

# *Department of Neurology*

ANNUAL REPORT / FY22-23







MESSAGE FROM THE CHAIR



Yale Neurology’s 2022–2023 annual report captures a remarkable year of achievements, expansions, collaborations, and – most importantly – community as we regain a sense of normalcy and relearn how to connect with one another. Lifted by a collegial spirit and strengthened by the addition of some new faces, the Department carries on its proud legacy of prestigious research, clinical, and educational programs.

We resumed our vigorous recruitment of faculty this year, and I am pleased to welcome 18 distinguished neurologists to the Department. In the last year, our 159 faculty members published more than 8,000 research papers, and have been honored with a wealth of national and international accolades for their outstanding achievements as clinicians, scientists, and educators. I am proud that Yale Neurology has once again secured a top ten ranking in total NIH funding, which reflects our notable expansion of translational research initiatives.

The addition of new clinical offerings enables us to better serve our New Haven community and the surrounding region. Our specialists now see patients in North Haven, Connecticut, and Westerly, Rhode Island, treating the full scope of neurological diseases and disorders from Alzheimer’s disease and migraine to Parkinson disease and neuropathy. Our clinicians are also at the helm of the newly established Center for Brain and Mind Health (co-directors: Serena Spudich, MD, MA; Kevin Sheth, MD);

the Charcot-Marie-Tooth Association (CMTA) Center of Excellence (co-director: Sasha Zivkovic, MD, PhD); and the Stephen and Denise Adams Center for Parkinson’s Disease Research (inaugural director: Clemens Scherzer, MD). Distinguished by transformative, multidisciplinary research, each of these centers is rooted in unwavering commitment to identifying breakthrough treatments and improving patients’ lives.

Given our largest group of trainees since our inception nearly 70 years ago, I am proud of the Department’s legacy of educating and retaining residents and fellows with a wealth of perspectives and passions. By prioritizing virtual recruitment, robust grand rounds, and physician wellness, we continue to meet our goal in producing agile and empathic leaders in our ever-changing field.

In this report, I invite you to join our community and read about our year of innovation, exploration, and collaboration. I extend my deepest gratitude to all members of Yale Neurology as we enter another year of unparalleled growth.

**David A. Hafler, MD**  
*William S. and Lois Stiles Edgerly  
Professor of Neurology and Professor of Immunobiology  
Chair, Department of Neurology  
Neurologist-in-Chief, Yale New Haven Hospital*





CONTENTS

MESSAGE FROM THE CHAIR 3

DEPARTMENT OF NEUROLOGY 5

VITAL STATS

DIVERSITY, EQUITY + INCLUSION 6

EDUCATION + ACADEMIC AFFAIRS 8

NEUROLOGY DIVISIONS

- General Neurology 10
- Epilepsy & EEG 12
- Movement Disorders 20
- Neurocritical Care & Emergency Neurology 28
- Neurodegenerative Disorders 34
- Neuro-Immunology 38
- Neurological Infections & Global Neurology 42
- Neuromuscular Medicine 46
- Neuro-Oncology 50
- Neuropsychology 54
- West Haven VA Medical Center 58
- Stroke & Vascular Neurology 62

CENTERS + PROGRAMS 45

NEUROLOGY LEADERSHIP

- Department Leadership 68
- Section Chiefs 68
- Postgraduate Education & Training Programs 69
- Fellowship Program Directors & Clerkship 69
- 2022-2023 Chief Residents 70

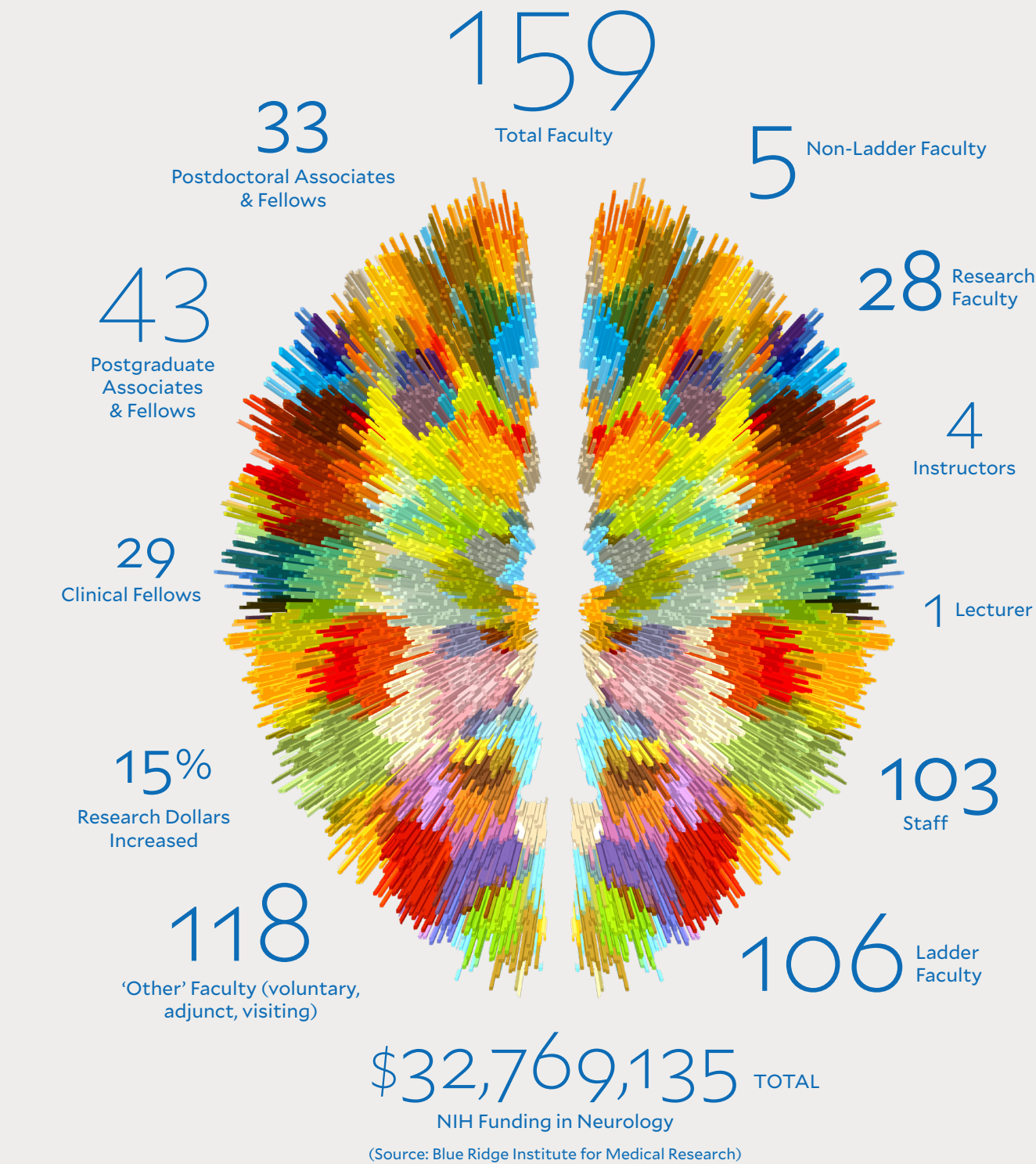
**Correspondence**  
**may be sent to:**  
2022-2023 Annual Report  
Allison Greco  
Department of Neurology  
15 York Street  
Lippard Lab of Clinical Investigation  
New Haven, CT 06510

**NEUROLOGY COMMUNICATIONS OFFICER**  
Allison Greco

**PHOTOGRAPHY**  
Andrew Osborne  
Kimberly Conner  
Abbey Campbell

**DESIGN + PRINT**  
Yale Printing & Publishing Services

VITAL STATS



**CLINICAL SITES:**  
New London, Bridgeport, Milford, Greenwich, Stamford, Fairfield, Guilford, North Haven, and Westerly, Rhode Island





Yale Neurology Faculty Retreat, Madison Beach Hotel, March 3, 2023

*Every incoming resident undergoes mandatory training in bias mitigation, responsiveness to microaggressions, and upstander training, which was provided at the faculty retreat in 2023.*

**Program Administration**

Reshma Narula, MD, assistant professor of neurology, is the Department’s director of diversity, equity and inclusion; and Vanessa Cooper, MD, assistant professor of clinical neurology, is the Department’s associate director of diversity and inclusion education. Narula serves as the Department’s representative on the Yale School of Medicine (YSM) Diversity Advisory Council (DAC); organizes and develops departmental Diversity, Equity, and Inclusion (DEI) training/education; and supports recruitment efforts. Cooper likewise assists with recruitment efforts, as well as with coordinating diversity and inclusion education for the Department’s residency program. Both leaders also offer support and guidance to faculty members, trainees, and staff.

**Engagement**

The Department of Neurology participates in the YSM DAC, which is chaired by Darin Latimore, MD, associate professor of internal medicine; deputy dean and chief diversity officer; and Title IX deputy coordinator, Office of the Dean, School of Medicine.

The DAC seeks to engage the YSM community in meaningful discussions as it proposes and evaluates new DEI-related programs.

**Education**

The Department of Neurology’s ongoing commitment to education in health disparities is reflected in designated Grand Rounds and Morbidity and Mortality Sessions. Several regularly scheduled lectures on health disparities are incorporated into the residents’ educational curriculum. In addition, every incoming resident undergoes mandatory training in bias mitigation, responsiveness to microaggressions, and upstander training, which was provided at the faculty retreat in 2023. Departmental educators have participated in seminars through YSM that deal with various aspects of diversity and inclusion in YSM’s many learning environments. An extensive collection of diversity resources from Yale and the City of New Haven are offered on the Department’s Diversity website, <https://medicine.yale.edu/neurology/diversity/>.

**Recruitment/Retention**

The Department remains committed to diverse and equitable recruitment and retention. This year, we have enhanced our efforts to reward and retain first-rate talent among faculty members and medical students by compiling a catalogue of career-advancing leadership opportunities and honors. This catalogue includes opportunities offered both by Yale and by national neurological societies that honor excellence in such areas as education and clinical excellence; noteworthy research; and service. Medical students can apply to programs that provide career guidance, networking, and mentorship. By providing this comprehensive catalogue and sponsoring individuals who apply each year, the Department seeks to recognize the accomplishments and contributions that make Yale Neurology a world-renowned department for training and employment.

**Promotion of Equity and Inclusion**

There are several affinity groups within the Yale community that offer an important source of collegiality, support, and peer mentoring. This year, the Women in Neurology Group was revived and continues to welcome participation. A list of existing Yale affinity groups is listed below.

- Women Faculty Forum
- Minority Organization for Retention and Expansion
- Committee on the Status of Women in Medicine
- Dean’s Advisory Council on LGBTQI+ Affairs
- Queer Faculty Affinity Group





The 2022–23 academic year marked a return to normalcy in our educational programs. Formal educational sessions across the continuum from pre-clerkship to continuing medical education took place largely in person with a focus on case-based learning and interactive discussions. While video conferencing technology allows greater access and convenience for those who cannot be on site, we have learned that our time together is critical to building community and a culture of lifelong learning in neurology.

JEREMY MOELLER, MD, MSC, associate vice-chair of education, neurology residency program director

The 2022–23 academic year marked a return to normalcy in our educational programs. Formal educational sessions across the continuum from pre-clerkship to continuing medical education took place largely in person with a focus on case-based learning and interactive discussions. While video conferencing technology allows greater access and convenience for those who cannot be on site, we have learned that our time together is critical to building community and a culture of lifelong learning in neurology.

Grand Rounds

Neurology Grand Rounds continues to be the cornerstone of our departmental educational offerings. Starting in February 2023, we expanded the time slot for Grand Rounds to 90 minutes. The first 30 minutes consist of a social lunch in which faculty members and trainees can mingle and meet our guest speak-

ers; lunch is followed by the formal presentation. We have moved Clinical Grand Rounds to Thursday at noon, and we have added to the number of sessions as of 2023. In the coming year, we will continue to widen the scope of Clinical Grand Rounds, which is critical to our clinical educational program, and include sessions focused on health disparities, quality improvement, and innovations in clinical care.

Residency and Fellow Recruitment

Resident and fellow recruitment has continued to be primarily virtual, which has both lowered costs and provided greater access to applicants. We have continued to recruit a diverse group of dynamic residents and fellows from across the country and around the world. The Department continues to maintain a robust website and social media presence, and our reputation continues to grow. Our residents and fellows comprise a critical source of

our physician workforce. Of the graduates of our residency program from 2011 through 2022, 45% have stayed for fellowship training, and 32% have remained to practice neurology in Connecticut, including 24 neurologists in the Yale system. Graduates of our program include more than a dozen persons in leadership positions, including residency and fellowship program directors.

Resident and Fellow Education

We have 30 residents and 27 clinical fellows in the 2023–24 academic year—the largest group of trainees ever. Since 1954, nearly 300 neurologists have graduated from our residency program; because of our exponential growth, one-third of those have graduated within the last decade. Our trainees have distinguished themselves in clinical care, research, and education. The T32 and R25 training and research education programs have promoted high-level research careers, and clinical fellows have had the option of pursuing a master's degree in medical education. Residents and fellows have served on national committees through the American Academy of Neurology and subspecialty societies. We have enjoyed rapid growth in our simulation programs, and our faculty members provide hundreds of hours of one-on-one education to our trainees. We continue to focus on resident and fellow wellness, and we plan to pilot “family groups” consisting of faculty, fellows, and residents to meet periodically for social events, with get-togethers focused on mentorship and wellness.



Yale Neurology Residency Welcome Picnic, Summer 2023

*The Neurology Department has implemented substantial improvements as a result of specific concerns raised in the context of the YNHH/YM physician wellness action collaborative survey.*

The Department continues to be a leader in its data-driven approach to physician well-being, with its work informed by quantitative and qualitative data gathered within the past year. We have begun offering coaching to faculty members at the individual level, and hope to expand this program. At the departmental level, we held a full faculty retreat in March 2023 that focused on methods to enhance well-being and identify departmental priorities. In response to these discussions, we have developed several approaches to increase faculty cohesion, including affinity group events and faculty/trainee dinners. This academic year, we will be piloting the Faculty-Trainee Families Initiative, which will bring together faculty members and trainees for periodic social events and mentoring. At the institutional level, we are represented on and contribute actively to the YNHH Clinician Wellness Council and the Council for Resident and Fellow Well-Being. Looking ahead, we will continue to monitor faculty well-being through quantitative and qualitative survey methods, including the upcoming Healthcare Professional Well-being Academic Consortium (PWAC) survey.



Sara Schaefer, MD, MHS, (right) trains Clinical Fellow Kathryn Zuchowski, MD, in the Botox Clinic.



# General Neurology



CHRISTOPHER H. GOTTSCHALK, MD, *clinical chief*

THE DIVISION OF **GENERAL NEUROLOGY** EVALUATES AND TREATS ALL NEUROLOGICAL DISORDERS. THIS DIVISION INCLUDES THE YALE HEADACHE AND FACIAL PAIN CENTER, WHICH SPECIALIZES IN THE DIAGNOSIS AND MANAGEMENT OF PRIMARY AND SECONDARY HEADACHE DISORDERS AND FACIAL PAIN, AS WELL AS THE YALE NEUROLOGY RESIDENT CLINICS. THE RESIDENT CLINICS OFFER SPECIALIZED CARE IN GENERAL NEUROLOGY AND STROKE, AND INCLUDE THE NEUROLOGY URGENT ACCESS CLINIC (NUAC).

## RESEARCH

- ▶ The **Headache Medicine** section continues to pursue industry-sponsored trials of treatments for primary headache disorders. A previous trial led to the approval of a new device for acute migraine attacks (NeuroLief, Relivion) that is worn around the head. Recently added trials include a trial of monoclonal anti-CGRP therapy for cluster headache and a trial of a novel device for treating migraine with aura. In the third quarter of 2023, we also began recruiting patients for a collaborative trial with the Division of Cardiology, testing the potential of patent foramen ovale (PFO) closure to treat migraine in patients who respond to antiplatelet therapy.

Division members continue to publish clinical updates in the advanced care of headache disorders:

- Migraine – Not Just a Numbers Game: Aim to Improve Quality of Life. *Neurology*, 2023.
- The Epidemiology of Primary Headache Disorders. *Seminars in Neurology*, 2022.
- Preventing the Progression of Episodic Migraine to Chronic Migraine with Acute Treatment Optimization. *Current Pain and Headache Reports*, 2022.

- ▶ **Emmanuelle Schindler, MD PhD**, is an assistant professor of neurology and medical director of the Headache Center of Excellence, VA Connecticut Healthcare System-West Haven (WHVA). She currently studies the therapeutic effects of the psychedelic compound, psilocybin, and she is thought to be the only researcher in the United States studying psychedelics in headache disorders. Schindler is also the first Yale researcher to study any psychedelic compound in humans.
- ▶ The **Schindler Lab**, in collaboration with the Biostudies Unit at the West Haven VA (Deepak D’Souza, MBBS, MD), continues studies of psilocybin in the treatment of primary headache disorders, including migraine and cluster headache. Related studies include the compound’s effects on pain perception in general and the mechanism of headache reduction.

- Exploratory investigation of a patient-informed low-dose psilocybin pulse regimen in the suppression of cluster headache: Results from a randomized, double-blind, placebo-controlled trial. *Headache*, 2022.

## CLINICAL

The Headache Medicine section provides comprehensive care for the full range of primary and secondary headache disorders, including migraine, cluster headache, post-traumatic headache, idiopathic intracranial hypertension (IIH or pseudotumor cerebri), CSF leaks, trigeminal and other cranial neuralgias, and others. Our patients receive highly specialized care from experts in the fields of headache medicine, neuro-ophthalmology, neurosurgery, neuroradiology, pain medicine, and psychology.

The division offers patient-centered care, providing virtual and in-person E&M visits and infusions across our system, including:

- 2- and 4-bed infusion suites (New Haven, Fairfield, and Stamford)
- 3T MRI with dedicated protocols for cranial neuralgias
- Surgical options that include microvascular decompression (MVD) and Gamma Knife therapy
- Interdisciplinary care with interventional neuroradiologists, neurosurgeons, and pain specialists for patients with complex disease
- Procedures that include on-demand nerve blocks and Botox® for chronic migraine
- Physical therapists, social workers, and dietitians
- Access to clinical trials

*Dr. Gottschalk administers Botox® as a treatment for chronic headaches.*

## LOCATIONS:

With a main hub in New Haven, the division has expanded with satellite locations in Stamford, Fairfield, Milford, North Haven, Guilford, and New London, Connecticut; and most recently Westerly, Rhode Island.

The general neurology division includes a multidisciplinary concussion program across all clinical sites, offering diagnostic evaluation and treatment; neuropsychological evaluation and neuropsychiatric care; physical therapy; and social work services.



*Dr. Bilchik is an assistant professor of neurology*



## PROVIDERS:

- Christopher H. Gottschalk, \*MD**, *section chief, general neurology; director, fellowship program; director, Headache & Facial Pain Center*
- Nicholas Tzikas, \*MD**, *assistant professor, clinical neurology; co-director, headache medicine fellowship program; Stamford site director, Headache & Facial Pain Center*
- Vanessa Cooper, \*MD**, *assistant professor, neurology; associate director for educational diversity, neurology*
- Tanya Bilchik, \*MD**, *assistant professor, neurology*
- Steven Novella, \*MD**, *associate professor, neurology*
- Sirisha Sanamandra, \*MD**, *assistant professor of clinical neurology*
- Emmanuelle Schindler, \*MD, PhD**, *assistant professor, neurology*  
[\*= Board-certified in headache medicine by the United Council for Neurologic Subspecialties (UCNS)]

## FELLOWSHIP TRAINING

The Yale Headache Medicine fellowship training program is a UCNS-certified year-long clinical program, training two fellows per year since 2020–2021. We also work together with the West Haven VA Headache Center of Excellence to provide an additional clinical research year for future clinician-scientists.



# Epilepsy + EEG



LAWRENCE J. HIRSCH, MD  
academic chief

THE YALE COMPREHENSIVE EPILEPSY CENTER PROVIDES PROMISING OPTIONS FOR ADULT AND PEDIATRIC PATIENTS WITH EPILEPSY. KNOWN FOR CLINICAL EXCELLENCE AND INNOVATIVE RESEARCH, THIS PROGRAM WAS ONE OF THE NATION'S FIRST, AND HAS GROWN INTO ONE OF THE MOST ACTIVE AND ADVANCED IN THE WORLD.

