusetts Institute of Technology Boston Children’s Hospital and Boston Medical Center, Boston Combined Residency in Pediatrics, 06/16 - 06/18

2. Hanalise Huff M.D., MPH
   Tulane University School of Medicine, New Orleans, LA
   Harbor UCLA Medical Center, Residency in Pediatrics, 07/16 - 06/18

3. Darius Ebrahimi-Fakhari M.D., Ph.D.
   Ruprecht-Karls University Heidelberg Heidelberg University Hospital, Residency in Pediatrics, 06/13 - 04/14
   Boston Children’s Hospital, Postdoctoral Fellow in Neurobiology, 04/14 - 06/16

4. Avantika Singh M.B., B.S.
   Vardhman Mahir Medical College, New Delhi Medical College of Wisconsin and Children’s Hospital of Wisconsin, 07/16 - 06/18
   Boston Children’s Hospital, Post-doctoral Clinical Research Fellowship in Neonatal Neurology, 07/14 - 06/16

5. Hannah Johnson M.D.
   Vanderbilt University School of Medicine, Nashville, TN
   Boston Children’s Hospital and Boston Medical Center, Boston Combined Residency in Pediatrics, 06/16 - 06/18

6. Leslie Hayes M.D.
   Weill Medical College of Cornell University, New York, NY
   Boston Children’s Hospital and Boston Medical Center, Boston Combined Residency in Pediatrics, 06/16 - 06/18

Second-Year Residents

7. Stephanie Donatelli, MD
   Boston College; Boston University School of Medicine, MD; Pediatric Residency, Boston Combined Residency Program (Boston Children’s Hospital/ Boston Medical Center)

8. Agnieszka Kielian, MD
   Loyola University Chicago, BS; University of Illinois at Chicago, College of Medicine, MD; Pediatric Residency, Children’s Hospital of Illinois

9. Sara Trowbridge, MD
   Harvard College; Harvard Medical School, MD; Pediatric Residency, Boston Combined Residency Program (Boston Children’s Hospital/ Boston Medical Center)

10. Louisa Keith, MD
    Harvard University; Drexel University College of Medicine, MD; Pediatric Residency, Mount Sinai Hospital

11. Diane Shao, MD, PhD
    Rice University; Harvard Medical School, MD; Harvard-MIT Division of Health Sciences and Technology, Ph.D; Pediatric Residency, Boston Combined Residency Program (Boston Children’s Hospital/ Boston Medical Center)

Third-Year Residents

12. Jamie Eskuri, MD
    College of Saint Benedict/ Saint John’s University; University of Iowa Carver College of Medicine, MD; Pediatric Residency, Boston Combined Residency Program (Boston Children’s Hospital/ Boston Medical Center)

13. Elizabeth Duke, MD
    Duke University; University of Maryland School of Medicine, MD; Pediatric Residency, Boston Combined Residency Program (Boston Children’s Hospital/ Boston Medical Center)

14. Catherine Salussolia, MD, PhD
    Swarthmore College, Stony Brook University, MD; Pediatric Residency, Stony Brook University

15. Lilly Grossmann, MD
    Dickinson College; SUNY Downstate College of Medicine, MD; Pediatric Residency, Mount Sinai Hospital

16. Shaguna Mathur, MD
    University of Winnipeg, Canada; American University of Integrative Sciences, GA; Mount Sinai Hospital

Pediatric Residency, Chicago

“The people here are wonderful, supportive and passionate about their work.”
Neurodevelopmental Disabilities (NDD) Residents

1. Nicolas Abreu, MD  
Yale College; Harvard Medical School, MD; Pediatric Residency, New York University

2. Michael Oanea M.D.  
University of Oklahoma College of Medicine, Oklahoma City, OK Stony Brook University, Residency in Pediatrics, 07/15 - 09/17

3. Jessica Solomon, MD  
Vanderbilt University, Peabody College; Vanderbilt University, MD; Pediatric Residency, Boston Combined Residency Program (Boston Children’s Hospital/and Boston Medical Center)

4. Tamar Goldberg, MD  
Skidmore College; University of Vermont College of Medicine, MD; Pediatric Residency, Thomas Jefferson Medical College, Alfred I DuPont Hospital for Children

“My colleagues are extremely smart, knowledgeable and great team players. The atmosphere is very collegial, making it a great place to work, learn and do research.”