## RESEARCH

► **Lawrence J. Hirsch, MD**, division chief, performs clinical research on brain monitoring with electroencephalography (EEG); status epilepticus; brain stimulation in epilepsy treatment; epilepsy surgery; rescue therapy for acute seizures outside the hospital; antiseizure medications; and more. Hirsch is the founder and former chair of the Critical Care EEG Monitoring Research Consortium (CCEMRC), which now includes more than 50 centers. He is co-chair of the medical advisory board of the NORSE Institute; PI of the International Open Biorepository for New-Onset Refractory Status Epilepticus (NORSE) and Febrile Infection-Related Epilepsy Syndrome (FIRES); and lead author of the American Clinical Neurophysiology Society's Standardized Critical Care EEG Terminology: 2021 Version. He has published over 250 peer-reviewed publications and more than 100 reviews, editorials, and book chapters. Hirsch directed or co-directed five symposia and gave more than 20 invited talks in seven countries in 2022. The second edition of his *Atlas of EEG in Critical Care* was published in early 2023.

- *Hirsch and Brenner's Atlas of EEG in Critical Care*, 2nd ed. Hoboken, NJ: **Wiley-Blackwell**, 2023.
- Cytokines in New-Onset Refractory Status Epilepticus Predict Outcomes. *Annals of Neurology*, 2023.
- International consensus recommendations for management of New Onset Refractory Status Epilepticus (NORSE) including Febrile Infection-Related Epilepsy Syndrome (FIRES): Summary and Clinical Tools. *Epilepsia*, 2022.
- Factors Predicting Outcome After Intracranial EEG Evaluation in Patients with Medically Refractory Epilepsy. *Neurology*, 2022.

► **Hal Blumenfeld, MD, PhD**, leads multidisciplinary collaborative research on disease-oriented neuroimaging. He is a world expert on the mechanisms of impaired consciousness in epilepsy. His research group is completing the START Clinical Trial (Stimulation of the Thalamus for Arousal Restoral in Temporal Lobe Epilepsy, <https://www.startepilepsy.com/>), a novel multisite clinical trial supported by an NIH BRAIN Initiative grant to test the effectiveness of thalamic stimulation in improving consciousness in focal seizures. Blumenfeld has multiple ROIs using animal models to investigate the fundamental mechanisms of the same clinical problem—impaired consciousness in focal seizures—and to develop new translational therapeutic approaches to treating epilepsy.

- Predictive Power of Interictal Epileptiform Discharges in Fitness-to-Drive Evaluation. *Neurology*, 2023.
- Decreased but diverse activity of cortical and thalamic neurons in consciousness-impairing rodent absence seizures. *Nature Communications*, 2023.
- Distinct signatures of loss of consciousness in focal impaired awareness versus tonic-clonic seizures. *Brain*, 2023.
- Human visual consciousness involves large scale cortical and subcortical networks independent of task report and eye movement activity. *Nature Communications*, 2022.

► **Hitten Zaveri, MSE, PhD**, is an electrical, computer, and biomedical engineer by training. He directs the Computational Neurophysiology Laboratory and co-directs the BioSense Laboratory and the Yale Clinical Neuroscience Group for Neuroanalytics (Yale Neuroscience Neuroanalytics, YNN). He studies brain networks and EEG connectivity, and is involved in the development of neurotechnology and medical devices. Zaveri's current projects include the use of network analysis to locate the onset area of epileptic seizures (NIH R01 NS109062); the introduction of a multimodal brain probe for traumatic brain injury (NIH UG3 NS123307); the development of a multimodal brain atlas (Yale Brain Atlas); seizure forecasting; and the development of a next-generation brain computer interface for brain monitoring and modulation.

- Quantitative assessment of burst suppression as a predictor of seizure recurrence in refractory status epilepticus. *Clinical Neurophysiology*, 2023.
- Seizure forecasting: Where do we stand? *Epilepsia*, 2023.
- High-resolution cortical parcellation based on conserved brain landmarks for localization of multimodal data to the nearest centimeter. *Scientific Reports*, 2022.
- Cellular recovery after prolonged warm ischaemia of the whole body. *Nature*, 2022.

► **Imran Quraishi, MD, PhD**, has co-directed the Center for Neurostimulation in Epilepsy since 2020. He studies the use of long-term ambulatory intracranial EEG as an epilepsy biomarker and as a novel tool for cognitive neuroscience, as well as working on translational models of genetic epilepsies, including channelopathies. Quraishi is a contributing editor of *Epilepsy Currents*, the official journal of the American Epilepsy Society.

- Nonquantal transmission at the vestibular hair cell-calyx synapse: KLV currents modulate fast electrical and slow K+ potentials. *Proceedings of the National Academy of Sciences of the United States of America*, 2023.
- Hippocampal recording via the RNS system reveals marked ipsilateral activation of epileptiform activity during Wada testing. *Epilepsy & Behavior*, 2022.
- Electronic seizures diaries for clinical care and research. *Epileptic Disorders*, 2022.
- Remembering the pattern: A longitudinal case study on statistical learning in spatial navigation and memory consolidation. *Neuropsychologia*, 2022.



In her clinical work, Aline Herlopian, MD (right), leads with compassion, guiding her patients through the complexities of epilepsy.





- **Richard H. Mattson, MD**, a legend in the world of epilepsy, came to Yale in 1967 after service in the United States Air Force Medical Service, where he and colleagues conducted the first studies establishing sleep deprivation as a useful adjunct in activating epileptogenic activity in an EEG recording. At Yale, he founded the Yale/VA Epilepsy Center and Intensive Epilepsy Monitoring Unit. It was one of the first—if not the world's first—continuous video/EEG monitoring units. Over the past five decades, this unit has grown into the current Yale Comprehensive Epilepsy Center. During the next 15 years, Mattson directed two multicenter comparative trials of antiseizure drugs. He served as director of the Yale neurology residency training program from 1985 through 1992. In 1990, he founded the Yale Medical School Neuroscience Clinical Clerkship, which he directed for 15 years. He also served as president of the American Epilepsy Society and has received numerous awards for his work. Mattson still writes an occasional review or pertinent case report as well as mentoring epilepsy fellows.
- **Christopher Benjamin, PhD**, completes cognitive neuropsychological evaluations for our patients with epilepsy. His research focuses on improving the lives of these patients. He has published frequently cited articles describing and validating new ways of mapping the brain's language and visual systems using functional MRI (fMRI). He regularly speaks on clinical fMRI at national and international conferences, and is co-chair of the International Neuropsychological Society's Epilepsy Special Interest Group. His ongoing projects focus on standardizing a multilingual battery for language mapping; improving training in clinical fMRI; and clarifying how training in language fMRI currently takes place and can be improved.

• Standardization of presurgical language fMRI in Greek population: Mapping of six critical regions. *Brain & Behavior*, 2022.

- **Benjamin Tolchin, MD, MS**, is the director of the Yale New Haven Health Center for Clinical Ethics. He studies the outcomes and equity of health care and ethics policies and programs. He also conducts research related to the treatment of functional or psychogenic seizures. Tolchin's research has been recognized with Young Investigator Awards from the American Clinical Neurophysiology Society and the American Epilepsy Society (AES); the Rebecca Goldberg Kaufman Clinical Award in Ethical Neuropsychiatry from the American Epilepsy Society; the Emerging Leaders Fellowship from the American Academy of Neurology (AAN); the Epilepsia Clinical Science Prize from the International League Against Epilepsy (ILAE); and the Office of Health Equity Research (OHER) Award for Yale Research Excellence. He is a Fellow of the AAN and serves on the AAN's Guidelines Subcommittee and Ethics, Law, and Humanities Committee. Tolchin currently leads work groups developing AAN guidelines for the management of functional seizures and an AAN/AES/Epilepsy Foundation position statement on seizures and driving.

- Work difficulties, work restrictions, and disability benefits in people with functional seizures: A survey study. *Epilepsy & Behavior Reports*, 2023.
- A Hub and Spoke Model for Improving Access and Standardizing Ethics Consultations Across a Large Healthcare System. *American Journal of Bioethics*, 2022.
- Visually sensitive seizures: An updated review by the Epilepsy Foundation. *Epilepsia*, 2022.

- **Adithya Sivaraju, MD, MHA**, oversees the cortical stimulation mapping program at Yale. In particular, he studies seizure onset networks by using direct cortical stimulation. He is also the director of the Post-Acute Symptomatic Seizure (PASS) Clinic of the Yale Comprehensive Epilepsy Center, and a national co-investigator of the recently funded multicenter effort (Post-Acute Symptomatic Seizure Investigation and Outcome Network, or PASSION) to study epileptogenesis and management of antiseizure medications in patients with acute brain injury.

- Intracranial Entrainment Reveals Statistical Learning across Levels of Abstraction. *Journal of Cognitive Neuroscience*, 2023.
- Impact of acute symptomatic seizures and their management on patient-reported outcomes after stroke. *Epilepsy and Behavior*, 2023.
- Do acute EEG findings add to clinical features in predicting outcomes after status epilepticus and acute symptomatic seizures? *Epilepsy and Behavior*, 2023.



The Yale Comprehensive Epilepsy Center frequently collaborates with colleagues from other departments. Dr. Hirsch (left) discusses a case with Eyiyeimi Damisah, MD, assistant professor, neurosurgery; assistant professor, neuroscience (right).



► **Hamada Hamid Altalib, DO, MPH**, directs the Epilepsy Clinical Outcomes Research program. He has a particular interest in quality of life and neuropsychiatric outcomes, as well as neurology health services from a population perspective. He directs the VA Connecticut Epilepsy Center of Excellence and is the Clinical Informatics Lead on the National Neurology Network Adequacy for VA Community Care program. He is also the Research Informatics Lead on the Human Epilepsy Project, a multicenter prospective cohort study. Altalib is the primary investigator of a national veterans' functional seizures cohort study and a co-investigator on several post-traumatic epilepsy cohort studies.

- Mood and Anxiety Disorders and Suicidality in Patients With Newly Diagnosed Focal Epilepsy: An Analysis of a Complex Comorbidity. *Neurology*, 2023.
- Dorsal bed nucleus of stria terminalis in depressed and nondepressed temporal lobe epilepsy patients. *Epilepsia*, 2022.
- Structural Neuroimaging in Adults and Adolescents with Newly Diagnosed Focal Epilepsy: The Human Epilepsy Project. *Neurology*, 2022.

► **Jeremy Moeller, MS, MSc**, researches various aspects of medical education, with a specific interest in assessment and the role of technology in neurology education. Moeller began and currently maintains the wildly popular Neurology Exam Prep Podcast, and developed a set of instructional videos on EEG interpretation that have been viewed more than 1 million times on YouTube. The set is used as part of the core curriculum in several neurology residency programs across the country. Moeller is co-chair of the American Epilepsy Society's Assessments and Examinations Committee, which is responsible for the Epilepsy Fellowship In-Service Training Examination (EpiFITE) and the Epilepsy Self-Assessment Examinations (SAEs).

- Neurology Education in 2035: The Neurology Future Forecasting Series. *Neurology*, 2023.
- Jeremy Moeller, Quality and Validity Evidence for a National In-Training Examination for Epilepsy Fellows. *Neurology: Education*, (forthcoming).

► **Aline Herlopian, MD**, studies pharmacokinetics, pharmacodynamics, and interactions of purified formulations of cannabidiol and cenobamate in patients with and without clobazam and other antiseizure medications. She completed her textbook, *Epilepsy Surgery: A Practical Case-Based Approach*, intended for residents, fellows, and junior faculty, with the goal of expanding knowledge of epilepsy surgery. Herlopian has presented and chaired symposia and workshops at the annual ACNS meetings for the past three years. She has investigated the role of high-frequency oscillations for the past year with Hitten Zaveri.

- *Epilepsy Surgery: A Practical Case-Based Approach*, 1st ed. New York: Springer Nature, 2023.

► **Christopher Traner, MD, MHS-Med Ed**, has an interest in neurology education; his master's thesis focused on neurology trainees' utilization patterns of online educational resources. He is currently the associate director of the epilepsy and clinical neurophysiology fellowship programs, and has a strong interest in mentorship and development.

- Insights From Chronic ECoG by RNS. *Journal of Clinical Neurophysiology*, 2023.



Offering a wide variety of treatment options for adult and pediatric patients with epilepsy, the Yale Comprehensive Epilepsy Center works with patients on an individualized treatment plan.

► **Maria Kristina (Inna) Dorotan, MD**, joined the division in July 2023. She completed her epilepsy and clinical neurophysiology fellowship at Brigham and Women's Hospital in Boston. She has a strong interest in clinical epilepsy, and plans to expand our capacity to care for patients with epilepsy who could become pregnant.

- Ictal Pain Mimicking Renal Colic: From Urology to Neurology. *Neurology*, 2023.

► **Bogdan Patedakis Litvinov, MD**, joined the division in July 2023. His focus is primarily clinical; he divides his time between the neurology hospitalist service at Bridgeport Hospital and the EEG services within the Yale New Haven Hospital system. He is a graduate of the Yale neurology residency program and of the epilepsy and clinical neurophysiology fellowship programs.



## CLINICAL

Each year, we continue to care for more than 4,000 patients with epilepsy or possible epilepsy via our outpatient services in New Haven, Guilford, and Stamford, with plans to expand to North Haven, Bridgeport, Milford and/or Greenwich soon. Our EEG services include routine outpatient EEGs; home video/EEG monitoring; inpatient video/EEG/EKG/O2 monitoring in both ICUs and in our adult (eight beds) and pediatric (three beds) epilepsy monitoring units with 24/7 live monitoring for safety; and advanced automated seizure detection and trending to aid review and timely recognition of important changes in brain activity. We perform more than 5,000 prolonged (more than 12 hours) video/EEG studies each year, with this volume continuing to grow. We now provide EEG services throughout most network hospitals, recently expanding to Greenwich, Bridgeport, Westerly, and Lawrence & Memorial Hospitals. We rolled out the use of new rapid EEG technology, allowing interpretable EEGs within six minutes at most of these sites as well. This technology has been used more than 400 times at YNHHS. We also offer evoked potential (somatosensory, visual, and auditory) and participate in multiple clinical trials of medications and devices.

We continue to offer every type of epilepsy treatment, from medications and dietary therapies (with a full-time epilepsy dietitian) to traditional resective surgery and neuromodulation—including vagus nerve stimulation, brain-responsive neurostimulation, and deep brain stimulation. We offer minimally invasive epilepsy surgery evaluations, including the use of robotically placed depth electrodes (also known as stereo EEG), and such minimally invasive treatments as laser ablations. We continue to be a Level 4 Comprehensive Epilepsy Center (the highest level); and we offer specialized services in psychiatry, neuropsychology, social work, nutrition, and all other aspects of caring for people with epilepsy. We work very closely with our colleagues in neurosurgery, pediatric neurology, neuroradiology, psychology, and psychiatry.

### LOCATIONS:

Our clinics are located in New Haven, Stamford, Guilford, Bridgeport, and North Haven.

### CLINICAL TRIALS:

We always offer patients the opportunity to participate in several clinical trials, including trials of medications and devices.



The continued expansion of epilepsy and EEG services throughout the region has enabled the Division to reach more patients and implement more cutting-edge technology.

## CLINICAL PROVIDERS:

**Lawrence J. Hirsch, MD**, chief, division of epilepsy and EEG; professor, neurology; co-director, Yale Comprehensive Epilepsy Center; co-director, Critical Care EEG Monitoring Program; program director, clinical neurophysiology ACGME fellowship; program director, epilepsy ACGME fellowship; co-program director, critical care EEG fellowship

**Emily J. Gilmore, MD, MS**, associate professor, neurology; medical director, neurosciences intensive care unit; co-director, neurotrauma; director, Neuromonitoring Program; co-director, Critical Care EEG Program; co-program director, critical care EEG fellowship

**Aline Herlopian, MD**, assistant professor, neurology; medical director of EEG services (including home video/EEG); director of clinical trials

**Imran Quraishi, MD, PhD**, associate professor, neurology; co-director, Center for Neurostimulation in Epilepsy; director, electric source imaging and magnetoencephalography programs.

**Adithya Sivaraju, MD, MHA**, associate professor, neurology; director, Post-Acute Symptomatic Seizure (PASS) Clinic; director, Cortical Stimulation and Mapping Program.

**Jeremy Moeller, MD, MSc**, associate professor, neurology; neurology residency program director; vice-chair of education; departmental program director, master of health science degree in medical education

**Hal Blumenfeld, MD, PhD**, the Mark Loughridge and Michele Williams Professor of Neurology and Professor of Neuroscience and of Neurosurgery; director, Yale Clinical Neuroscience Imaging Center (CNIC)

**Richard H. Mattson, MD**, professor emeritus, neurology; director emeritus, Yale Comprehensive Epilepsy Center; adjunct professor, nursing; co-chair and advisor, J. Kiffin Penry Epilepsy MiniFellowships

**Hamada Hamid Altalib, DO, MPH**, associate professor, neurology and psychiatry; chief of neurology at the West Haven VA Medical Center; track director, health informatics, online executive MPH program

**Benjamin Tolchin, MD, MS**, associate professor, neurology; inaugural director, Yale New Haven Health Center for Clinical Ethics

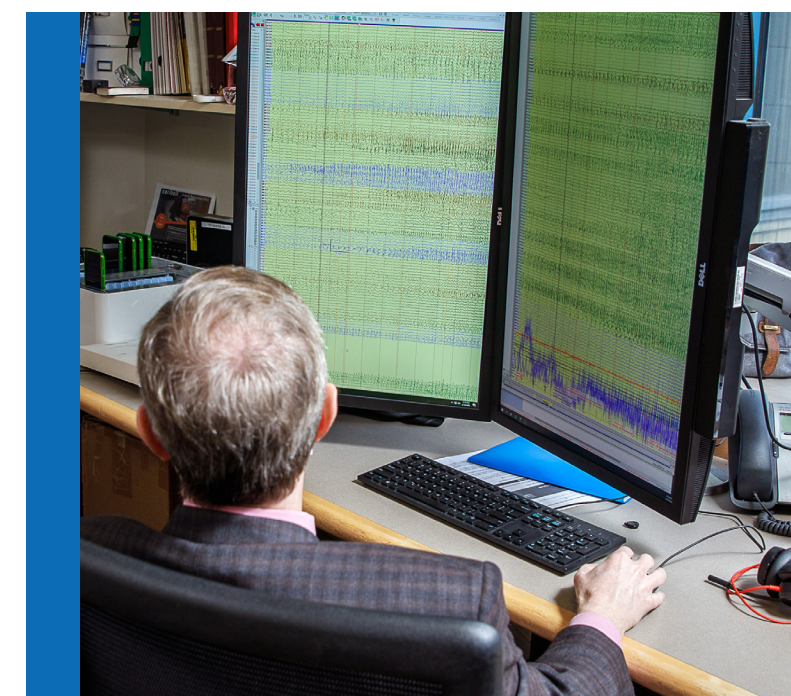
**Christopher Traner, MD, MHS-Med Ed**, assistant professor, neurology; associate fellowship director, clinical neurophysiology ACGME fellowship; associate fellowship director, epilepsy ACGME fellowship

**Maria Kristina Dorotan, MD**, assistant professor, neurology

**Bogdan Patedakis Litvinov, MD**, assistant professor, neurology

**Christopher Benjamin, PhD**, neuropsychologist; associate professor, neurology, neurosurgery, psychology, and radiology & biomedical imaging

**Sung-Min Park, MD, PhD**, assistant professor, neurology; director, evoked potentials



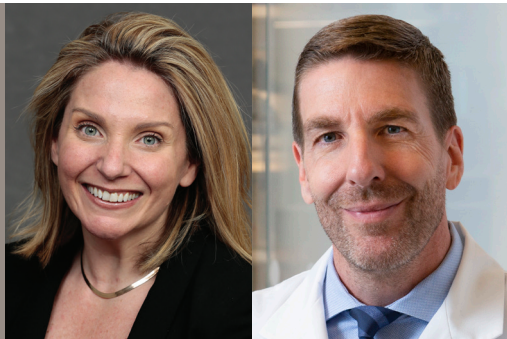
Dr. Hirsch analyzes an EEG.

## FELLOWSHIP TRAINING

In addition to teaching EEG and epilepsy care to neurology residents, we continue to train five epilepsy fellows each year. Hirsch and Traner oversee the two ACGME fellowships (two clinical neurophysiology fellows and two epilepsy fellows); and Hirsch and Gilmore oversee the nation's longest-running critical care EEG fellowship (one fellow per year).



# Movement Disorders



**VERONICA SANTINI, MD, MA**  
*clinical chief*

**CLEMENS SCHERZER, MD, MBA**  
*academic chief*

THE **YALE COMPREHENSIVE MOVEMENT DISORDERS CENTER** DELIVERS EXCEPTIONAL HOLISTIC PATIENT-CENTERED CARE DEDICATED TO IMPROVING THE LIVES OF PEOPLE WITH MOVEMENT DISORDERS. THE DIVISION BOASTS WORLD-CLASS FACULTY MEMBERS COMMITTED TO EDUCATING THE NEXT GENERATION OF SUBSPECIALTY EXPERTS, AS WELL AS A ROBUST RESEARCH PROGRAM THAT ADVANCES UNDERSTANDING OF MOVEMENT DISORDERS AND LOOKS FOR EVIDENCE-BASED TREATMENTS THAT WILL LEAD TO A CURE.

## RESEARCH

- ▶ Yale School of Medicine has the unique opportunity to maintain four scientific research programs funded by the Aligning Science Across Parkinson's (ASAP) Initiative of the Michael J. Fox Foundation for Parkinson's Research. This initiative works toward translational discoveries in Parkinson's disease (PD) treatments by supporting interdisciplinary teams. The lead investigators of Yale's ASAP programs include:
- ▶ The **Neurogenomics Lab** led by Clemens Scherzer, MD, MBA, uses genomics and computational biology across scales and dimensions—from single brain cells to spatial, dynamic, and genetic transcriptomics to patient populations— to decode, simulate, and reprogram the genetic software of patients' brain cells.

- Safety and efficacy of venglustat in GBA1-associated Parkinson's disease: an international, multicentre, double-blind, randomized, placebo-controlled, phase 2 trial. *Lancet Neurology*, 2023.
- Circular RNAs in the human brain are tailored to neuron identity and neuropsychiatric disease. *Nature Communications*, 2023.
- Association Between Use of Any of the Drugs Prescribed in Norway and the Subsequent Risk of Parkinson Disease: A Drug-Wide Association Study. *Neurology*, 2023.

- ▶ **Clemens Scherzer, MD, MBA**, is the inaugural director of the Stephen and Denise Adams Center for Parkinson's Disease Research at Yale School of Medicine; the academic chief of the Movement Disorders division of the Department of Neurology; and the incoming Stephen and Denise Adams Professor of Neurology.

Scherzer is a pioneer in precision neurology; he uses massive data streams from genomes, transcriptomes, and large patient cohorts to develop predictive, precise, and preventive health care for patients with PD. His research led to the discovery of genetic drivers, biomarkers, and therapeutic targets for the disease, and will be instrumental in upcoming clinical trials.

- ▶ The **Zhang Lab** investigates the immune network of the central nervous system and the underlying causes of inflammatory neurologic diseases, including PD.

**Le Zhang, PhD**, is assistant professor of neurology and of neuroscience at Yale School of Medicine.

The **Zhang** and **Hafler Labs** are investigating the immune system's role in the initiation and progression of disease in PD. Recent reports provided early suggestive evidence that in addition to the immune system's potential to amplify neurodegeneration, a T cell-mediated autoimmune process may be involved in triggering pathology specific to PD. As PD has a strong association with the HLA-DR haplotype commonly seen in autoimmune disease—in addition to new findings of autoimmunity to  $\alpha$ -synuclein and the role of the microbiome in disease models—the lab accepts the working hypothesis that PD is initiated by an autoimmune event in a subset of patients.

The labs will further investigate the hypothesis that progression of PD pathology is initiated and/or abetted by an autoimmune process involving  $\alpha$ -synuclein-specific T cell activation triggered by gut microbiome dysbiosis, followed by neuroimmune interactions that establish PD in the brain. The labs will integrate neuroimmunology, single-cell genomics, mouse models, and microbiome approaches in addressing this hypothesis. Investigators will examine whether T cell-mediated autoimmunity initiates neurodegeneration in PD, and whether these early immunological processes converge on classic archetypes of neurodegeneration. Comparison of the blood, CSF, and gut immune populations affected in PD and prodromal PD will determine the role of the gut-brain axis in regulating microbial antigen-specific immune responses, and may allow researchers to develop biomarkers predicting response to therapy. This work will produce an unprecedented map (the interactome) of the neuroimmune interactions disturbed in PD; identify rational targets for clinical trials; and pave the way for the development of new treatments.

- ▶ The **DeCamilli Lab** focuses on mechanisms underlying the dynamics and traffic of intracellular membranes, with emphasis on membrane transport reactions involved in neurotransmission.

**Pietro De Camilli, MD**, is the John Klingenstein Professor of Neuroscience and professor of cell biology; investigator of the Howard Hughes Medical Institute; director of the Program in Cellular Neuroscience, Neurodegeneration and Repair; and director of the Kavli Institute for Neuroscience at the Yale School of Medicine.

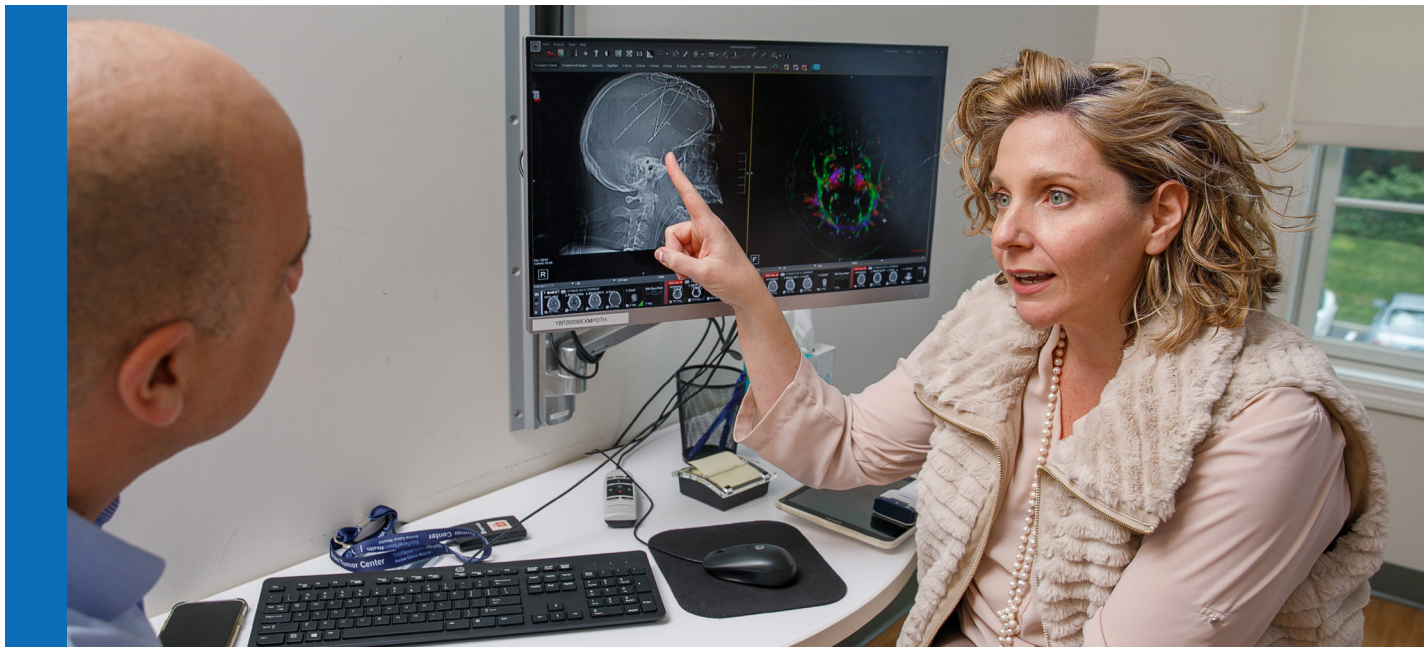
The De Camilli Lab will use the tools of cell biology to elucidate the function of the many identified genes that cause or increase the risk of PD, as well as the mechanisms through which their mutations lead to disease. Among the mutations that cause or increase susceptibility to PD, some are known or thought to impair the function of endolysosomes or mitochondria. Although these mutations may promote disease via independent mechanisms, growing evidence points to important cross-talks between endolysosomes and mitochondria with various effects on bioenergetics, mitochondrial quality control, and the innate immune system. Investigators will use a multidisciplinary approach to investigate the cell biology of selected PD-associated genes that act in the endocytic pathway and lysosomes. These include the genes encoding synaptotagmin 1, *LRRK2* and *VPS13C*. The lab will define how their dysfunction leads to PD, including testing the hypothesis that disruption of mechanisms linking the endocytic system to mitochondrial physiology may play a role in the pathogenesis of PD. By identifying cellular processes whose dysfunction leads to PD susceptibility, the lab's research will support translation of PD genetics into new opportunities for successful treatment.

- ▶ The **Biederer Lab** focuses on the cognitive impairments in patients with PD by exploring the vulnerability of cell types and circuits in the neocortex.

**Thomas Biederer, PhD** is associate professor of neurology.

The Biederer Lab seeks to understand cognitive impairments in PD by elucidating the vulnerability of cell types and circuits in the neocortex implicated in the pathogenesis of the disease. Biederer will lead the work of a strong interdisciplinary team to clarify these mechanisms by defining the progression of network pathology through longitudinal in vivo imaging of neuronal activity and analysis of synaptic dysfunction; mapping gene expression patterns that mark vulnerable and protected cell types; and using mathematical modeling to synthesize the roles of cellular, synaptic, and network vulnerabilities in the progression of the disease, predicting and experimentally validating network manipulations to correct aberrant cortical function. These experiments will determine to what extent PD causes progressive cognitive deficits through damage to vulnerable neurons and synapses as well as disruption of cortical network connectivity. These findings will open new avenues to ameliorate cognitive decline in PD.





Drs. Zibly (Left) and Santini (Right) collaborate at the Movement Disorders clinic location in Guilford, Conn.

**The Movement Disorders division is also proud of the remarkable ongoing work of the following division researchers:**

- **Veronica Santini, MD, MA**, associate professor of neurology, clinical chief of movement disorders, and director of the Comprehensive Parkinson Disease Program has a niche specialization in the treatment of autonomic dysfunction and multidisciplinary approaches, and is a demonstrated leader in the care of the most complex conditions, including Huntington disease, adult-onset genetic ataxias, multiple system atrophy and other atypical parkinsonian disorders, and advanced PD. As Santini expands integrated clinical trial and research opportunities in the movement disorders center, she maintains her scholarly focus on clinical excellence driven by social justice and equitable health care; patient-reported outcomes of complementary therapies; and advancing therapeutics in the clinical space. She is internationally recognized as a medical educator; she focuses on instructing medical students in the art of physical examination and enhancing the medical student pipeline into neurology.
- **Sule Tinaz, MD, PhD**, is assistant professor of neurology and a clinician-scientist with multiple NIH funded grants whose research contributes to a mechanistic understanding of the neurodegenerative process in PD and to the development of promising novel therapeutics. Using MRI and network analyses, she demonstrates the structural and functional changes in specific brain networks and elucidates their relation to disease severity and to motor and non-motor symptoms in PD, while developing non-pharmacological interventions for symptom control, disease modification, and neuroprotection. Working closely with collaborators across Yale and in the community, Tinaz collaborates on PD research to apply the benefits of her work to the quality of life of patients with PD.
- The **Tinaz Lab** focuses on the investigation of motor, behavioral, and cognitive dysfunction in movement disorders to identify novel therapeutic targets, biomarkers of disease progression, and brain-behavior changes using multimodal neuroimaging techniques.

- Mental imagery content is associated with disease severity and specific brain functional connectivity changes in patients with Parkinson's disease. *Brain Imaging and Behavior*, 2023.
- Magnetic resonance imaging modalities aid in the differential diagnosis of atypical parkinsonian syndromes. *Frontiers in Neurology*, 2023.
- Characterization of Early Stage Parkinson's Disease From Resting-State fMRI Data Using a Long Short-Term Memory Network. *Frontiers in Neuroimaging*, 2022.

► **Jesse M. Cedarbaum, MD**, is an instructor in neurology and adjunct professor of psychiatry. Cedarbaum and his team of clinical researchers collaborate with the Hafler and Zhang Labs to investigate the clinical and immunological aspects of the earliest stages of PD. Cedarbaum spent the majority of his career working in the pharmaceutical industry, leading teams of scientists to develop therapeutic agents for neurodegenerative (Parkinson's disease, Alzheimer's disease, ALS, peripheral neuropathies, and spinocerebellar ataxias) and retinal disorders (age-related macular degeneration and diabetic retinopathy). He has also led efforts to develop and apply novel rating scales, biomarkers, and digital health technologies. Cedarbaum is a recognized leader in industry-academic collaborations, having served as the chair of the Industry Scientific Advisory Board (ISAB) of the Michael J. Fox Foundation-sponsored Parkinson's Progression Markers Initiative, and as the industry co-chair of the Critical Path Institute's Critical Path for Parkinson's Consortium. He currently chairs the scientific advisory committee of the Edmond J. Safra Accelerating Clinical Treatments for Parkinson's Disease (ACT-PD) Initiative.

► **Sara Schaefer, MD, MHS**, assistant professor of neurology, is the definition of a clinician-educator, and her contributions to medical education are impressive. As the associate program director of the adult neurology residency program, she restructured the didactic curriculum with a focus on advanced clinical reasoning and communication, asynchronous learning, and well-being; and drew up individualized formative assessments. She chairs the clinical competency committee and serves as a formal mentor for multiple residents each year. Her educational philosophy underlies her aspiration to change the methodology of teaching about movement disorders.

Schaefer was part of a national project to develop standardized milestones for movement disorders fellows. She developed numerous educational tools, including the International Parkinson and Movement Disorder Society's MDS podcast (now serving as its deputy editor) and nationally recognized modules, using a novel algorithm to teach movement disorder phenomenology. Other e-learning tools that Schaefer developed include the "Neurology Nuts and Bolts: Constructing your Career" podcast and the Grey Matter Project virtual high school neuroscience curriculum.

- Rethinking our Approach to Educating New Learners in Movement Disorders Phenomenological Diagnosis. *Movement Disorders*, 2023.
- Viewpoint on Milestones for Fellowship Training in Movement Disorders. *Movement Disorders*, 2022

► **Brian Koo, MD**, is an associate professor of neurology with clinical and research expertise in the aspects of sleep medicine that cross over into neurology. He is particularly interested in the sleep-related movement disorders. Koo's primary research interest is elucidating the underlying pathophysiology of restless legs syndrome (RLS), and he is currently conducting research funded by the Department of Defense to assess melanocortin hormone levels in the cerebrospinal fluid of patients with RLS. He is also involved in a Michael J. Fox Foundation study to assess autoimmunity and the microbiome in patients with rapid eye movement (REM) sleep behavior disorder.

► **Nigel Bamford, MD**, is an associate professor of pediatrics and neurology; associate professor of cellular and molecular physiology and director of the Pediatric Movement Disorders Clinic. Bamford uses optical, electrophysiological, biochemical, and behavioral experiments to investigate the mechanisms underlying synaptic function and plasticity in the basal ganglia of genetically modified mice. His recent research has been focused on to the impact of dopamine deficiency and excess on striatal function. His experiments have demonstrated that motor and cognitive functions depend on the coordinated interactions between dopamine and acetylcholine at striatal synapses. These results suggest that pharmacological treatments which stabilize the expression of hyperpolarization-activated cation channels may improve acetylcholine-dopamine reciprocity and motor function in PD. The mechanisms discovered may encode rational and irrational behaviors; underlie a variety of movement disorders; and influence responses to stress.

The **Bamford Lab** focuses on the mechanisms underlying synaptic function and plasticity in the basal ganglia of genetically modified mice.



► **Sreeganga Chandra, PhD** is an associate professor of neurology and neuroscience who investigates familial genes for PD. The Chandra Lab has recently focused on endolysosomal genes—in particular, how they influence synapse function and lead to neurodegeneration. The Lab uses different approaches to investigate these questions in mouse models and stem cell-derived neurons.

► The **Chandra Lab** focuses on synaptic dysfunction in neurodegenerative diseases.

- Dopamine transporter and synaptic vesicle sorting defects underlie auxilin-associated Parkinson's disease. *Cell Reports*, 2023.
- Pharmacological Mechanism of the Non-hallucinogenic 5-HT<sub>2A</sub> Agonist Ariadne and Analogs. *ACS Chemical Neuroscience*, 2023.
- $\alpha$ -Synuclein Pathology and Reduced Neurogenesis in the Olfactory System Affect Olfaction in a Mouse Model of Parkinson's Disease. *Journal of Neuroscience*, 2023.
- $\alpha$ -Synuclein colocalizes with AP180 and affects the size of clathrin lattices. *Journal of Biological Chemistry*, 2023.

► **Hae-Young Hawong, DO, PhD**, assistant professor of neurology, is the newest addition to the movement disorders team as of September 2023. Hawong attended Michigan State University, where she earned a BS in biochemistry and molecular biology, as well as a BS in mathematics prior to completing a physician-scientist DO/PhD program at the same institution. Hawong worked on parkin-mediated mitophagy in animal mitochondrial permeability transition pore (MPTP) models in her PhD studies. She recently completed a movement disorders fellowship at Oregon Health and Science University, where she investigated the electrophysiology markers of levodopa-induced dyskinesia (LID) by using EEG to look at the power spectral density (PSD) of gamma oscillation for LID—work that she will continue alongside her clinical practice at Yale.



Sule Tinaz, MD, PhD, (Foreground) collaborates with Jesse Cederbaum, MD, (Background)

CLINICAL

Adams Comprehensive Parkinson Disease and Movement Disorders Care Center

The Adams Comprehensive Parkinson Disease Center at YSM is committed to delivering care that improves the human experience of those with PD and other movement disorders. The center provides transformative care for the most complex patients with PD, while working in close collaboration with the Adams Center for Parkinson Disease Research to advance understanding of and find the cure for PD.

The Adams Center offers holistic and complementary care, medication management, and advanced therapeutics. The grand opening of the North Haven Movement Disorders Center this year allows for further integration of multidisciplinary experts with clinical research participation. The implementation of novel nursing navigation and education programs supports patients' understanding of brain health and reduces barriers to care.

This program includes comprehensive patient self-reporting and personalized coaching; nursing education and tailored resource referrals; streamlined engagement in research opportunities; and follow-up nursing encounters that encourage understanding and compliance with medical treatment plans. Timely follow-up with our advanced practice provider further guarantees patient education and adherence. Our weekly multidisciplinary clinic provides time and expertise to patients in coping with issues that most often affect their daily lives. In addition to individualized resource procurement, our social worker expertly explores patients' psychosocial burdens; and our specialized neurorehabilitation team designs treatment plans to help meet their functional needs.

To further enrich patients' experience, we have developed the EmPOWERed with Parkinsons Program, a holistic program delivering evidence-based complementary therapies. Serving all patients in the Greater New Haven community, we aim to offer free or subsidized programming that allows participants to take ownership of their lives through newly developed ADA- and transportation-accessible support groups; bilingual exercise programs; art and music therapies; and mindfulness and meditation programs. Participants can take advantage of a monthly calendar of events at the Center, and enjoy activities in their local communities in partnership with community foundations.

Our team has specialized expertise in the full range of movement disorders, including PD and atypical parkinsonian disorders, tremor, tic, dystonia, chorea, ataxia, myoclonus, cognitive impairment, Huntington disease, Wilson disease, gait disorders, restless leg syndrome, and other autoimmune and genetic movement disorders. We executed more than 7,000 comprehensive treatment plans this year. Care is further optimized in such specialized clinics as the Memory and Movement Aging Clinic; the Wilson Disease Association Center of Excellence (one of seven nationwide); and the Yale Restless Legs Syndrome Program (one of 10 RLS Foundation Quality Care Centers in the United States).

In addition, we continue to offer advanced therapies. This year, the team welcomes Zion Zibly, MD, MBA, an internationally recognized functional neurosurgeon who will co-lead our comprehensive deep brain stimulation program and MR-guided focused ultrasound therapy; Yale is the only institution in the state to offer this therapy. Likewise, our specialists administered therapeutic botulinum toxins for dystonia, spasticity, hemifacial spasm, tremor, sialorrhea, and hyperhidrosis to more than a thousand patients. Close collaboration with experts in the fields of behavioral neurology, neuropsychology, sleep medicine, psychiatry, autonomics, radiology, neurogenetics, neuro-ophthalmology, and pharmacology continue to improve compassionate care alongside cutting-edge research.

**LOCATIONS:** The division provides interdisciplinary care at Yale New Haven Hospital, Guilford, North Haven, Greenwich, and the West Haven VA.

**CLINICAL TRIALS:** The division combines basic science, translational, and clinical research working toward biomarker discovery; identifying markers of disease progression; and evaluating behavioral and pharmacologic interventions in movement disorders.