Program leadership and selection committee

See page 28 for a complete list of Neurology faculty.

1. Scott Pomeroy, MD, PhD  
Chief of Neurology  
Member, Resident Selection Committee

2. Mustafa Sahin, MD, PhD  
Chair, Resident Selection Committee

3. David K. Urion, M.D., FAAN  
Director of Education and Residency Training Programs in Child Neurology and Neurodevelopmental Disabilities

4. Heather Olson, MD  
Member, Resident Selection Committee

5. Caitlin Rollins, MD  
Member, Resident Selection Committee

6. April Levin, MD  
Member, Resident Selection Committee

7. Annapurna Poduri, MD, MPH  
Member, Resident Selection Committee

8. Miya Bernson-Leung, MD, EdM  
Associate Program Director of the Child Neurology Training Program

9. Elizabeth Barkoudah, MD  
Associate Program Director for the Neurodevelopmental Disabilities Training Program

“It has been a real pleasure to work with such amazing and approachable attendings and great residents. My resident colleagues have become great lifelong friends.”
CAREER DEVELOPMENT

Whether your career goal is general clinical neurology, subspecialty research or a mix, the Child Neurology residency program provides strong support and guidance on grants, fellowships, research projects and more.

Current Careers of Former Residents

- 65% Clinical/Translational Research
- 25% Academic Clinical Child Neurology/Teaching
- <1% Community-Based Practice
- 10% Basic Research
Grooming the next generation of child neurologists

“We have outstanding opportunities to work with world-class clinicians and researchers in other fields, including radiology, neuroscience and psychology, to build long-term mentoring and collaborative relationships.”

Advisors
Throughout training, residents have access to advisors in the Department of Neurology who match their clinical and/or research interests. Residents typically meet with their advisors at least two times each year.

Advisors:
• develop a personal relationship with the resident
• provide career guidance, support and planning
• provide mentorship and advice about career choices
• advocate for the resident
• facilitate the resident’s professional development
• serve as a resource in personal and professional decision-making

Research Career Advisory Group
In their first year, residents begin meeting with our Research Career Advisory Group to ensure that they have the breadth of expertise needed to help guide them into a research area. The group helps decide on the need for an additional research advisor and provides advice on how to get started with a project. In the second and third years, residents receive continued guidance on their research progress.
Selected Publications from Recent or Current Residents

2018


2017


2016


2015


LIFE IN BOSTON

Boston is a medical paradise like no other, with three major medical schools and some two dozen hospitals. It’s also a fun place to live, with interesting people and unmatched cultural and recreational offerings.

It boasts world-class museums, theater and music—the Longwood Medical Area even has its own orchestra. It’s also a legendary sports town where Red Sox, Patriots, Celtics and Bruins players pay frequent visits to Boston Children’s patients.

Hiking and biking in the Berkshires of Western Massachusetts, skiing in New Hampshire or Vermont, touring the mansions of Newport, Rhode Island, exploring the rugged coast of Maine or relaxing on the beaches of Cape Cod are all within a couple of hour’s drive.
Work/life supports

Many of our residents are juggling work and family responsibilities. A variety of programs are available to help.

Office of Clinician Support (OCS)
The OCS provides a safe, confidential place to talk for anyone who does clinical work with patients, including trainees. The program assists clinicians with any problem they may be having, whether it be work-related or personal. The OCS is staffed by mental health clinicians familiar with working in the hospital environment and is available seven days a week. 617-355-6705

Child Care
Boston Children’s Hospital Child Care Center
Located at 21 Autumn Street, a short walk from Boston Children’s Hospital, the Center is staffed by teachers trained in Child Development and Early Childhood Education and provides care to 42 children 3 months through 5 years old. 617-355-6006

Bright Horizons Family Center at Landmark
Located in the Landmark Building on the corner of Brookline Ave. and the Fenway. 617-450-0790

Parents in a Pinch
If your regular child care provider falls through, Parents in a Pinch will provide in-home care in the day or evening, 7 days a week. 617-739-5437, ext. 2

Parenthood and residency
“At certain points in one’s life, there are definites. Upon entering medical school, I definitely knew my path lay in pediatrics.

After completing my pediatrics residency, I was given the opportunity to pursue Neurodevelopmental Disabilities (NDD) residency training at Boston Children’s Hospital. I also knew that motherhood was a definite I wanted to pursue, but the question was, when?

A balance needed to be reached between this desire and my NDD residency training. Midway in my training, reality struck, and following the birth of my first child, I received the same excellent support I received in my educational pursuits. I have been blessed with a department that is truly cognizant of life experiences and focused on the overall education and life support of its trainees.

In addition to child care offerings, the faculty has been very flexible with my clinic times and desire to be a part of my children’s lives.”

— Elizabeth Barkoudah, MD, 2011 graduate and Co-Director of the Cerebral Palsy Program at Boston Children’s

The Longwood Work/Life Liaison
This Harvard Medical School office provides information, resources, referrals, educational programs and support to those combining work lives with family needs. hms.harvard.edu/humanresources/worklife-harvard-longwood

Employee Lactation Support Program
This program provides support, information and lounges for nursing mothers. 617-355-0005

Employee Assistance Program (EAP)
Confidential services are available 24/365 from our EAP provider, KGA. kgreer.com

Need housing assistance?
The Harvard Housing Office
The Harvard Housing Office offers listings of apartments, condominiums, houses and rooms for rent or sale, information on finding a roommate, lists of local, short-term accommodations, lists of movers and self-storage facilities and more. The office also offers “affordable” apartments at the Trilogy, 170 Brookline Avenue, near the Longwood Medical Area. For more information, visit huhousing.harvard.edu or call 617-496-7827.

Lease Guarantee Program
Boston Children’s Hospital has implemented this program for all residents and fellows who are paid through the hospital to help ease the pressure of the high cost of housing in the Boston area. If a landlord requires advance payment of the last month’s rent and/or a security deposit, the hospital will guarantee payment according to the lease guaranty procedure. In return, the resident or fellow agrees to reimburse Boston Children’s for any payment the hospital makes. For more information, call the HR Employee Service Center at 617-355-7780.

Other sources of housing information:
• Craig’s List
• MIT European Club
ABOUT BOSTON CHILDREN’S HOSPITAL

Located in the heart of the roughly 20-square-block Longwood Medical Area, Boston Children’s Hospital is the top-ranked pediatric hospital in the United States by U.S. News & World Report and consistently ranks #1 in Neurology and Neurosurgery.
At a glance

Founded in 1869, Boston Children’s is now a 395-bed comprehensive center for pediatric and adolescent health care. Our child neurologists also practice in six satellite locations in the Boston suburbs.

Boston Children’s is the primary pediatric program of Harvard Medical School and home to the world’s largest research enterprise based at a pediatric medical center.

The hospital has received four Gold Beacon Awards for Critical Care Excellence, has been named a Leapfrog Group Top Children’s Hospital for safety and quality, and was named one of Hospital and Health Network’s “Most Wired” hospitals for information technology.

A brief history of Neurology at Boston Children’s

1920–1952 The very roots of child neurology began at Boston Children’s Hospital with the appointment of Dr. Bronson Crothers to lead the newly established Neurology Service. In 1929, “Ward 9” in the newly created Bader Building opened as the first dedicated space for child neurology at a U.S. children’s hospital. In the 1930s and 1940s, Dr. Crothers made landmark contributions into the causes, classification and management of cerebral palsy.

1944 Dr. William Lennox developed the Seizure Unit, the first comprehensive pediatric epilepsy unit in the world. Since its founding, the program has remained at the forefront of pediatric epilepsy under Drs. Cesare Lombroso and Gregory Holmes and today under the leadership of Dr. Philip Pearl.

1952–1962 Dr. Randolph Byers assumed the leadership of Neurology. Among his groundbreaking accomplishments, he was the first to link environmental lead exposure to long-term cognitive and learning disorders in children. His studies on kernicterus, spinal muscular atrophy, inflammatory disorders of the central nervous system and other pediatric neurological disorders form the basis for much of our clinical understanding today.

1962–1990 An independent Department of Neurology—the first devoted to children in the U.S.—was established at Boston Children’s Hospital and Harvard Medical School. In 1963, Dr. Charles Barlow became the Department Chief, establishing a program in basic neuroscience and what is now called the NIH-sponsored Intellectual and Developmental Disabilities Research Center (IDDRC) at the hospital. Dr. Barlow’s accomplishments also included contributions to the understanding of headache in children.