**PROVIDERS:**

- Veronica Santini, MD, MA**, clinical division chief, movement disorders; inaugural director, Yale Comprehensive Parkinson Disease Care Center; associate professor, neurology
- Clemens Scherzer, MD, MBA**, academic division chief; the Stephen and Denise Adams Endowed Professor in Parkinson's Disease Research; professor, neurology
- Sule Tinaz, MD, PhD**, assistant professor, neurology
- Amar Patel, MD**, assistant professor, neurology; director, YNHH Botulinum Toxin Clinic
- Sara Schaefer, MD, MHS**, assistant professor, neurology; associate program director, neurology; fellowship director, movement disorders
- Ana Vives-Rodriguez, MD**, assistant professor, neurology; director, Memory and Movement Aging Clinic
- Hae-Young Hawong, MD, PhD**, assistant professor, neurology
- Alice Rusk, MD**, associate professor, neurology; chief of neurology, Greenwich Hospital; medical director, Yale Medicine Neurology for Greenwich and Stamford
- Brian Koo, MD**, associate professor, neurology; director, Yale Restless Legs Syndrome Program; director, Sleep Laboratory of the VA Connecticut Healthcare System
- Jesse Cedarbaum, MD**, adjunct professor, neurology; director, movement disorders clinical trials program
- Nigel Bamford, MD**, associate professor, pediatrics and neurology; associate professor of cellular and molecular physiology; director, Pediatric Movement Disorders Clinic; chief, section of pediatric neurology
- Diana Richardson, MD**, assistant clinical professor, neurology; director, National VA Parkinson's Disease Consortium, West Haven
- Zion Zibly, MD, MBA**, associate professor, stereotactic & functional neurosurgery; director, Neurosurgical Cancer Pain, neurosurgery; director, Center of Neuromodulation, neurosurgery

**FELLOWSHIP TRAINING**

Yale is a premier training institution for two-year clinical and research fellows in movement disorders who receive individually tailored instruction. In addition to extensive training in common and rare movement disorders, multidisciplinary care, and advanced therapies, the fellows receive pediatric, autonomic, vocal cord dysfunction, electromyography, and neurocognitive training. Opportunities for clinical and translational research, medical education, and independent scholarship are available to all fellows.





# Neurocritical Care + Emergency Neurology



GUIDO FALCONE, MD, SCD, academic chief



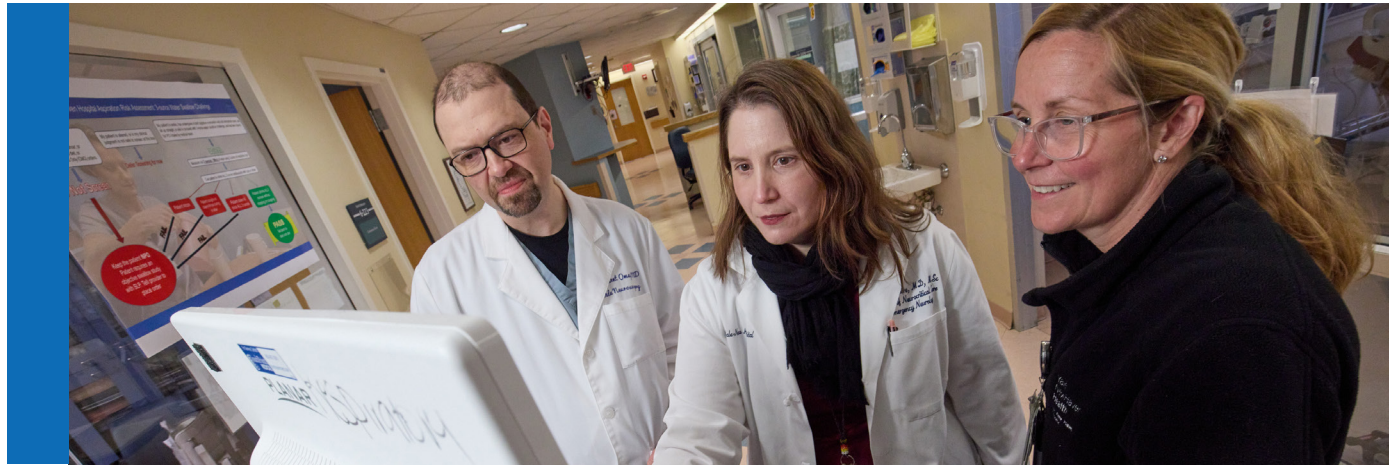
EMILY J. GILMORE, MD, MS, clinical chief

THE DIVISION OF NEUROCRITICAL CARE AND EMERGENCY NEUROLOGY IS STAFFED BY A MULTIDISCIPLINARY TEAM DEDICATED TO IMPROVING THE LIVES OF PATIENTS SUFFERING FROM ACUTE NEUROLOGICAL INJURIES. THE YALE NEUROSCIENCE INTENSIVE CARE UNIT'S GOAL IS TO DELIVER EXCEPTIONAL CLINICAL CARE AND CUTTING-EDGE CLINICAL RESEARCH TO EVERY PATIENT IN ORDER TO REMAIN A WORLD-CLASS CENTER OF ACUTE NEUROSCIENCE.

## RESEARCH

- ▶ **Emily Gilmore, MD, MS**, is an associate professor of neurology; medical director of the neurosciences intensive care unit; co-director of neurotrauma; director, Neuromonitoring Program; co-director, Critical Care EEG Program; and co-program director, critical care EEG fellowship. Gilmore has built a comprehensive, multidisciplinary program to address a range of patient care needs, from acute settings through rehabilitation and recovery. She has made Yale a leading center for advanced multimodal monitoring, exceptional clinical care, and pioneering research.
- ▶ **The Gilmore Lab** uses advanced invasive and noninvasive technology, including continuous electroencephalogram monitoring, to identify signatures of metabolic stress. These procedures are done to obtain patient-derived thresholds of bioenergetic failure, with particular focus on traumatic brain injuries (TBIs). The lab's primary task is the development of targeted interventions with the potential to prevent secondary damage to neurons and improve patient outcomes across a wide range of acute brain injuries.

- Systematic Evaluation of Research Priorities in Critical Care Electroencephalography. *Journal of Clinical Neurophysiology*, 2023.
- Practice Standards for the Use of Multimodality Neuromonitoring: A Delphi Consensus Process. *Critical Care Medicine*, 2023.
- Developing a Standardized Approach to Grading the Level of Brain Dysfunction on EEG. *Journal of Clinical Neurophysiology*, 2023.
- Validation of the rCAST score and comparison to the PCAC and FOUR scores for prognostication after out-of-hospital cardiac arrest. *Resuscitation*, 2023.



Dr. Gilmore (Center) fills a number of research, clinical, and education roles at Yale.

- ▶ **Guido Falcone, MD, SCD**, is an associate professor of neurology and the director of clinical research in neurocritical care. Falcone is internationally recognized for his expertise in population genetics and big data, and has won numerous awards for his work in genetic epidemiology as it pertains to acute brain injury. He leads the Yale Longitudinal Study of Acute Brain Injury for the Division of Neurocritical Care and Emergency Neurology.

- ▶ **The Falcone Lab** integrates clinical, genomic, and neuroimaging data to identify novel pathways and therapeutic targets related to cerebrovascular disease, brain health, and aging.

- Polygenic Susceptibility to Hypertension and Blood Pressure Control in Stroke Survivors. *Neurology*, 2023.
- Polygenic Susceptibility to Hypertension and Cognitive Performance in Middle-aged Persons Without Stroke or Dementia. *Neurology*, 2023.
- Whole-Exome Sequencing Analyses Support a Role of Vitamin D Metabolism in Ischemic Stroke. *Stroke*, 2023.
- Association of Chronic Kidney Disease With Risk of Intracerebral Hemorrhage. *JAMA Neurology*, 2023.

- ▶ **Nils Petersen, MD, PhD**, is an associate professor of neurology and director of the Yale Cerebrovascular Lab (YCVL). Petersen's clinical and research interests lie in using innovative neuromonitoring modalities to understand blood flow regulation. Through working with colleagues in neurology, neurosurgery, and neuroradiology, he is helping to build the infrastructure for continuous cerebrovascular autoregulatory monitoring in critically ill patients with neurovascular disorders

- ▶ **The Petersen Lab** utilizes neuromonitoring methods and bedside data processing technology to develop personalized treatments and improve outcomes following acute neurologic injury.

- Impact of Therapeutic Interventions on Cerebral Autoregulatory Function Following Severe Traumatic Brain Injury: A Secondary Analysis of the BOOST-II Study. *Neurocritical Care*, 2023.
- Association Between Hemodynamics After Endovascular Thrombectomy and Cerebral Edema Development (S4.008). *Neurology*, 2023.
- Investigating the Relationship Between Oximetry Trends During Endovascular Therapy and Neurological Worsening for Patients with Acute Ischemic Stroke (S24.006). *Neurology*, 2023.
- Hypoperfusion intensity ratio is correlated to infarct growth rate parameters when modelled as a logistic growth function (P6-5.022). *Neurology*, 2023.

- ▶ **Rachel Beekman, MD**, is an assistant professor of neurology and fellowship director of neurocritical care. Beekman's lab focuses on valuation of optimal blood pressure goals after cardiac arrest with the use of near-infrared spectroscopy for continuous autoregulation monitoring. She was awarded an institutional KL2 grant that began in March 2022; she also has an industry-sponsored award. Beekman collaborates with the Yale Positron Emission Tomography (PET) Research Center to better understand changes in synaptic density in patients who survive cardiac arrest.

- ▶ **The Beekman Lab** uses multimodality monitoring to identify novel physiologic biomarkers and individualized treatment approaches to improve outcomes in patients after cardiac arrest.

- Brain imaging after cardiac arrest. *Current Opinion in Critical Care*, 2023.
- Expanding beyond ischemic stroke: A qualitative MRI score that facilitates outcome prediction in patients with hypoxic ischemic brain injury. *Resuscitation*, 2023.
- Dissecting the Complex Association Between Age and Sex in Cardiac Arrest Outcomes-Age Disparity, Sex Disparity, or All of the Above? *JAMA Network Open*, 2023.





Rachel Beekman, MD, (Right) is an award-winning assistant professor of neurology whose lab uses multimodality to identify novel physiologic biomarkers and individual treatment approaches to improve outcomes in patients after cardiac arrest.

► **Jennifer A. Kim, MD, PhD**, is an assistant professor of neurology. Kim's lab focuses on the use of new computational methods of critical care electroencephalography and neuroimaging to predict the neurodeterioration of nerve cells in patients at high risk of additional injury. She has received multiple grant awards, including a K23 grant, an American Academy of Neurology Clinical Research Training Scholarship, an American Heart Association Post-doctoral Fellowship award, an NIH R25 grant, a NeuroNEXT Fellowship, a Bee Foundation award, and a Swabius Foundation award. She is also a co-investigator on NIH R01 and UG3 grants.

► The **Kim Lab** focuses on the investigation of early EEG and MRI biomarkers, using computational methods to improve prediction of short- and long-term complications after such severe brain injuries as subarachnoid hemorrhage, brain trauma, and ischemic stroke.

- Quantitative epileptiform burden and electroencephalography background features predict post-traumatic epilepsy. *Journal of Neurology Neurosurgery & Psychiatry*, 2022.
- Automated EEG-based prediction of delayed cerebral ischemia after subarachnoid hemorrhages. *Clinical Neurophysiology*, 2022.
- Development and Validation of a Model to Identify Critical Brain Injuries Using Natural Language Processing of Text Computed Tomography Report. *JAMA Network Open*, 2022.
- The Utility of Quantitative EEG in Detecting Delayed Cerebral Ischemia After Aneurysmal Subarachnoid Hemorrhage. *Journal of Clinical Neurophysiology*, 2022.

► **Jessica Magid-Bernstein, MD, PhD**, is an assistant professor of neurology. Magid-Bernstein's lab, under the mentorship of Lauren Sansing, MD and Kevin Sheth, MD, focuses on translational investigation of inflammation in hemorrhagic stroke. This work combines her PhD studies in immunology with her clinical knowledge gained from training. She has recently been awarded the Neurocritical Care Society Research Training Fellowship Grant.

► The **Magid-Bernstein Lab** studies the role of inflammation in patients following hemorrhagic stroke via profiling inflammatory cells and biomarkers within cerebrospinal fluid. This research involves collaboration with basic science labs.

- Cerebral Hemorrhage: Pathophysiology, Treatment, and Future Directions. *Circulation Research*, 2022.
- Cerebral Microbleeds and Acute Hematoma Characteristics in the ATACH-2 and MISTIE III Trials. *Neurology*, 2022.
- Intraventricular Hemorrhage Expansion in the CLEAR III Trial: A Post Hoc Exploratory Analysis. *Stroke*, 2022.
- Jessica Magid-Bernstein, Guidelines in Action: Management of acute and chronic hydrocephalus following aneurysmal subarachnoid hemorrhage. *Journal of Clinical Neurophysiology*, (forthcoming).

► **Morgan L. Prust, MD**, is an assistant professor of neurology. Prust is a neurointensivist with extensive experience caring for underserved patients in Zambia with neurologic illnesses. Inspired by that experience, he is interested in defining the epidemiology of neurocritical illness in low- and middle-income countries; optimizing systems of care in resource-limited settings to improve the outcomes of neurologic emergencies; and forming collaborations to implement data-driven clinical innovations at scale across a range of global health contexts.

► The **Prust Lab** studies neurocritical illness and stroke in the context of global health, working to identify scalable and, cost-effective interventions to reduce morbidity and mortality from neurologic emergencies in resource-limited settings.

- Cost-effectiveness of neurocritical care in settings with limited resources. *Lancet Global Health*, 2023.
- Sporadic Creutzfeldt-Jakob Disease Initially Presenting With Posterior Reversible Encephalopathy Syndrome: A Case Report. *Neurologist*, 2023.
- Subdural empyema secondary to pansinusitis after coronavirus disease 2019 infection in an immunocompetent patient: illustrative case. *Journal of Neurosurgery: Case Lessons*, 2023.

► **Kevin Sheth, MD**, is a professor of neurology and neurosurgery, and vice-chair for clinical and translational research in the Departments of Neurology and Neurosurgery. Sheth has introduced and developed several innovative therapeutic platforms in prevention and acute treatment for patients with neurovascular disease. Sheth has more than 300 publications in the fields of stroke, neurotechnology, and clinical trials. He has been elected to membership in the American Society for Clinical Investigation and received the American Heart Association Stroke Research Mentorship Award.

► The **Sheth Lab** develops translational and prevention/acute treatment strategies for neurovascular disease by partnering with colleagues in basic science, innovative technologies, and clinical trial platforms.

- Baseline Cardiovascular Risk Factor Control in Patients with Type 2 Diabetes and Coronary Disease Versus Stroke: Secondary Analysis of Cardiovascular Outcome Trials. *Stroke*, 2023.
- CT With CTA Versus MRI in Patients Presenting to the Emergency Department with Dizziness: Analysis Using Propensity Score Matching. *American Journal of Roentgenology*, 2023.
- Improvement in the Prediction of Cerebrovascular Events With White Matter Hyperintensity. *Journal of the American Heart Association*, 2023.



The Yale Neurosciences Intensive Care Unit joins forces with many other disciplines at Yale to deliver world-renowned clinical care.



## CLINICAL

The Yale Neurocritical Care and Emergency Neurology division provides comprehensive care for a variety of acute neurologic and neurosurgical disorders, including: intracerebral hemorrhage, acute ischemic stroke, subarachnoid hemorrhage, traumatic brain and spinal cord injuries, status epilepticus, encephalitis, and cardiac arrest. The program also provides care for the most complex pre-and post-operative neurosurgical patients. We offer specialized, multidisciplinary care with 9 neurocritical care faculty, world-class critical care nursing, a robust team of advanced practice providers, and various levels of trainees, including dedicated neurocritical care fellows. Our experts collaborate with specialists in the fields of vascular neurology, interventional neurosurgery, neuroradiology, emergency medicine, trauma surgery, pulmonary critical care, and cardiology to deliver exceptional individualized care coupled with opportunities to participate in clinical trials at the forefront of neurology. Our division offers urgent evaluation and transfer of patients requiring the most sophisticated care offered in the state of Connecticut through Y Access and our telehealth programs. The Division has optimized patient-centered care with its state-of-the-art neurosciences ICU, which includes:

- 19-bed unit
- Portable CT and MRI
- Advanced invasive and noninvasive neuromonitoring with continuous EEG, electrocorticography, measurement of intracranial pressure (ICP) and, brain tissue oxygen, microdialysis, cerebral blood flow, and autoregulatory indices
- Integrated patient care model with neurosurgery
- Collaborative multidisciplinary care with the divisions of vascular neurology, general neurology, trauma critical care surgery, pulmonary critical care, and cardiology, and the department of emergency medicine
- Opportunities to participate in pioneering clinical trials across the continuum of care
- Dedicated physical therapy, occupational therapy, and speech-language pathology services
- Specialized social workers and care managers who facilitate optimal rehabilitation placement and discharge services
- Patient educators and access to family support groups

**LOCATIONS:** Our central facility is our neurosciences ICU at the York Street campus.

**CLINICAL TRIALS:** The division continues to expand its work with multiple NIH-funded grants and pharmaceutical trials.

### PROVIDERS:

**Emily J. Gilmore, MD, MS**, associate professor, neurology; medical director, neurosciences intensive care unit; co-director, neurotrauma; director, Neuromonitoring Program; co-director, Critical Care EEG Program; co-program director, critical care EEG fellowship; staff neurointensivist

**Guido Falcone, MD, ScD**, associate professor, neurology; staff neurointensivist; director, clinical research in neurocritical care; training director of, the “Yale AHA/Bugher Center of Research Excellence in Hemorrhagic Stroke Prevention & Treatment”

**Nils Petersen, MD, PhD**, associate professor, neurology; staff neurointensivist, neurosciences intensive care unit; director, Yale Cerebrovascular Lab (YCVL)

**Rachel Beekman, MD**, assistant professor, neurology; fellowship director, neurocritical care; staff neurointensivist

**Jennifer A. Kim, MD, PhD**, assistant professor, neurology; staff neurointensivist

**Jessica Magid-Bernstein, MD, PhD**, assistant professor, neurology; staff neurointensivist

**Morgan L. Prust, MD**, assistant professor, neurology; affiliated faculty, Yale Institute for Global Health; staff neurointensivist

**Kevin Sheth, MD**, professor of, neurology and neurosurgery; executive director of the NNCTU and vice-chair for clinical and translational research in the Departments of Neurology and Neurosurgery; staff neurointensivist

**Lena O’Keefe, MD**, instructor, neurology; staff neurointensivist



The Yale Neurocritical Care and Emergency Neurology program provides comprehensive care for a variety of acute neurologic and neurosurgical disorders, including traumatic brain injury.

Yale Neurotrauma team pictured above; left to right: Jenna Appleton, PA-C; Dr. Gilmore; Sacit Bulent Omay, MD; and Jen Amaturio, RN, BSN

## FELLOWSHIP TRAINING

The Neurocritical Care fellowship is a comprehensive, two-year program designed to graduate clinicians who excel in both critical care medicine and emergency neurology. Our trainees take advantage of the scholarly environment that Yale offers, contributing to research, educational, and quality improvement projects. Our fellows have a high success rate for their first-choice post-training placement, whether an additional fellowship (i.e., vascular neurology or critical care electroencephalography) or a faculty position.





# Neurodegenerative Disorders



STEPHEN STRITTMATTER, MD, PHD  
academic chief

SAYED (AUSIM) AZIZI, MD, PHD  
clinical chief

YALE'S DEPARTMENT OF NEUROLOGY FEATURES SEVERAL PROGRAMS  
FOCUSED ON COMBATING NEURODEGENERATION AND FACILITATING  
NEURAL REPAIR ON THE CLINICAL AND RESEARCH FRONTS.

## RESEARCH

- **Arman Fesharaki-Zadeh, MD, PhD**, is an assistant professor of neurology and psychiatry. His main area of research is the long-term sequelae of traumatic brain injury and chronic traumatic encephalopathy using preclinical models. He is one of the founding members of the Yale Concussion Program, which continues its clinical development. His other areas of research involve studying synaptic density alterations in behavioral variant frontotemporal dementia (bvFTD) using PET brain imaging, and the treatment of cognitive symptoms in long COVID syndrome.
- **The Fesharaki Lab**, in collaboration with David Matuskey, MD, examines the synaptic density and neurobehavioral symptoms in patients with behavioral variant frontotemporal dementia (bvFTD).

- Scientific Rationale for the Treatment of Cognitive Deficits from Long COVID. *Neurology International*, 2023.
- Clinical experience with the  $\alpha 2A$ -adrenoceptor agonist, guanfacine, and N-acetylcysteine for the treatment of cognitive deficits in "Long-COVID19." *Neuroimmunology Reports*, 2023.

- **Carolyn A. Fredericks, MD**, is the Henry F. McCance Scholar in Neurodegeneration at Yale and assistant professor of neurology. Fredericks' research focuses on preclinical Alzheimer's disease and on less common Alzheimer's variants, using advanced imaging tools to better understand how the disease progresses through functional networks in the brain. She is a member of Yale's Clinical Neurosciences Imaging Center (CNIC); serves on the Alzheimer's Association's State Medical Scientific Advisory Council and the Yale Alzheimer's Disease Research Center's Clinical Core; and is affiliated with the Yale Interdisciplinary Neurosciences Program (Graduate School of Arts and Sciences). Her work is funded by the Alzheimer's Association, the National Institute on Aging (National Institutes of Health), and the McCance Foundation.
- **The Fredericks Lab** uses multimodal neuroimaging to understand the relationship between pathology and connectivity in Alzheimer's disease.

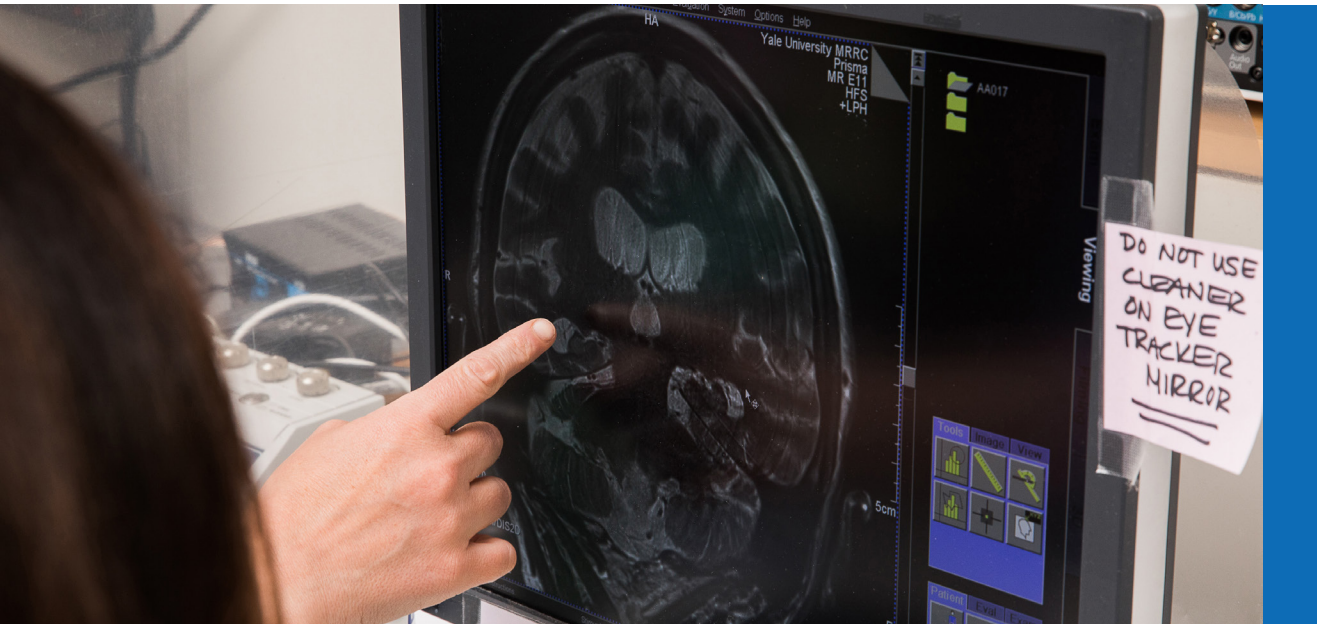
- Performance of a fully-automated Lumipulse plasma phospho-tau181 assay for Alzheimer's disease. *Alzheimer's Research & Therapy*, 2022.

- **Jaime Grutzendler, MD**, is the Dr. Harry M. Zimmerman and Dr. Nicholas and Viola Spinelli Professor of Neurology and Neuroscience; vice-chair for research in neurology; and director of the Center for Experimental Neuroimaging at the Yale School of Medicine. Grutzendler's clinical interests focus on neurodegenerative disorders, with special emphasis on such dementias as Alzheimer's disease. He also leads a research laboratory focused on understanding brain function and the cellular basis of neurological diseases. He is specifically interested in elucidating the cellular and molecular mechanisms of neurodegeneration as well as developing methods for intravital brain imaging and translational neuroscience. Grutzendler is also looking to develop small-molecule therapeutics for disorders within the fields of neurodegeneration and nervous system injury.
- **The Grutzendler Lab** studies cell-cell interactions in neurodegeneration/glia-vascular biology/translational neuroscience/intravital microscopy.

- PLD3 affects axonal spheroids and network defects in Alzheimer's disease. *Nature*, 2022.

- **Stephen M. Strittmatter, MD, PhD**, is chair and professor of neuroscience, the Vincent Coates Professor of Neurology, and director of the Yale Alzheimer Disease Research Center (ADRC), the Yale Memory Disorders Clinic, and the Kavli Institute for Neuroscience at Yale. Strittmatter's clinical emphasis is on Alzheimer's disease and frontotemporal dementia. His laboratory has mapped the molecular pathway by which  $\beta$ -amyloid, innate immunity, and tau are linked at the synapse to cause cognitive symptoms in Alzheimer's, and he has developed therapeutic approaches that target this pathway. His research has also defined the molecular basis of nerve fiber repair after adult injury. His laboratory research has appeared in more than 270 publications. Dr. Strittmatter's research has been recognized by the King Faisal International Prize in Medicine, the Ameritex Award, and the Alzheimer Association Zenith Fellow Award.
- **The Strittmatter Lab** studies the molecular and cellular basis of synapse loss in Alzheimer's disease with a particular focus on treatments to protect synapse and cognitive function.

- Soluble Nogo-Receptor-Fc decoy (AXER-204) in patients with chronic cervical spinal cord injury in the USA: a first-in-human and randomised clinical trial. *Lancet Neurology*, 2023.
- Single-cell transcriptomic atlas of Alzheimer's disease middle temporal gyrus reveals region, cell type and sex specificity of gene expression with novel genetic risk for MERTK in female. *medRxiv*, 2023.





► **Carmen Carrión, PsyD**, primarily researches health disparities and the ways in which the social determinants of health influence neurological and cognitive outcomes as well as performance on cognitive evaluations. She is the site PI for the R01 NIH-funded Neighborhoods Study led by Amy Kind, MD, PhD, of the University of Wisconsin. This is a multi-site study conducted through the Alzheimer's Disease Research Center (ADRC), which aims to demonstrate that living in a disadvantaged neighborhood will predict lower levels of cognitive function, faster cognitive decline, and greater disease burden—including AD neuropathology among the targeted sample. Carrión is also the site PI for a study led by Juan Carlos Arango-Lasprilla, PhD, of BioCruces Vizcaya Health Research Institute in Bilbao, Spain. This is a multi-site study intended to gather normative data from the Spanish-speaking population of the United States.

- Brain-phenotype models fail for individuals who defy sample stereotypes. *Nature*, 2022.

► **Emily S. Sharp, PhD**, is a co-investigator on NIH-funded clinical trials and neuroimaging projects within the Yale Alzheimer's Disease Research Center. She is a co-investigator on a NIH-funded phase III clinical trial within the Department of Anesthesiology, examining cognitive outcomes following two types of ED-placed endotracheal tubes. Sharp provides expert consultation on other clinical research projects, including studies of frontotemporal dementia; atypical AD (logopenic; posterior cortical atrophy); Parkinson's disease; and the outcomes of deep brain stimulation (DBS) and Gamma Knife treatments in PD and essential tremor.

► **Anna Szekely, MD**, is a neurogeneticist with particular expertise in neurodegeneration. She primarily researches key molecular perturbations underlying rare neurological disorders with known or predicted genetic etiology by using emerging genomic technologies. As one of the founding members of Yale's Program on Neurodevelopment and Regeneration, Szekely is a collaborator on several NIH-funded projects (PIs: Vaccarino, Chawarska) related to genetically influenced neurodevelopmental disorders, including autism and Tourette syndrome. She is also a member of the NIH's PsychENCODE Consortium. Her work involves the use of leading genomic approaches of iPSC-based neuronal modeling and postmortem brain analysis, combined with clinical data. Other recent projects include innovative research on the role of somatic mosaicism in the brain, with implications for adult-onset progressive neurodegenerative disorders, often with lateralized or focal onset/presentation.

- Characterization of human basal ganglia organoids. *Molecular Psychiatry*, 2022.
- Mispatterning and interneuron deficit in Tourette Syndrome basal ganglia organoids. *Molecular Psychiatry*, 2022.



The Yale Memory Disorders Clinic provides interdisciplinary care to patients and their families.



Carolyn A. Fredericks, MD, and her lab use multimodal neuroimaging to understand the relationship between pathology and connectivity in Alzheimer's disease.

## CLINICAL

The Yale Memory Disorders Clinic provides care for patients with a broad spectrum of cognitive and affective complaints, including Alzheimer's disease, vascular cognitive impairment, and frontotemporal lobar degeneration. The clinic's specialists in behavioral neurology, neuropsychiatry neuropsychology, and neurogenetics provide interdisciplinary care to patients and their families.

**LOCATIONS:** The division has its primary hub in New Haven and has expanded with a satellite location in Guilford.  
**CLINICAL TRIALS :** The division continues to add to its number of NIH-funded grants.

## PROVIDERS:

**Stephen Strittmatter, MD, PhD**, the Vincent Coates Professor of Neurology and Professor of Neuroscience; chair, neuroscience; director, Kavli Institute for Neuroscience; director, cellular neuroscience, neurodegeneration and repair; director, Yale Alzheimer's Disease Research Center (ADRC); director, Memory Disorders Clinic

**Sayed (Ausim) Azizi, MD, PhD**, clinical chief, Behavioral Neurology and Memory Disorders

**Carmen I. Carrión, PsyD**, assistant professor, clinical neurology; associate core leader, outreach, recruitment, and engagement core, Alzheimer's Disease Research Center (ADRC)

**Arman Fesharaki-Zadeh, MD, PhD**, assistant professor, psychiatry and neurology

**Carolyn A. Fredericks, MD**, assistant professor, neurology; Henry F. McCance Scholar in Neurodegeneration

**Jaime Grutzendler, MD**, the Dr. Harry Zimmerman and Dr. Nicholas and Viola Spinelli Professor of Neurology and Neuroscience; vice-chair for research, neurology; director, Yale Center for Experimental Neuroimaging (YCEN)

**Emily Sharp, PhD**, assistant professor, neurology; division chief, neuropsychology; associate training director, postdoctoral residency program, neuropsychology

**Anna Szekely, MD**, associate research scientist in neurology; attending physician, neurogenetics program; member, program in neurodevelopment and regeneration

**Ana Vives-Rodriguez, MD**, assistant professor, neurology; attending physician, memory disorders and movement disorders

**Darren Volpe, MD**, associate professor, clinical neurology; associate program director, neurology; director, behavioral neurology and neuropsychiatry fellowship; VA site director, Yale neurology residency program

## FELLOWSHIP TRAINING

The behavioral neurology/neuropsychiatry fellowship training program has been expanded, offering two options to incoming fellows: one is the traditional one-year full-time fellowship; the other is a two-year half-time fellowship for trainees simultaneously pursuing clinical training and clinical/translational research or attending-level clinical care. The expansion of the fellowship program to 1.5 slots began in 2022.



# Neuro-Immunology



KATHERINE DESTEFANO, MD, MS  
clinical chief

THE YALE MULTIPLE SCLEROSIS CENTER PROVIDES COMPREHENSIVE CARE TO PATIENTS WITH MULTIPLE SCLEROSIS (MS), NEUROMYELITIS OPTICA, TRANSVERSE MYELITIS, OPTIC NEURITIS, AND OTHER NEUROIMMUNE DISORDERS. EXPERT FELLOWSHIP-TRAINED NEUROLOGISTS WORK TOGETHER WITH EXPERIENCED NURSES, THERAPISTS, AND SOCIAL WORKERS TO CARE FOR PATIENTS IN ALL STAGES OF DISEASE.

## RESEARCH

► **David A. Hafler, MD** is the William S. and Lois Stiles Edgerly Professor and Chair, Department of Neurology; professor of immunobiology; and neurologist-in-chief of Yale New Haven Hospital. A preeminent physician-scientist, Hafler has made seminal discoveries defining the pathogenesis of multiple sclerosis and autoimmune diseases; he has more than 470 publications in the fields of MS, autoimmunity, and immunology. He was the recipient of a Jacob Javits Investigator Award from the NIH; he was also awarded the Dystel Prize for MS research from the American Academy of Neurology and the Raymond Adams Prize from the ANA. Hafler is the 2023 recipient of the prestigious AAI-Steinman Award for Human Immunology Research. He has been elected to membership in the AOA Society, the American Society of Clinical Investigation, the Association of American Physicians, and the National Academy of Medicine.

► **The Hafler Lab** investigates the underlying causes of inflammatory neurologic diseases, particular multiple sclerosis.

- Locus for severity implicates CNS resilience in progression of multiple sclerosis. *Nature*, 2023.
- Impaired TIGIT expression on B cells drives circulating follicular helper T cell expansion in multiple sclerosis. *Journal of Clinical Investigation*, 2022.
- A multiple sclerosis-protective coding variant reveals an essential role for HDAC7 in regulatory T cells. *Science Translational Medicine*, 2022.

► **David Pitt, MD** obtained his MD from the Philipps-Universität Marburg in his native Germany. He subsequently completed a postdoctoral fellowship at the Albert Einstein College of Medicine (laboratory of C.S. Raine, PhD, DSc) in New York, followed by a neurology residency and a clinical/research neuroimmunology fellowship at Washington University in St. Louis. He joined the Yale faculty in 2021, where he is currently an associate professor. Pitt is a co-director of the recently established National Multiple Sclerosis Brain Bank. He sees patients at the Yale Multiple Sclerosis Center.

► **The Pitt Lab** focuses on the neurodegenerative aspects of multiple sclerosis, particular the role of glial cells.

- Clinical trials in multiple sclerosis: past, present, and future. *Polish Journal of Neurology and Neurosurgery*, 2022.
- Susceptibility source separation from gradient echo data using magnitude decay modeling. *Journal of Neuroimaging*, 2022.
- Magnetic Susceptibility Source Separation Solely from Gradient Echo Data: Histological Validation. *Tomography*, 2022.
- Efficacy of Disease Modifying Therapies in Progressive MS and How Immune Senescence May Explain Their Failure. *Frontiers in Neurology*, 2022.
- Toward Precision Phenotyping of Multiple Sclerosis. *Neurology: Neuroimmunology & Neuroinflammation*, 2022.

► **Kevin O'Connor, PhD**, is a neuroimmunologist with a special interest in human autoimmune neurologic diseases. His research is concentrated on human translational immunology and neurology. He and his group are specifically interested in defining the mechanisms by which B cells and the antibodies they produce contribute to both the pathophysiology and tissue injury observed in human autoimmune diseases. The team seeks to understand how particular autoreactive B cell subsets and their autoantibodies initiate and sustain autoimmunity by studying human-derived specimens. The diseases the researchers investigate include myasthenia gravis (MG); neuromyelitis optica spectrum disorder (NMOSD); and myelin oligodendrocyte glycoprotein antibody disease (MOGAD).

► **The O'Connor Lab** investigates the mechanisms by which B cells and the autoantibodies they produce contribute to the pathology of autoimmune disease in humans.

- Individual myasthenia gravis autoantibody clones can efficiently mediate multiple mechanisms of pathology. *Acta Neuropathologica*, 2023.
- MOGAD patient autoantibodies induce complement, phagocytosis, and cellular cytotoxicity. *JCI Insight*, 2023.
- Precision targeting of autoantigen-specific B cells in muscle-specific tyrosine kinase myasthenia gravis with chimeric autoantibody receptor T cells. *Nature Biotechnology*, 2023.
- Reemergence of pathogenic, autoantibody-producing B cell clones in myasthenia gravis following B cell depletion therapy. *Acta Neuropathologica Communications*, 2022.

► **Erin Longbrake, MD, PhD**, is an associate professor of neurology and director of the clinical and translational research program in multiple sclerosis and the neuroimmunology fellowship program. Longbrake's scientific interests focus on the clinical heterogeneity observed among patients with MS and on elucidating the immunologic changes that precede the development of clinical disease. She is the PI for multiple pharmaceutical and NIH-sponsored clinical trials. She also manages the observational Detection Research for Early Asymptomatic MS (DREAM) study cohort and the neuroimmunology biorepository. Additional areas of research include evaluation of the effects of the COVID-19 pandemic on patients with neuroimmune diseases, and exploration of the role of the microbiome in multiple sclerosis.

► **The Longbrake Lab** seeks to understand the genetic-environmental-immune interactions that trigger the autoimmune processes leading to multiple sclerosis (MS), as well as the heterogeneity characteristic of individual patients with this disease. Using clinical/translational methodology and fostering close collaborations with wet-lab research groups, the Longbrake Lab is particularly interested in the preclinical spectrum of MS and developing ways to identify disease pathology before the emergence of clinical symptoms.

- Prior cycles of anti-CD20 antibodies affect antibody responses after repeated SARS-Cov-2 mRNA vaccination. *JCI Insight*, 2023.
- Worsening physical functioning in patients with neuroinflammatory disease during the COVID-19 pandemic. *Multiple Sclerosis and Related Disorders*, 2022.



CLINICAL

The Yale Multiple Sclerosis Center provides comprehensive care for a variety of inflammatory neurologic disorders, including multiple sclerosis, neuromyelitis optica, sarcoidosis, and autoimmune encephalitis. The MS Center is part of the Yale Interventional Immunology Center, which provides patients with highly specialized care from experts in the fields of rheumatology, neuroimmunology, allergy and immunology, and dermatology. The division offers urgent evaluation of patients with new-onset disease within a matter of days through the MS Access program. The division has optimized patient-centered care with one-stop shopping for E&M visits and infusion, including:

- A 14-bed infusion suite
- 3T MRI scanner with dedicated MS protocols
- Optical coherence tomography (OCT) testing/imaging interpreted by neuro-ophthalmologists
- Interdisciplinary care with rheumatologists and immunologists for patients with crossover disease
- Spasticity management with Botox®
- Social workers and dietitians
- Patient education and support groups
- Access to clinical trials

**LOCATIONS:** The division’s primary facility is in North Haven; it has expanded with satellite locations in Fairfield, New London, and Stamford.

**CLINICAL TRIALS :** The division continues to expand its work with multiple NIH-funded grants in addition to expansive pharmaceutical trials. Current NIH-funded initiatives include the CAVS Study, a multicenter investigator-initiated study examining the utility of the central vein sign for distinguishing MS from its mimics. In addition, the Ocrelizumab Discontinuation in Relapsing Multiple Sclerosis (AMS05) trial will investigate whether short-term B-cell depletion is sufficient for preventing MS disease activity if initiated early during the disease pathogenesis.