1990–2005 Dr. Joseph Volpe was appointed Neurologist-in-Chief in 1990. During his tenure, the size and scope of the Child Neurology Residency Training Program grew substantially, and Dr. Basil Darras became the Training Program Director. Dr. Volpe fostered the development of subspecialty clinical programs, with particular emphasis on Fetal/Neonatal Neurology and recruited 20 new faculty.

2005–present Dr. Scott Pomeroy succeeded Dr. Volpe as Bronson Crothers Professor and Neurologist-in-Chief in 2005. His tenure has been marked by continued growth of the Boston Children’s Hospital Neurology Residency Training Program, a commitment to translational neuroscience, growing support of high-quality clinical neuroscience research and the development of several exciting new subspecialty clinical programs.
Our very large clinical and research faculty guarantees that if you have a question, someone is here to answer it. Many of our faculty did their own Child Neurology residency at Boston Children’s Hospital.
Child Neurology faculty at Boston Children’s Hospital

Chiefs/Directors
Scott L. Pomeroy, MD, PhD
Neurologist-in-Chief
Basil Darras, MD
Associate Neurologist-in-Chief
Phillip Pearl, MD
Director, Division of Epilepsy

Senior Clinical Faculty
David Coulter, MD
Elizabeth Engle, MD
Tobias loddenkemper, MD
Annapurna Poduri, MD, MPH
Michael J. Rivkin, MD
Paul Rosenberg, MD, PhD
Alexander Rotenberg, MD, PhD
Mustafa Sahin, MD, PhD
Janet Soul, MD
Robert Tasker, MD
Nicole Ulrich, MD, PhD
David K. Urion, MD, FAAN

Clinical Faculty
Norberto Alvarez, MD
Irina Anselm, MD
Elizabeth Barkoudah, MD
Nicole Baumer, MD, Med
Leslie Benson, MD
Ann Marie Bergin, MD
Miya Bernson-Leung, MD, EdM
Jeffrey Bolton, MD
Catherine Chapman, MD
Paul Chervin, MD
Alexander Cohen, MD
Peter Davis, MD
Christopher Elitt, MD, PhD
Michel Fayad, MD
Partha Ghosh, MBBS
Mark Gorman, MD
Jennifer Hanowell, DO
Chellamani Harini, MD
Karameh Hawash-Keumerle, MD
Jamie Heath, MD
Kush Kapur, PhD
Lauren Kondev-LaFortune, MD
Ken LaRovere, MD
Alyssa Lebel, MD
Laura Lehman, MD
April Levin, MD
Mark H. Libenson, MD
David Lieberman, MD, PhD
Jonathan Lipton, MD, PhD
Kiran Maski (Prasad), MD
Maitreyi Mazumdar, MD, MPH, MSc
Claudio Melo de Gusmao, MD
Anna Minster, MD
Christelle Moufawad El Achkar, M.D.
Jeff Neil, MD, PhD
Heather Olson, MD
Judith Owens, MD, MPH
Archana Patel, MD, MPH
Carrie Peek, MD, EdM
Juriaan Peters, MD
Peter Raffalli, MD
Michael Robbins, MD
Eugene J. Roe, MD
Caitlin Rollins, MD
Cynthia Rooney, MD
Arnold Sansevere, MD
Sarah Spence, MD
Karen Spencer, MD, MPH
Siddharth Srivastava, MD
Masanori (Max) Takeoka, MD
Kinga Tomczak, MD
Molly Tracy, MD
Robert R. Wolff, MD
Christopher Yuskaitis, MD, PhD

Research Faculty
Clifford Woolf, MB, BCh, PhD
Director, F.M. Kirby Neurobiology Center
Todd Anthony, PhD
David Bellinger, PhD
Chinfei Chen, MD, PhD
Michael Costigan, PhD
Michael Crickmore, PhD
Elizabeth Engle, MD
Michela Fagiolini, PhD
Xi He, PhD
Zhigang He, PhD
Takao Hensch, PhD
Alan Levin, MD
Jonathan Lipton, MD, PhD
Annapurna Poduri, MD, MPH
Scott Pomeroy, MD, PhD
Paul Rosenberg, MD, PhD
Alexander Rotenberg, MD, PhD
Mustafa Sahin, MD, PhD
Thomas Schwarz, PhD
Judith Jebanathirajah Steen, PhD
Beth Stevens, PhD
Michael Tri H. Do, PhD
Hisashi Umemori, MD, PhD