PROVIDERS:

**David A. Hafler, MD**, *the William S. and Lois Stiles Edgerly Professor of Neurology and Professor of Immunobiology; chair, neurology; neurologist-in-chief, Yale New Haven Hospital*

**Katherine DeStefano, MD, MS**, *associate professor, neurology; medical director, Multiple Sclerosis/Interventional Immunology Center*

**Erin Longbrake, MD, PhD**, *associate professor, neurology; director, Neuroimmunology/Multiple Sclerosis fellowship program; director of clinical research in neuroimmunology*

**David Pitt, MD**, *associate professor, neurology*

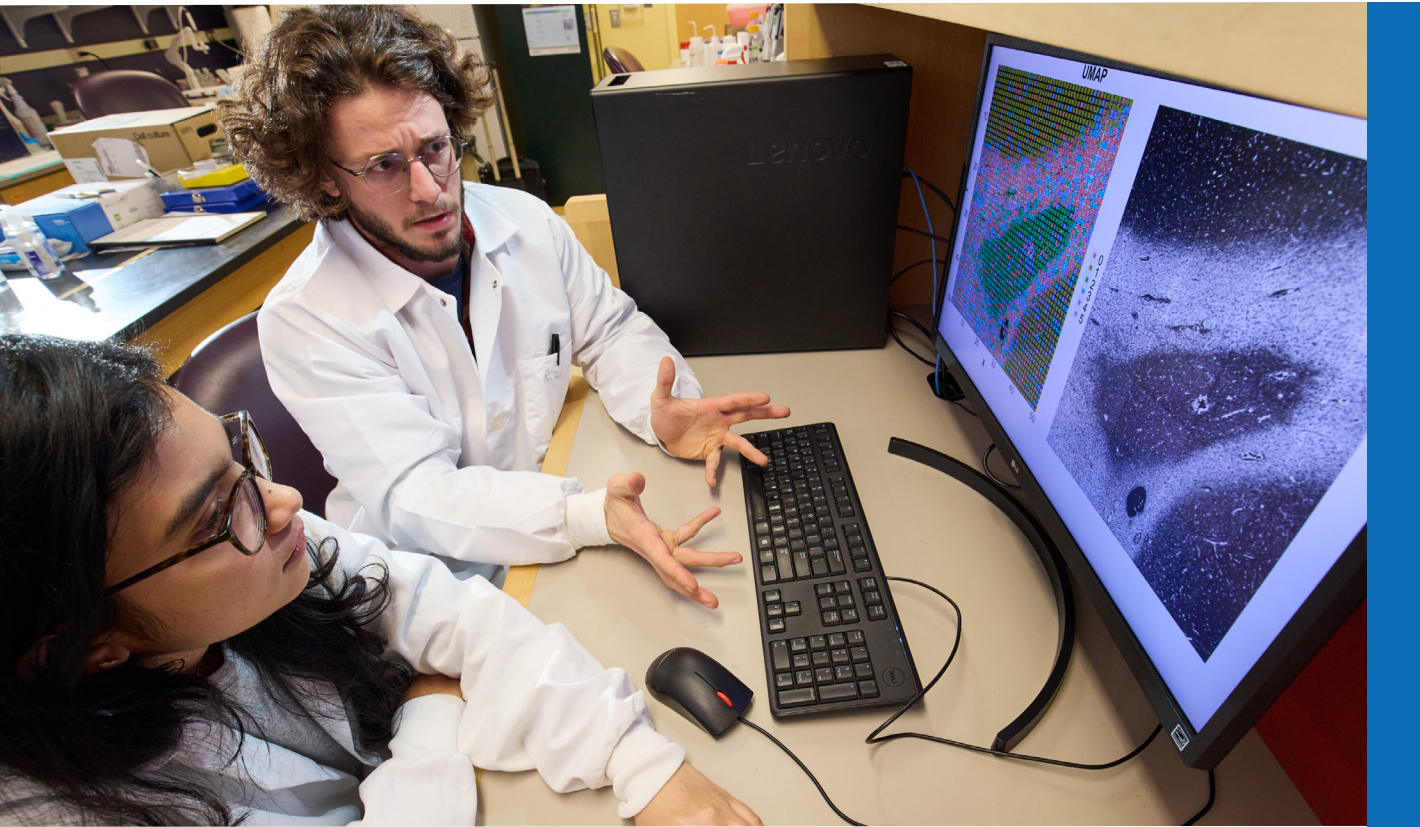
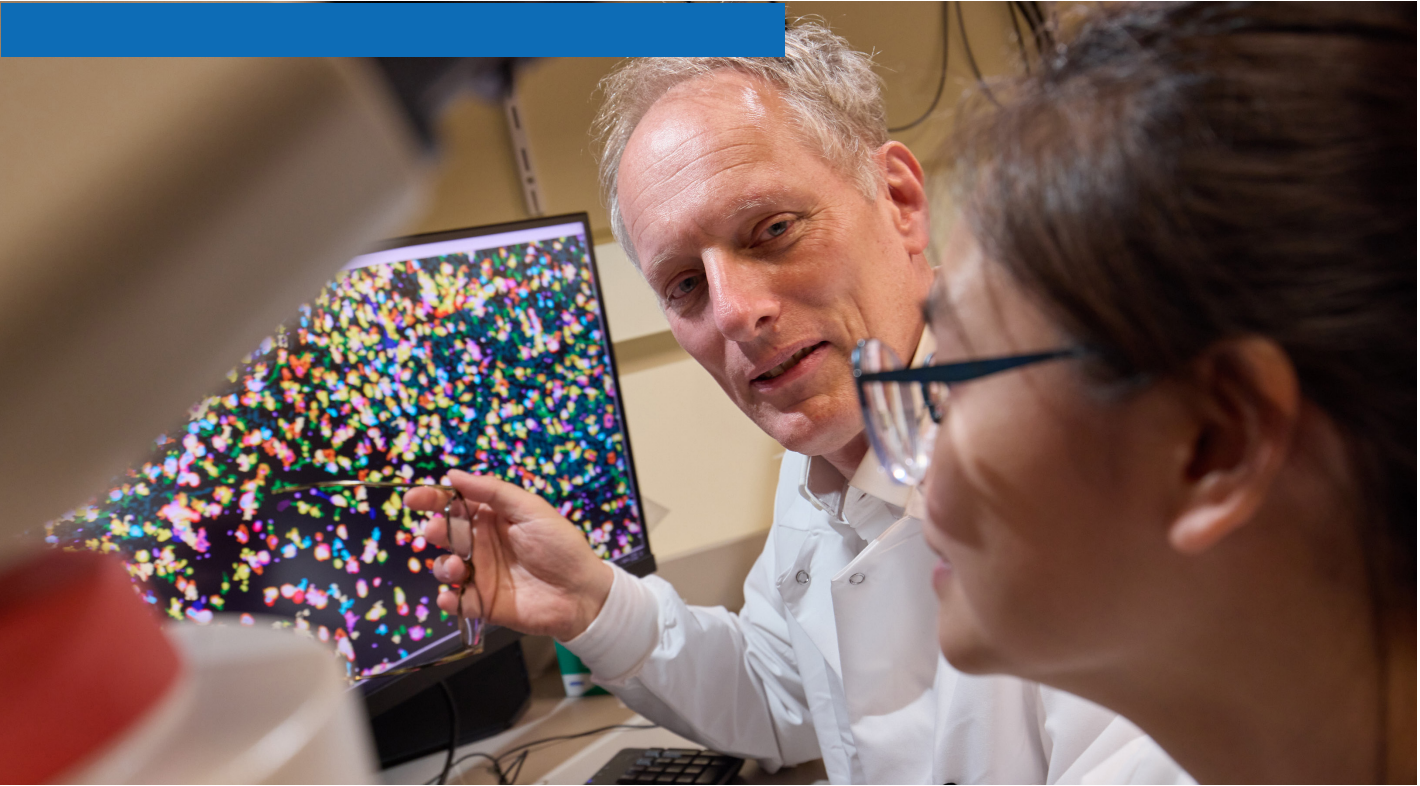
**Naila Makhani, MD, MPH**, *associate professor, pediatrics (neurology); director, Pediatric MS Program*

**Samantha Epstein, MD**, *assistant professor, neurology*

**John Peters, MD**, *assistant professor, clinical neurology*

FELLOWSHIP TRAINING

The Neuroimmunology fellowship program includes both clinical trainees and those simultaneously pursuing clinical training and clinical/translational research. The program typically has two to four trainees during any given academic year.



Through its range of current research projects, using innovative techniques, the Pitt Lab seeks to better understand—and ultimately treat—neurodegeneration MS.



# Neurological Infections + Global Neurology



SERENA SPUDICH, MD, MA, division chief

THE **NEUROLOGICAL INFECTIONS & GLOBAL NEUROLOGY DIVISION** PROVIDES CARE FOR PATIENTS WITH INFECTIONS THAT INVOLVE THE NERVOUS SYSTEM EITHER DIRECTLY OR INDIRECTLY. THE DIVISION ALSO CONDUCTS RESEARCH IN THE CAUSES AND MANAGEMENT OF THESE DISORDERS IN THE UNITED STATES AND GLOBAL SETTINGS. THE DIVISION ALSO AIMS TO PROVIDE AN ENVIRONMENT FOR TRAINING IN THE DIAGNOSIS AND MANAGEMENT OF THESE DISORDERS.

## RESEARCH

► **Serena Spudich, MD, MA**, is the Gilbert H. Glaser Professor and Chief, Division of Neurological Infections and Global Neurology in the Department of Neurology; and co-director, Center for Brain & Mind Health at Yale. Spudich is an expert in the clinical and mechanistic understanding of HIV-1 and COVID-19 infections in the nervous system. She gives numerous talks, organizes meetings, and advises the National Academy of Medicine, the American Academy of Neurology, and the NIH (including as co-chair of the steering committee of the \$1.1 billion NIH Researching COVID to Enhance Recovery (RECOVER) initiative). She is currently the PI on active NIH grants for studies of infections of the nervous system totaling more than \$10 million annually.

► The **Spudich Lab** examines the neuropathogenesis and clinical neurologic effects of viral illnesses (HIV-1 and SARS-CoV-2), including long-term sequelae following the resolution of acute infection and eradication of viral reservoirs in the brain.

- Antiretroviral Therapy Intensification for Neurocognitive Impairment in HIV. *Clinical Infectious Diseases*, 2023.
- Biotypes of Central Nervous System Complications in People With Human Immunodeficiency Virus: Virology, Immunology, and Neuropathology. *Journal of Infectious Diseases*, 2023.
- Rebound HIV-1 in cerebrospinal fluid after antiviral therapy interruption is mainly clonally amplified R5 T cell-tropic virus. *Nature Microbiology*, 2023.

► **Shelli Farhadian, MD, PhD**, is an assistant professor in the Department of Medicine (Infectious Diseases); the School of Public Health; and the Department of Neurology at Yale. Farhadian is the recipient of numerous NIH awards and is currently principal investigator of two NIH R01 awards, in addition to a Merck Investigator Award. She was a co-founder of the IMPACT biorepository study of acute infection at Yale, and currently analyzes clinical data and biospecimens from COVID-19 patients to better understand the numerous aspects of acute COVID-19 and long COVID, including neurological impairment. She leads translational studies using novel genomic approaches to examine the brains of people with HIV.

► The **Farhadian Lab** examines the pathogenesis and clinical effects of such infections as SARS-CoV-2 (COVID-19), HIV-1, syphilis, and babesiosis in end organs, including the brain.

- Neurologic Complications of Babesiosis, United States, 2011–2021. *Emerging Infectious Diseases*, 2023.
- Sleep deficiency among people living with human immunodeficiency virus: A growing challenge. *HIV Medicine*, 2023.
- A unique maternal and placental galectin signature upon SARS-CoV-2 infection suggests galectin-1 as a key alarmin at the maternal-fetal interface. *Frontiers in Immunology*, 2023.

► **Kathryn Holroyd, MD**, is an instructor in the Department of Neurology and a member of the International NeuroHIV Cure Consortium (INHCC). Holroyd completed a neuroimmunology fellowship at Mass General Brigham as well as a neuroinfectious diseases and global health fellowship at Yale and in Bangkok, Thailand. She has published more than 15 papers from 2020 to 2023, including several on the neurologic complications of such viral infections as COVID-19 and HIV. She continues to participate actively in global health research in both Zambia and Thailand, and is pursuing an independent programmatic line of research evaluating the neurovascular complications of acute HIV infection.

► **Lindsay McAlpine, MD, BSc**, is an instructor in the Department of Neurology. McAlpine completed a fellowship in neuroimmunology, neuro-infectious disease, and clinical research at Yale University. She co-founded the NeuroCOVID Clinic with Serena Spudich to treat patients with neurologic sequelae of COVID-19. McAlpine is an investigator in the COVID Mind Study at Yale. She has published more than 10 papers between 2020 and 2023 related to COVID-19, and presented at several conferences. She continues to direct the NeuroCOVID Clinic located in Guilford, Conn. Her current research uses advanced MRI techniques to investigate the effects of long COVID on the brain.

- Neurological sequelae of vaccines. *Neurological Sciences*, 2023.
- Anti-SARS-CoV-2 and Autoantibody Profiling of a COVID-19 Patient With Subacute Psychosis Who Remitted After Treatment With Intravenous Immunoglobulin. *Biological Psychiatry*, 2023.



Lindsay McAlpine, MD, BSc, specializes in the diagnosis and treatment of neuroinflammatory and neuroinfectious diseases.



► **Phillip Chan, MBChB, PhD**, is an associate research scientist in the Department of Neurology at Yale and a member of the International NeuroHIV Cure Consortium (INHCC). He is a neurologist by training and completed his PhD in 2021, based on research findings from the RV254 acute HIV cohort conducted in Bangkok, Thailand. Chan joined Yale in May 2022, and won the Robert E. Leet and Clara Guthrie Patterson Trust Mentored Research Award for his proposal titled “Impact of Vascular Risk Factors and Vascular Injury Biomarkers on Synaptic Density in People Living with HIV on Stable Treatment.”

- Immunological, Cognitive, and Psychiatric Outcomes After Initiating Efavirenz- and Dolutegravir-based Antiretroviral Therapy During Acute Human Immunodeficiency Virus Infection. *Clinical Infectious Diseases*, 2023.
- Cognitive Health in Persons With Human Immunodeficiency Virus: The Impact of Early Treatment, Comorbidities, and Aging. *Journal of Infectious Diseases* 2023.
- Brain volumetrics differ by Fiebig stage in acute HIV infection. *AIDS*, 2023.



## CLINICAL

**Spudich** provides outpatient specialty care and consultations in the Nathan Smith Clinic at Yale and via telehealth for patients with infections affecting the central nervous system, including HIV, syphilis, progressive multifocal encephalopathy, and long COVID. She also provides inpatient consultation on complex neuroID cases and is an attending physician on the general neurology ward service.

**Farhadian** provides outpatient specialty care and consultation in the Nathan Smith Clinic to patients with infections affecting the central nervous system, including HIV, syphilis, Lyme disease, brain abscesses, post-neurosurgical infections, and West Nile virus. She also provides inpatient consultation on complex neuroID cases and is an attending physician on the infectious disease service and internal medicine inpatient clinical services.

**Holroyd** provides inpatient neurology care at St. Raphael's Hospital in the Yale New Haven Health System. She specializes in the diagnosis and treatment of neuroinflammatory and neuroinfectious diseases, including multiple sclerosis, neuromyelitis optica spectrum disorder (NMOSD), sarcoidosis, encephalitis, and HIV.

**McAlpine** provides outpatient specialty care and consultations in neuroimmunology at the Yale Multiple Sclerosis Center in New London and in long COVID at the NeuroCOVID Clinic in Guilford. She specializes in the diagnosis and treatment of neuroinflammatory and neuroinfectious diseases, including multiple sclerosis, neuromyelitis optica spectrum disorder (NMOSD), sarcoidosis, encephalitis, tickborne diseases, HIV, and long COVID.

**LOCATIONS:** Spudich and Farhadian's NeuroID clinics are located in the Nathan Smith Clinic at 15 York Street, New Haven, Conn. St. Raphael's Hospital is located at 1450 Chapel Street, New Haven, Conn. McAlpine's NeuroCOVID clinic is located at 800 Boston Post Road, Guilford, Conn., and her neuroimmunology clinic is located at 194 Howard Street, New London, Conn.

**CLINICAL TRIALS:** The division has multiple NIH-funded grants that support human subjects research on neuroHIV and neuroCOVID. We do not currently conduct interventional trials.

## PROVIDERS:

**Serena Spudich, MD, MA**, *the Gilbert H. Glaser Professor of Neurology; affiliated faculty, Yale Institute for Global Health; chief, neurological infections & global neurology; co-director, Center for Brain & Mind Health at Yale*

**Shelli Farhadian, MD, PhD**, *assistant professor in the department of medicine (infectious disease) and neurology*

**Kathryn Holroyd, MD**, *instructor, neurology*

**Lindsay McAlpine, MD**, *instructor, neurology*

## FELLOWSHIP TRAINING

The Division of Neurological Infections and Global Neurology fellowship program includes both clinical trainees and those simultaneously pursuing clinical training and clinical/translational research. The program has had one fellow per year since 2017.

## CENTERS + PROGRAMS

### NEUROLOGY PROGRAMS

- Center for Brain and Mind Health
- Charcot-Marie-Tooth Association (CMTA) Center of Excellence
- Comprehensive Movement Disorders Program
- Adams Center for Parkinson's Disease
- Yale Clinical Neuroscience Group for Neuroanalytics (YNN)
- Alzheimer's Disease Research Center
- Clinical Neurosciences Imaging Center
- Center for Neuroepidemiology and Clinical Neurological Research (CNE2)
- Center for Neuroscience and Regeneration Research
- Program in Cellular Neuroscience, Neurodegeneration and Repair
- Yale Center for Experimental Neuroimaging
- Program in Clinical & Translational Neuromuscular Research
- COVID Mind Study at Yale
- Yale Program for Neuroinflammation
- Headache and Facial Pain Center
- Yale Concussion Program
- Lumbar Puncture Clinic
- Yale Comprehensive Epilepsy Center
- Botulinum and Neurogenetics Programs
- Restless Legs Syndrome Program
- Yale Neurotrauma Program
- Dorothy Adler Geriatric Assessment Center
- Yale Multiple Sclerosis Center
- ALS Program
- Myasthenia Gravis Program

### EDUCATION & TRAINING

- **Yale Visiting Elective Scholarship Program to Enhance Healthcare Workforce Diversity in Neurology**
- **Yale Neurology Residency Program**
- **Grey Matter Project**
- **Fellowships**
  - Behavioral Neurology/Neuropsychiatry
  - Epilepsy & EEG
  - Headache Medicine
  - Movement Disorders
  - Multiple Sclerosis
  - Neurocritical Care
  - Bugher Fellowship in Hemorrhagic Stroke
  - Neuromuscular Medicine
  - Neuro-Oncology
  - Neuropsychology
  - Vascular Neurology





# Neuromuscular Medicine



SASHA ZIVKOVIC, MD, PHD, academic chief  
DANIEL DICAPUA, MD, clinical chief

THE **NEUROMUSCULAR PROGRAM** IS VERY ACTIVE IN BASIC SCIENCE AND CLINICAL RESEARCH IN VARIOUS AREAS OF NEUROMUSCULAR DISEASE, WITH FACULTY AS MEMBERS OF BOTH THE NORTHEAST ALS ALLIANCE CONSORTIUM (NEALS) AND THE WORLD FEDERATION OF NEUROLOGY ALS CONSORTIUM.

## RESEARCH

The **Program in Clinical and Translational Neuromuscular Research (CTNR)** is led by Richard Nowak, MD, MS, and is focused on immune-mediated neuromuscular conditions—specifically myasthenia gravis (MG); chronic inflammatory demyelinating polyneuropathy (CIDP); Guillain-Barré syndrome (GBS); and inclusion body myositis (IBM).

► **Richard Nowak, MD, MS** is the founding director of the CTNR and is actively involved in the research of myasthenia gravis. He has launched EXPLORE-MG2 and ADAPT-teleMG pilot trials, as well as an international registrational phase III study, the Myasthenia Gravis Inebilizumab Trial (MINT). Nowak was instrumental in developing MG treatment guidelines in response to the 2020 COVID-19 pandemic and establishing COVID-19-associated risks and effects in myasthenia gravis (CARE-MG), an international physician-reported registry.

- Addressing Outcome Measure Variability in Myasthenia Gravis Clinical Trials. *Neurology*, 2023.
- Randomized Double-Blind Placebo-Controlled Trial of the Corticosteroid-Sparing Effects of Immunoglobulin in Myasthenia Gravis. *Neurology*, 2023.
- Safety and efficacy of zilucoplan in patients with generalised myasthenia gravis (RAISE): a randomised, double-blind, placebo-controlled, phase 3 study. *Lancet Neurology*, 2023.

► **Bhaskar Roy, MBBS, MBioMedSci**, is involved in clinical and translational research in neuromuscular disease, particularly idiopathic inflammatory myopathies. He is the co-chair of the Inclusion Body Myositis (IBM) scientific interest group under the International Myositis Assessment and Clinical Studies Group (IMACS). Roy's research interests include optimizing the functional outcome measures in IBM as well as modifying and validating the IBM functional rating scale (IBM-FRS), and developing MRI and blood-based biomarkers in IBM. He is leading an international collaboration with the goal of developing a core set of functional outcome measures to enable the assessment of treatment response in a clinical trial. He is also working to develop objective outcome measures of muscle health in IBM and other muscle diseases.

- Provisional practice recommendation for the management of myopathy in VCP-associated multisystem proteinopathy. *Annals of Clinical & Translational Neurology*, 2023.
- Diagnosing and managing dysphagia in inclusion body myositis: a systematic reviews. *Rheumatology (Oxford)*, 2023.
- Current status of clinical outcome measures in inclusion body myositis: a systematised reviewdouble-blind, placebo-controlled, phase 3 study. *Clinical & Experimental Rheumatology*, 2023.

► **Sasha Zivkovic, MD, PhD** is the director of the Charcot-Marie-Tooth Association (CMTA) Center of Excellence at Yale and leads the Yale CMT program with Irvin Oh, MD, from the Department of Orthopedic Surgery. Zivkovic will be a Yale site investigator of an international registry for patients with chronic inflammatory demyelinating polyneuropathy. He is also active in clinical research of hereditary, autoimmune, and paraproteinemic neuropathies.

- CSF Findings in Relation to Clinical Characteristics, Subtype, and Disease Course in Patients with Guillain-Barré Syndrome. *Neurology*, 2023.
- Patients with transthyretin amyloidosis enrolled in THAOS between 2018 and 2021 continue to experience substantial diagnostic delay. *Amyloid*, 2023.
- Modified Erasmus GBS Respiratory Insufficiency Score: a simplified clinical tool to predict the risk of mechanical ventilation in Guillain-Barré syndrome. *Journal of Neurology, Neurosurgery, & Psychiatry*, 2023.