Did their Child Neurology or Neurodevelopmental Disabilities residency at Boston Children’s
HOW TO APPLY

The Department of Neurology currently accepts at least six new Child Neurology residents and at least one Neurodevelopmental Disabilities resident into its training program each year.
Application procedure

Incoming residents can apply for two types of positions:

**Combined Neurology and Pediatrics Residency**
This Categorical position includes a two-year General Pediatrics residency and a three-year Child Neurology residency at Boston Children’s Hospital. The General Pediatrics residency is done through the Boston Combined Residency Program at Boston Children’s Hospital/Boston Medical Center (BCRP).

**Combined Neurodevelopmental Disabilities and Pediatrics Residency**
This Categorical position includes a two-year General Pediatrics residency and a four-year Neurodevelopmental Disabilities residency at Boston Children’s Hospital. The General Pediatrics residency is done at Baystate Medical Center.

**Entry requirements**
Applicants must have completed one of the following: two years of training in pediatrics, postgraduate year 1 (PGY-1) training in internal medicine plus one residency year (PGY-2) in pediatrics, or one year of training in pediatrics plus one year of neuroscience research.

We feel strongly that applicants need two prior years of clinical training before their Child Neurology training, given its very significant inpatient and intensive care unit demands. We will only consider a third option—one year of clinical training with a year of research—under very special circumstances.

**Matching**
Matching will be done through the Electronic Residency Application Service (ERAS): [aamc.org/students/medstudents/eras](http://aamc.org/students/medstudents/eras).

The Child Neurology Match or Neurodevelopmental Disabilities Match will be simultaneous with the General Pediatrics match.

The Child Neurology Categorical position includes a preliminary position in the Boston Combined Residency Program. Child Neurology Categorical applicants will still need to apply separately to the Boston Combined Residency Program: [bostonchildrens.org/bcrp/application](http://bostonchildrens.org/bcrp/application). These candidates will also spend a day interviewing with the BCRP.

**Matching: NDD**
The NDD position includes a preliminary position at Baystate Medical Center in Springfield, MA. Neurodevelopmental Disabilities Categorical applicants will still need to apply separately to Baystate through ERAS with NRMP number 1286320P1. For information about the program, visit [baystatehealth.org/education-research/education/residencies/pediatrics](http://baystatehealth.org/education-research/education/residencies/pediatrics).

Candidates will also spend a day interviewing with program leadership at Baystate.

**Reserve positions**
Reserve Positions are available for residents who will have completed their pediatric residency training and be ready to begin their Child Neurology or Neurodevelopmental Disabilities residency training in the Summer of 2019.

**Interviews**
Approximately 40 candidates will be invited to Boston for an interview by the Resident Selection Committee and will have opportunities to meet with several clinical and research faculty as well as current neurology residents. The day will include a brief orientation session, a series of interviews, lunch, a tour of the facilities and a dinner with our neurology residents.

If you are coming for an interview, we will try to arrange for you to meet with clinicians or researchers in your area of interest. For MD/PhD applicants, we can arrange additional sessions to discuss research and fellowship opportunities in the Boston area as well as meetings with scientists in specific fields of interest.

For applicants to the Combined Neurology and Pediatrics Residency or Combined NDD and Pediatrics Residency, we can help arrange for back-to-back interview days to include both programs.

For specific questions, please contact David K. Urion, MD, the Residency Program Director, david.urion@childrens.harvard.edu. You may also arrange a time to speak with Dr. Urion by calling Stephanie Hansbury at 617-355-7819.
“I was delighted by the ease with which the conversation flowed during my interviews. We chatted about my interests, opportunities available to residents and future developments in the department. I was particularly impressed by the fact that we were treated as future colleagues and not simply interviewees.

During lunch, we were able to meet many members of the faculty and ask questions in a relaxed and informal manner. Even after my interview, Dr. Sahin and Dr. Urion were always available via phone or email. I thought this spoke volumes about how invested they were in their residents.”

— Samata Singhi, MD, medical director, epilepsy monitoring unit, Kennedy Krieger Institute, Assistant Professor of Neurology and Pediatrics, Johns Hopkins School of Medicine, 2016 graduate