► **Huned Patwa, MD**, is the chief of the VA Connecticut Healthcare System in West Haven. He is the principal investigator of two clinical trials for treatment of ALS that use novel agents to treat neuroinflammation in the disease. He is the chair of the VA ALS executive committee, which is developing a national policy for the care of veterans with ALS.

- Neurogenic orthostatic hypotension after treatment with sorafenib. *BMJ Case Reports*, 2023.



Drs. Nowak (Right) and Roy (Left).



CLINICAL

The Neuromuscular Division continues to expand subspecialized neuromuscular care across the region. Our physicians have neuromuscular outpatient clinics in New Haven, North Haven, Greenwich, Stamford, Fairfield, Milford, Guilford, Old Saybrook, and New London. We have also expanded our neurologic care into Westerly, Rhode Island. The Division of Neuromuscular Medicine and EMG has increased its number of faculty members from 10 to 17 since 2020. It provides comprehensive care for a variety of neuromuscular conditions, including myasthenia gravis, myopathies, and acquired and inherited neuropathies. The Yale Myasthenia Gravis Clinic is one of the largest MG clinical programs in the United States; is internationally recognized; and is dedicated to excellence in patient care. It is designated as a Partner in Care by the Myasthenia Gravis Foundation of America (MGFA) and offers patients access to advanced diagnostics, opportunities to participate in research, and a precision-medicine approach to MG treatment. Our program is also a designated Muscular Dystrophy Association (MDA) Comprehensive Care Center that provides expert care to patients with muscular dystrophy, ALS, and other neuromuscular conditions. ALS patients are also treated at the ALS Association Certified Treatment Center of Excellence at the VA Connecticut Interdisciplinary ALS Clinic in West Haven and the ALS Association Affiliated Clinic in New Haven. A new ALS clinic will also be established in Greenwich. Most recently, adult patients with CMT are now able to receive subspecialized care at the CMT clinic in North Haven, which is operated under the Yale CMT Program and the CMTA Center of Excellence at Yale.

PROVIDERS:

- Sasha Zivkovic, MD, PhD**, professor, neurology; academic chief, neuromuscular medicine; director, Yale CMTA Clinic and Yale CMTA Center of Excellence
- Daniel DiCapua, MD**, associate professor, clinical neurology; clinical chief, neuromuscular medicine; clinical director of neuromuscular medicine; director, fellowship program, neuromuscular medicine
- Huned Patwa, MD**, professor, neurology; chief of staff, VA Connecticut Healthcare System in West Haven
- Richard Nowak, MD, MS**, associate professor, neurology; director, Program in Clinical & Translational Neuromuscular Research; director, Yale Myasthenia Gravis Clinic
- Bhaskar Roy, MBBS, MBioMedSci**, associate professor, neurology; director of the Muscular Dystrophy Association adult care clinic, neurology; medical director, Electrodiagnostic Laboratory, Yale Medicine; co-chair, IBM scientific interest group from IMACS
- Benison Keung, MD**, associate professor, neurology; ambulatory neurology director for the New Haven area
- Kunal Desai, MD**, assistant professor, clinical neurology; director of neuromuscular medicine at Greenwich/Stamford
- Sania Atta, MD**, assistant professor, neurology
- Uzma Usman, MBBS**, assistant professor, neurology; director, MDA-ALS/Motor Neuron Disease Clinic, New Haven
- Bilal Hameed, MD**, assistant professor, neurology
- Babar Khokhar, MD, MBA**, associate dean for clinical affairs; associate professor, neurology; associate dean for clinical affairs, Yale School of Medicine; chief medical officer, Yale Medicine; chief ambulatory medical officer, Yale Medicine and Yale New Haven Health; vice-chair, operations, neurology; director, MDA-ALS/Motor Neuron Disease Clinic
- Jeffrey Dewey, MD, MHS**, assistant professor, neurology; associate program director, neurology residency; director of wellness, neurology residency; director, neurology clerkship
- Thomas Toothaker, MD**, associate professor, neurology
- Bertrand Tseng, MD, PhD**, assistant professor, clinical neurology
- Ylec Mariana Cardenas Castillo, MD**, assistant professor, clinical neurology
- Adeel Zubair, MD**, assistant professor, neurology
- Michael McCauley, MD, MS**, assistant professor, neurology

FELLOWSHIP TRAINING

Dr. DiCapua is the Neuromuscular Medicine fellowship director. The program currently has two fellows. The one-year fellowship covers all aspects of electrodiagnostic testing (EMG/NCS) studies and clinical care of patients with neuromuscular disorders. It also provides superb clinical and research opportunities across a wide variety of neuromuscular diseases.





# Neuro-Oncology



ANTONIO OMURO, MD, division chief

THE **DIVISION OF NEURO-ONCOLOGY**, PART OF THE CHÊNEVERT FAMILY BRAIN TUMOR CENTER AT YALE, MAKES USE OF ALL THE COMPONENTS ESSENTIAL TO MANAGING PATIENTS WITH PRIMARY BRAIN TUMORS, BRAIN METASTASES, AND NEUROLOGIC COMPLICATIONS OF CANCER: COMPREHENSIVE EVALUATION AND DIAGNOSIS, THE VERY NEWEST TREATMENT OPTIONS, THOROUGH FOLLOW-UP, AND PSYCHOSOCIAL SUPPORT. ALL PATIENTS ARE WELCOME, REGARDLESS OF WHETHER THEY ARE NEWLY DIAGNOSED OR HAVE ALREADY RECEIVED EXTENSIVE TREATMENT.

## RESEARCH

We are now leading a NIH-funded, Phase 0/IB double-blind, placebo-controlled, multi-institutional clinical trial to investigate the effects of targeting anti-TIGIT and anti-PD-1 in patients with recurring glioblastoma multi-forme (GBM). Our study represents the only trial in the United States investigating anti-TIGIT in patients with GBM. Blood and tumor samples collected as part of the trial will be analyzed with cutting-edge techniques—including single-cell sequencing spatial transcriptomics—to help us understand how the immune system changes in response to these therapies to combat GBM. This study therefore offers an exciting opportunity to provide a promising new therapy for patients with GBM, and to improve our understanding of the immune system's interactions with brain cancers.

► **Antonio Omuro, MD**, is the Neuro-Oncology division chief. Omuro is an internationally recognized clinical researcher and leader in the field of neuro-oncology, having designed and led several highly influential clinical trials and associated translational research. He is a member of the Clinical Oncology NIH review panel and a fellow of the American Academy of Neurology. Other recent accomplishments include a NIH R01 grant in partnership with the Hafler Lab to conduct a translational clinical trial investigating anti-TIGIT and anti-PD-1 therapies in glioblastoma. In collaboration with the Mayo Clinic, Omuro was also awarded a U19 grant from the NCI, and joining the Glioblastoma Therapeutics Network, a group of select institutions that advances clinical and translational research in glioblastoma. Omuro has also been a formal mentor to several PhD, MD, resident, and fellowship students across Yale.

- Radiotherapy combined with nivolumab or temozolomide for newly diagnosed glioblastoma with unmethylated MGMT promoter: An international randomized phase III trial. *Neuro-Oncology*, 2023
- Multicenter Phase II Trial of the PARP Inhibitor Olaparib in Recurrent IDH1- and IDH2-mutant Glioma. *Cancer Research Communications*, 2023
- Phase III trial of chemoradiotherapy with temozolomide plus nivolumab or placebo for newly diagnosed glioblastoma with methylated MGMT promoter. *Neuro-Oncology*, 2022

► **Joachim Baehring, MD**, professor of neurology and neurosurgery, and vice-chair of neurology, is an internationally renowned clinical researcher dedicated to brain tumors and the neurologic complications of cancer. As a highly accomplished investigator, he has participated in numerous clinical trials and conducted multiple retrospective projects focused on a variety of rare brain tumors and other clinical problems. Baehring is a member of the National Comprehensive Cancer Network (NCCN) Guidelines faculty for CNS tumors, which is responsible for defining the best clinical practices in neuro-oncology. He is also an active mentor for several neurology residents and students, and serves as the program director of the Neuro-Oncology Fellowship Program.

Joachim Baehring, MD, continued from previous page

- NCCN Guidelines® Insights: Central Nervous System Cancers, Version 2.2022. *Journal of the National Comprehensive Cancer Network*, 2023.
- Treatment Options for Recurrent Primary CNS Lymphoma. *Current Treatment Options in Oncology*, 2022.
- Myasthenia Gravis in the Setting of Immune Checkpoint Inhibitor Therapy: Practical Considerations and Opinion-Based Approach to Acute Management. *Cureus*, 2022.

► **Zachary Corbin, MD, MHS**, is an assistant professor of neurology specializing in the development of novel neuroimaging tools in brain tumors. He has developed a multimodality metabolic imaging technique called the Warburg Index to characterize and quantify the Warburg effect (an abnormal pattern of glucose metabolism found in cancer cells) in brain tumors. Corbin has received the YCCI Scholar Award, an intramural KL2 grant, to further develop the Warburg Index. He is an investigator on a multi-PI R01 grant for the development of a technique called deuterium metabolic imaging. He also has a clinical research interest in treatments for brain tumors and complications of cancer, and participates in a number of clinical trials for brain tumors. Corbin teaches medical students and physician assistant students; as a clinical mentor, he participates in training the neuro-oncology fellows, neurology residents, and hematology/oncology fellows.

- Phase 2 study of pembrolizumab in patients with recurrent and residual high-grade meningiomas. *Nature Communications*, 2022.
- Impact of radiotherapy delay following biopsy for patients with unresected glioblastoma. *Journal of Neurosurgery*, 2022.

► **Mary Barden, MD** is a neuro-oncologist and an assistant professor in clinical neurology. Barden is a graduate of the Yale School of Medicine and of the Neurology Residency and Neuro-Oncology Fellowship at Yale New Haven Hospital. She is associate director of the Neuro-Oncology Fellowship, and is directly involved in the education of fellows and residents. As an active clinician, Barden works primarily in the inpatient setting as a neuro-oncology hospitalist and consultant.

- Top advances of the year: Neuro-oncology. *Cancer*, 2023.

► **Nicholas Blondin, MD**, is an assistant professor of neurology. He is a board-certified neuro-oncologist with an active practice in Trumbull and New Haven, and is a principal investigator on multiple clinical trials in gliomas and meningiomas. In fact, he enrolls an outstanding number of participants in clinical trials at Yale. Blondin is a highly sought-after lecturer in CME events and an excellent teacher residents and fellows.

- An expanded safety/feasibility study of the EMulate Therapeutics Voyager™ System in patients with recurrent glioblastoma. *CNS Oncology*, 2023.
- The clinical and genomic features of seizures in meningiomas. *Neuro-Oncology Advances*, 2023. *Journal of Neuro-Oncology*, 2021.



## CLINICAL

The Division of Neuro-Oncology provides comprehensive care for patients with a variety of brain tumors and neurologic complications of cancer. The Division is part of the Yale Cancer Center (YCC) and Smilow Cancer Hospital. It offers chemotherapy management and infusions for patients with gliomas, meningiomas, primary CNS lymphomas, and other cancers. The Division also collaborates with the Brain Metastases Program at YCC to offer care for patients with brain metastases and radionecrosis. All attendings are active principal investigators/recruiters for therapeutic clinical trials. The inpatient service provides elective chemotherapies for CNS hematologic diseases, and provides consultations throughout YNHH. It also provides neurologic support for the CAR-T cell program at Smilow. The Division offers patients direct access to the hospital, with same-week appointments available to all.



Former neuro-oncology fellow and current assistant professor Mary Barden, MD, and Dr. Omuro.

**LOCATIONS:** Smilow Cancer Hospital on Park Street, New Haven, and Smilow Cancer Care Center in Trumbull.

**CLINICAL TRIALS:** A highlight of the program is the wide variety of clinical trials to advance novel treatment for neuro-oncologic diseases, including multicenter trials led by Yale researchers.

## PROVIDERS:

**Antonio Omuro, MD**, professor, neurology; chief, neuro-oncology; clinical trials director, Chênevert Family Brain Tumor Center at Smilow Cancer Hospital and Yale Cancer Center

**Joachim Baehring, MD**, professor, neurology and of neurosurgery; associate chief, neurology; director, neuro-oncology fellowship program; vice chair, clinical affairs, neurology

**Nicholas Blondin, MD**, assistant professor, clinical neurology

**Zachary Corbin, MD, MHS**, assistant professor; associate director, neuro-oncology fellowship program

**Mary Barden, MD**, assistant professor, clinical neurology

## FELLOWSHIP TRAINING

The Neuro-Oncology fellowship program is a United Council for Neurologic Subspecialties (UCNS)-accredited two-year program, offering both clinical and research training in neuro-oncology. Two positions are available each year, and completion of the fellowship enables trainees to become UCNS board-certified in neuro-oncology. The program has been successful as a pipeline of talent to the division, with three of our attendings having completed the Neuro-Oncology Fellowship at Yale.





# Neuropsychology



EMILY S. SHARP, PhD, division chief

**NEUROPSYCHOLOGY** IS A SPECIALTY CLINICAL SERVICE THAT PROVIDES IN-DEPTH EVALUATIONS OF COGNITIVE (THINKING) FUNCTIONING. THESE FUNCTIONS INCLUDE MEMORY, ATTENTION, AND PROBLEM SOLVING, AS WELL AS PSYCHOLOGICAL FUNCTIONING (EMOTIONAL HEALTH, INCLUDING THE ABILITY TO COPE WITH DEPRESSION OR ANXIETY). NEUROPSYCHOLOGICAL ASSESSMENT IS PART OF THE GOLD STANDARD WORKUP FOR DIAGNOSES AND STAGING OF MANY NEUROLOGICAL AND MEDICAL DISORDERS. NEUROPSYCHOLOGICAL ASSESSMENTS HELP PATIENTS, THEIR FAMILIES, AND TREATMENT TEAMS TO BETTER UNDERSTAND THE PATIENT’S COGNITIVE STRENGTHS AND WEAKNESSES. THESE ASSESSMENTS INFORM TREATMENT AND CAN LEAD TO IMPROVED QUALITY OF LIFE.

## RESEARCH

The division’s faculty members have ongoing collaborations with faculty members in neurology, the wider medical school, and the university, as well as with other national and international institutions. Our faculty members are sought out for their expertise in the measurement of cognition within clinical trials and longitudinal studies, as well as for their skills in multicultural and bilingual assessments.

► **Emily Sharp, PhD**, is dedicated to expanding the clinical and research work of the neuropsychology division. Her patient care centers on neuropsychological evaluation referrals from specialists in behavioral neurology and movement disorders. She is a co-investigator on NIH-funded clinical trials and neuroimaging projects within the Yale Alzheimer’s Disease Research Center (ADRC). She is the site PI for a NIH-funded phase III clinical trial (PREVENT) within the Department of Anesthesiology, examining cognitive outcomes following two types of emergency department (ED)-placed endotracheal tubes. Sharp provides expert consultation on other clinical research projects, including studies of cognition in frontotemporal dementia, atypical Alzheimer’s disease and movement disorders. She has widened neuropsychology clinical services to provide presurgical evaluations to the cochlear implant team. She and her colleagues recently presented a study examining hearing loss, functional abilities, and cognitive decline.

- Hearing loss is associated with faster cognitive decline but not diagnostic conversion in the ADNI cohort. *American Association of Geriatric Psychiatry Annual Conference*, 2023.
- Design and Implementation of Community Consultation for Research Conducted under Exception from Informed Consent Regulations – The PREVENT Study, *under review*.
- A Professional Musician with Progressive Visuospatial Concerns: A Case Study and Review of Musical Alexia, *under review*.

► **Christopher Benjamin, MPsy, PhD**, provides neuropsychological evaluations of patients with epilepsy and memory disorders. He is the division’s epilepsy neuropsychologist and a member of the epilepsy surgical program, where he also assists as needed in intracranial mapping of patients on the ward. He has published frequently cited articles describing and validating new ways of using MRI to map the brain’s language and visual systems. Benjamin’s contributions have been recognized through grants from the National Academy of Neuropsychology, the American Academy of Clinical Neuropsychology, and the Yale Center for Clinical Investigation. His ongoing projects focus on standardizing a multilingual battery for language mapping; improving training in clinical fMRI; and clarifying how training in language fMRI is currently done and might be improved. Dr. Benjamin is co-chair of the International Neuropsychological Society’s Epilepsy Special Interest Group.

► **Carmen I. Carrión, PsyD**, is a bilingual (English/Spanish) clinical neuropsychologist specializing in culturally responsive assessment of brain function across diverse neuropsychiatric, medical, and neurological conditions. She actively contributes to the Hispanic Neuropsychological Society’s Practice Committee, which is dedicated to establishing guidelines for culturally sensitive service delivery. Certified by YNHH’s Bilingual Competency Program (BCP), Carrión dedicates 25% to 40% of her clinical practice to conducting evaluations in Spanish. Carrión’s research focuses on addressing limitations in neuropsychological measures; reducing cognitive health disparities; and examining the impact of social determinants of health on test performance and neurological outcomes. Carrión serves as the site PI for a multisite study that aims to enhance the diagnostic accuracy of cognitive disorders among the Hispanic/Latino community in the United States. She is also the site PI for the NIH-funded Neighborhoods Study, which seeks to understand how living in a socioeconomically disadvantaged neighborhood can lead to cognitive disparities and an increased risk of Alzheimer’s disease and related dementias. Dr. Carrión’s expertise extends to collaborations with faculty members in Yale’s School of Public Health, the Department of Psychiatry, the Division of Bioimaging Sciences, and the Magnetic Resonance Research Center.

- Assessment of disparities in timely diagnosis and comprehensive workup of cognitive impairment between English and Spanish speakers. *American Journal of Geriatric Psychiatry*, 2024.
- Associations between dementia staging, neuropsychiatric behavioral symptoms, and divorce or separation in late life: A case control study. *PLOS One*, 2023.

► **Franklin C. Brown, PhD**, focuses on visual memory and cognitive inefficiency in various neurological disorders, including epilepsy, brain tumor, multiple sclerosis, oncology , and traumatic brain injury. He also examines the role of such modifiable variables as sleep, mood, anxiety, and other aspects of patients’ lives that may affect cognition. His visual memory test is used in multiple-site epilepsy studies in North America and Australia.

► **Ginger Mills, PsyD**, is a bilingual (English/Spanish) clinical neuropsychologist specializing in the assessment of neurological disorders and neurodegenerative conditions. As a neuropsychologist, she is interested in the effects of bilingualism and culture on cognitive functioning. Her research has been primarily focused on prospective memory or “remembering to remember”—an aspect of cognition important in carrying out intended actions.



As a bilingual clinical neuropsychologist, Dr. Carrión conducts neuropsychological evaluations for a diverse patient population.



► **Lucas Driskell, PsyD**, performs neuropsychological evaluations for patients with neurovascular disorders and neurodegenerative diseases. His research interests involve the relationship between cardiovascular health and cognitive longevity across the lifespan, as well as the impact of cardiovascular interventions on cognition. He is also interested in progressive cerebrovascular diseases. He continues his involvement in research initiatives focused on education and training within the field of neuropsychology.

- Impact of bilingualism on cognitive outcome in stroke: recommendations from a systematic review. *Annals of Clinical and Translational Neurology*, under review.
- Early Career Research Development Symposium: Tips for Building a Successful Clinical Research Career. *American Psychological Association*, 2023.

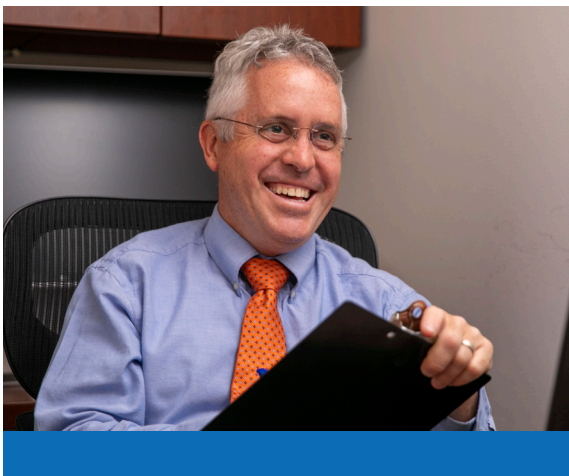
► **Alice Perez, PhD**, is a bilingual neuropsychologist who conducts assessments in both English and Spanish of patients with various neurological conditions, including neurodegenerative disorders, epilepsy, and autoimmune disorders. In regard to research, she currently collaborates with Nishant Mishra, MD, PhD, on the effects of bilingualism on the cognitive outcomes of stroke survivors. Perez also supervises neuropsychology externs at the Fairfield office.

► **Linda D. Ruiz, PhD**, is a bilingual neuropsychologist who conducts neuropsychological assessments with patients presenting with a broad range of conditions, including neurodegenerative/movement disorders; stroke; chronic illness (e.g., cancer and autoimmune conditions); head injuries; and comorbid psychiatric conditions. Her research interests include examining the social determinants of health to better understand the ways in which biological, psychological, social, and environmental factors interact to influence health outcomes at the community level.

► **Stephanie Towns, PsyD**, provides clinical care for patients at Greenwich Hospital. In her generalist practice, she receives referrals from Yale Neurology and Neurosurgery; the Center for Healthy Aging at Greenwich Hospital; and community neurology practices in southern Connecticut and Westchester, New York. She also provides presurgical evaluations for deep brain stimulation (DBS) for patients in southern Connecticut. Her most recent research has focused on education and training in neuropsychology, as well as the role of sleep as it relates to cognitive functioning. She is currently collaborating with faculty in the Department of Neurology on grant proposals to support future research. She serves on the education committees of the American Academy of Clinical Neuropsychology (AACN) and Division 40 of the American Psychological Association (Society for Clinical Neuropsychology). She also serves as the chair of three AACN committees. Towns is the driving force behind the development of our postdoctoral fellowship, and she supervises several neuropsychology externs each year.



Dr. Perez provides presurgical evaluations for DBS for patients in southern Connecticut.



Dr. Brown focuses on visual memory and cognitive inefficiency in various neurological disorders.



Yale Neuropsychology faculty

## CLINICAL

The Neuropsychology Division provides comprehensive evaluations of the neurocognitive functioning of patients with CNS disorders, including neurodegenerative, movement, autoimmune, and neurovascular disorders. The Neuropsychology Division also provides presurgical evaluations essential to candidates for invasive and noninvasive surgical interventions for epilepsy, tumor resection, cochlear implants, and deep brain stimulation. There is significant demand for our expertise, and our division has expanded from two faculty clinicians in 2014 to 10 in 2022. Our growth has allowed us to offer specialty (e.g., epilepsy; neuro-oncology; DBS), generalist, and bilingual clinical services across a large portion of Connecticut.

**LOCATIONS:** With a central facility in New Haven, the division has expanded with satellite locations in Fairfield, Guilford, Greenwich, Milford, and New London, with an additional location to be added in North Haven in 2023.

## PROVIDERS:

- Emily S. Sharp, PhD**, chief, division of neuropsychology; associate professor, neurology; associate training director, neuropsychology  
**Timothy Belliveau, PhD**, associate professor, neurology  
**Christopher Benjamin, PhD**, associate professor, neurology  
**Franklin Brown, PhD**, associate professor, neurology  
**Carmen I. Carrión, PsyD**, assistant professor, neurology  
**Lucas D. Driskell, PsyD**, assistant professor, neurology  
**Ginger Mills, PsyD**, assistant professor, neurology  
**Alice Perez, PhD**, assistant professor, neurology  
**Linda Ruiz, PhD**, assistant professor, neurology  
**Stephanie J. Towns, PsyD**, associate professor, neurology; training director, neuropsychology

## FELLOWSHIP TRAINING

The Neuropsychology training program is a two-year postdoctoral program in clinical neuropsychology. Our program is accredited by the Association of Postdoctoral Programs in Clinical Neuropsychology (APPCN), and approved by Yale New Haven Hospital's graduate medical education (GME) program. We participate in the APPCN Match.



# West Haven VA Medical Center



**HAMADA ALTALIB, DO, MPH,**  
chief of neurology, VA CT

THE **VA CONNECTICUT (VA CT) HEALTHCARE SYSTEM** IS ONE OF THE LEADING HEALTH CARE SYSTEMS SERVING VETERANS IN THE COUNTRY. THE VA CT PROVIDES VETERANS WITH HEALTH CARE SERVICES AT 10 LOCATIONS IN CONNECTICUT, AND DRAWS IN REFERRALS FROM ACROSS THE COUNTRY.

The VA CT is committed to excellence in clinical care, and was honored in 2023 by *Becker's Hospital Review* with a five-star rating for excellent patient experience. Academic research and training are major priorities at VA CT, which has ranked in the top 10 most heavily federally funded VA centers in the last decade. The neurology service at VA CT is home to the Center for Neuroscience and Nerve Regeneration, and collaborates with many other VA research centers, including the Mental Illness Research, Education and Clinical Center (MIRECC); the National Center for Post-Traumatic Stress Disorder; the Clinical Epidemiology Research Center (CERC), and the Cooperative Studies Program Coordinating Center (CSPCC).

## RESEARCH

► **Hamada Altalib, DO, MPH** is the chief of neurology for VA CT and the Northeast Region's director of the VA's Epilepsy Centers of Excellence (ECoE). His research focuses on traumatic brain injury, the neuropsychiatric impact of epilepsy, and psychogenic nonepileptic seizures. He is also the director of the Yale Executive MPH Program Health Informatics Track, and has been leading health informatics program evaluations in neurology. He continues to serve as the primary investigator of a Department of Defense-funded project, the Post-Traumatic Psychogenic Seizure and Epilepsy Project.

- Interactive CBT for Headache and Relaxation Training (iCHART): Study Protocol of a Single-Arm Trial of Interactive Voice Response Technology Delivery of Cognitive-Behavioral Therapy for Veterans with Post-Traumatic Headache. *Cephalalgia Reports*, 2023.
- Mood and Anxiety Disorders and Suicidality in Patients With Newly Diagnosed Focal Epilepsy: An Analysis of a Complex Comorbidity. *Neurology*, 2023.

► **Amy Grinberg, PhD**, is a clinical health psychologist providing behavioral interventions for veterans with headache disorders through individual and interdisciplinary clinics in the VA Connecticut Healthcare System. She served as principal investigator on a clinical trial funded by the VHA Headache Center of Excellence (HCoE), Interactive CBT for Headache And Relaxation Training (iCHART); and as co-investigator on a VA Health Services Research and Development (HSR&D) clinical trial, Telemedicine-based Cognitive Therapy for Migraine (TENACITY).

► **Emmanuelle Schindler, MD, PhD**, completed the first clinical trials investigating the effects of psilocybin on headache disorders (NCT02981173, NCT03341689, and NCT03806985), and she is nearing completion of a follow-up study of migraine (NCT04218539). She has secured funding to begin neuroimaging work in the field of psychedelics and headache disorders, and the effects of occipital nerve blockade in chronic post-traumatic headache.

- The therapeutic potential of psychedelics. *Science*, 2022.

► **Jason Sico, MD, MHS**, is the national director of the Veterans Health Administration HCoE. He directs the Veterans Health Administration's Research, Education, Evaluation, and Engagement Activities Center for Headache (RE3ACH); has recently completed one VA HSR&D clinical trial TENACITY, and serves as the PI of both an ongoing stroke/TIA clinical trial (Addressing Sleep Apnea Post-Stroke/TIA (ASAP); NCT04322162) and a recently funded National Center for Complementary and Integrative Health (NCCIH) study related to chiropractic care and migraine.

- Calcitonin Gene-Related Peptide Monoclonal Antibodies and Risk of SARS-CoV-2 Infection and Severe COVID-19 Outcomes Among Veterans with Migraine Disorder *JAMA Network Open*, 2023.

► **Hajime Tokuno, MD**, is the associate chief of VA CT Neurology. His clinical expertise is in neuromuscular pain and peripheral nerve disorders. He maintains a large cohort of study subjects with chronic neck and back pain due to dystonia. He tracks the subjects' responses to botulinum toxin injections using pain scales, functional scales, medical thermography, surface electromyography (EMG), and range of motion measures.

► **Brian Koo, MD**, reports ongoing progress for the study titled "Restless Leg Syndrome: The Role of Melanocortin Hormones," funded by the Department of Defense. Koo is also a co-investigator in the study titled "Tracing the Origin and Progression of Parkinson's Disease through the Neuro-Immune Interactome."

► **Huned Patwa, MD**, is the associate dean for veterans affairs at the Yale School of Medicine and chief medical officer at the VA CT Healthcare System. As a clinician, he chairs the VA ALS executive committee tasked with developing a national system and policy for care of veterans with amyotrophic lateral sclerosis. He is also the author of *Healthcare System*, a manuscript assessing the use of the intrathecal baclofen pump for treatment of spasticity in primary lateral sclerosis. Patwa is the principal investigator on two clinical trials for treatment of ALS, using novel agents to treat neuroinflammation caused by the disease.

► **Stephen Waxman, MD, PhD**, is the Bridget Flaherty Professor of Neurology, Neurobiology, and Pharmacology at Yale School of Medicine, and served as chairman of Neurology at Yale from 1986 until 2009. He founded the Center for Neuroscience & Regeneration Research at Yale in 1988 and is its current director. Waxman has published more than 700 scientific papers; his H-index is 109 and his papers have been cited more than 40,000 times.

- Prospects for Pain. *New England Journal of Medicine*, 2023



The VA CT Healthcare System is one of the leading health care systems serving veterans in the country and is committed to excellence in clinical care.



CLINICAL

The neurology service at the VA CT offers outstanding care and clinical services to veterans across New England. The program has several centers recognized for their excellence in patient care: the Epilepsy Center of Excellence (Karen Medin, DO, director); the Headache Center of Excellence (Emmanuelle Schindler, MD, PhD, director); the ALS Certified Treatment Center (Huned Patwa, MD, director); and the Parkinson's Consortium Center (Diana Richardson, MD, director). Treatment services at VA Connecticut include:

- Epilepsy monitoring unit admission
- Prolonged video-EEG monitoring
- Psychogenic nonepileptic seizures (PNES) management
- Mental health support
- Movement disorder and Parkinson's specialized treatment
- Electromyography (EMG)
- Telehealth & virtual visit care
- Surgical referral
- Headache Infusion Center
- Inpatient headache treatment

**CLINICAL TRIALS:** “Human epilepsy 3: new-onset generalized epilepsy” (PI: Hamada Altalib); “REALIZE (CVL-865) Study” (PI: Hamada Altalib).

PROVIDERS

- Hamada Altalib, DO, MPH,** *associate professor, neurology and psychiatry*
- Adeniyi Fisayo, MD, PharmD,** *assistant professor, neurology and ophthalmology and visual science*
- Amy Grinberg, PhD,** *assistant professor, neurology; national director, behavioral headache medicine, VHA Headache Centers of Excellence (HCoE)*
- Karen Medin, DO,** *assistant professor, neurology; director of the ECoE VA CT*
- John Ney, MD,** *assistant professor, neurology; director of the ECoE VA CT*
- Diana Richardson, MD,** *assistant clinical professor, neurology; director, National VA Parkinson's Disease Consortium, West Haven; director, movement disorders, VA CT*
- Hajime Tokuno, MD,** *associate professor, clinical neurology*
- Emmanuelle Schindler, MD, PhD,** *assistant professor, neurology; medical director, Headache Center of Excellence*
- Jason Sico, MD,** *associate professor, neurology; associate professor, internal medicine (section of general medicine)*
- Darren Volpe, MD,** *associate professor, neurology; Yale neurology residency site director for VA CT*

FELLOWSHIP TRAINING

Residents at the VA receive extensive outpatient training and education through both continuity and subspecialty clinics. Residents frequently comment on the wide variety of neurologic conditions treated in the general neurology clinics. They work with specialists in sleep disorders, movement disorders, epilepsy, multiple sclerosis, and neurodegenerative and neuromuscular disorders. Our clinic preceptors are all dedicated clinician-educators and have more than 40 combined years of experience in working in resident education. We will be accepting applications for headache and neurophysiology fellows in the coming year.





# Stroke + Vascular Neurology



JOSEPH SCHINDLER, MD, clinical chief

SRIKANT RANGARAJU, MBBS, MS, academic chief

THE DIVISION OF VASCULAR NEUROLOGY EVALUATES, TREATS, AND STUDIES DISEASES THAT AFFECT THE STRUCTURE AND FUNCTION OF THE BLOOD VESSELS SUPPLYING THE BRAIN. OUR GOAL IS TO PROVIDE THE BEST POSSIBLE CARE FOR OUR PATIENTS WITH STROKE AND CEREBROVASCULAR DISEASE.

## RESEARCH

**Lauren Sansing, MD, MS**, professor of neurology, is a vascular neurologist specializing in the acute treatment of stroke and complex neurovascular diseases. She also serves as vice-chair of faculty affairs in nNeurology, directs the basic and translational stroke research program, co-directs the neurology residency R25 research training program, and leads a NIH-funded research laboratory studying inflammatory mechanisms in brain injury across the basic-translational-clinical spectrum. She leads the Yale program for the first-ever NIH stroke preclinical trial network (SPAN), and the American Heart Association/ Bugher Center of Excellence for Hemorrhagic Stroke Prevention and Treatment Research at Yale. She has won numerous awards, including the American Neurological Association Derek Denny-Brown Young Neurological Scholar Award and the American Academy of Neurology Michael S. Pessin Stroke Leadership Prize. She has also been elected into the American Society for Clinical Investigation (ASCI) and the Henry Kunkel Society.

► **The Sansing Lab** studies neuroinflammatory responses in stroke, intracerebral hemorrhage, and chronic cerebroal vascular disease, with a focus on understanding which immune responses after acute brain injury cause further injury, and which responses aid in recovery. The lab also focuses on translation of preclinical models to clinical trials through large-scale, multicenter collaborations.

- Embracing Heterogeneity in The Multicenter Stroke Preclinical Assessment Network (SPAN) Trial. *Stroke*, 2023.
- Role of Inflammatory Processes in Hemorrhagic Stroke. *Stroke*, 2023.
- Cerebral Hemorrhage: Pathophysiology, Treatment, and Future Directions. *Circulation Research*, 2022.
- Inflammatory Responses After Ischemic Stroke. *Seminars in Immunopathology*, 2022.
- The Stroke Preclinical Assessment Network: Rationale, Design, Feasibility, and Stage 1 Results. *Stroke*, 2022.



► **Adam de Havenon, MD, MSCI**, an associate professor of neurology, concentrates his research on intracranial atherosclerosis, white matter hyperintensities and vascular contributions to cognitive impairment and dementia (VCID); and blood pressure variability. During vascular neurology fellowship training, he found during his vascular neurology fellowship discovered that he wanted his expertise to close the gap fill the space between the basic science involved in stroke research and its implementation in human subjects. His long-term research goal is to bridge these fields and lead a team of basic and clinical researchers to address the most treatment-resistant diseases in vascular neurology, as well as provide excellent care to patients suffering from these diseases. De Havenon has published more than 100 peer-reviewed articles; and his research into secondary stroke prevention and advanced neuroimaging has received funding from the National Institutes of Health, the American Academy of Neurology, and the American Heart Association.

- Association of Blood Pressure Variability With Death and Discharge Destination Among Critically Ill Patients With and Without Stroke. *Neurology*, 2023.
- Improvement in the Prediction of Cerebrovascular Events With White Matter Hyperintensity. *Journal of the American Heart Association*, 2023.
- Twenty-Year Disparity Trends in United States Stroke Death Rate by Age, Race/Ethnicity, Geography, and Socioeconomic Status. *Neurology*, 2023.
- Large Vessel Occlusion Stroke due to Intracranial Atherosclerotic Disease: Identification, Medical and Interventional Treatment, and Outcomes. *Stroke*, 2023.

► **Rachel Forman, MD**, is an assistant professor of neurology and a stroke neurologist at Yale New Haven Hospital. She treats patients with stroke-related conditions in the hospital, as well as seeing patients in the Guilford stroke clinic. Her areas of interest include community and childhood stroke education; primary stroke prevention, and addressing racial and ethnic disparities in stroke care. She formed stroke outreach groups in Chicago and Boston during her medical training. She recently partnered with the Yale Stamp Out Stroke program to continue this work; she serves as the faculty advisor of the program. Stamp Out Stroke hosted 11 events in 2021 alone, reaching more than 400 individuals in the City of New Haven and in surrounding communities. More recently, Forman has partnered with two Yale stroke nurses and the Yale Pathways to Science program to provide stroke education to local high school students. Forman has also educated other care providers about racial and ethnic disparities in stroke care, including speaking at the annual Lawrence M. Brass Yale Stroke Symposium and publishing a paper highlighting this issue in *Current Treatment Options in Neurology*. She also serves as the Yale Site PI for the REDUCE trials, which evaluate blood pressure treatment in patients with intracerebral hemorrhage.

- Technical Dissonance in Home Blood Pressure Monitoring After Stroke: Having the Machine, but Not Using Correctly. *American Journal of Hypertension*, 2023.
- Protecting the Brain, From the Heart: Safely Mitigating the Consequences of Thrombosis in Intracerebral Hemorrhage Survivors With Atrial Fibrillation. *Stroke*, 2022.

► **James Giles, MD, PhD**, moved to Yale as an assistant professor in late 2022. Originally from England, he came to the United States in 2014 to train in neurology. He attends on the inpatient stroke service at Yale New Haven Hospital and sees outpatients at the Yale Physicians Building in New Haven. He has a broad background in both basic science and clinical stroke research. His research has been funded by the American Heart Association and the British Heart Foundation. His core research interest is the use of biomedical and clinical informatics to improve stroke diagnosis, treatment, and prevention. He further serves as the Yale Site PI of the SISTER trial, testing a novel emergency treatment for stroke.

- James Giles, Multi-Omics Approaches to Discovering Acute Stroke Injury and Recovery Mechanisms. *Stroke Genetics* (forthcoming).
- Endovascular Treatment of Acute Stroke. *Current Neurology and Neuroscience Reports*, 2022.
- Direct Oral Anticoagulants Versus Warfarin in the Treatment of Cerebral Venous Thrombosis (ACTION-CVT): A Multicenter International Study. *Stroke*, 2022.



► **Nishant Mishra, MD, PhD**, is an assistant professor of neurology and a clinical neuroscientist who has been active in clinical stroke research since 2005. He has been a Fellow of the European Stroke Organization (FESO) since 2012, and currently serves on the editorial boards of *Neurology* (Green Journal), PLOS One (academic editor), and *Frontiers in Neurology* (associated editor). His lab focuses on clinical research to prevent and treat post-stroke epilepsy and cognitive impairment.

► **The Mishra Lab's** research projects spans the full width of stroke care, including acute intervention, prevention, and post-stroke recovery.

- International Post Stroke Epilepsy Research Consortium (IPSERC): A consortium to accelerate discoveries in preventing epileptogenesis after stroke, *Epilepsy & Behavior*, 2022.
- The Common Pathways of Epileptogenesis in Patients with Epilepsy Post-Brain Injury: Findings From a Systematic Review and Meta-analysis. *Neurology*, 2023.
- Impact of genetic polymorphisms on the risk of epilepsy amongst patients with acute brain injury: A systematic review. *European Journal of Neurology*, 2023.

► **Dhasakumar Navaratnam, MD, PhD**, professor of neurology, is a neurotologist and neurologist who provides advanced, comprehensive evaluation of and treatment for patients with hearing and balance problems. He conducts a weekly clinic in the Hearing and Balance Center on Howard Avenue, where he sees patients with a range of hearing and balance problems. He also attends on the inpatient and consultation service at YNHH, and is a member of the YNHH stroke service that provides 24/7 coverage for Yale New Haven Hospital. Navaratnam directs the clinical neuroscience module for second-year medical students, as well as a course on the molecular and cellular mechanisms of neurological disease.

► **The Navaratnam Lab's** research focuses on the basic mechanisms of hearing and balance and the clinical aspects of stroke.

- Single -particle cryo-EM structure of the outer hair cell motor protein prestin. *Nature Communications*, 2022.
- Clinical criteria to exclude acute vascular pathology on CT angiogram in patients with dizziness. *PLoS One*, 2023.
- Megahertz Sampling of Prestin (SLC26a5) Voltage-Sensor Charge Movements in Outer Hair Cell Membranes Reveals Ultrasonic Activity that May Support Electromotility and Cochlear Amplification. *Journal of Neuroscience*, 2023.
- Outer hair cell function is normal in  $\beta$ V spectrin knockout mice. *Hearing Research*, 2022.

► **Srikant Rangaraju, MBBS, MS**, is an associate professor of neurology, a vascular neurologist, and a physician-scientist. After establishing his research program at Emory University in Atlanta, he moved to Yale in 2023. Rangaraju's research focuses on exploring immune-mediated mechanisms of neurodegeneration and post-ischemic injury in the brain, leveraging pre-clinical mouse models, as well as multi-omics modalities to assess molecular changes occurring in different classes of neurons and glial cells. He is also actively involved in stroke research through, via participation in clinical trials, and clinical research studies related to post-stroke prognosis, plasma-based protein biomarkers, and risk-stratification in cryptogenic stroke.

► **The Rangaraju Lab** has been funded by the NIH since 2016. The group has identified promising therapeutic targets to modulate microglia-mediated mechanisms in neurodegeneration and stroke. One example is the Kv1.3 potassium channel, which is over-expressed in a sub-set of pro-inflammatory microglia and macrophages in the brain in Alzheimer's disease, as well as in the sub-acute phase following ischemic stroke. Using pharmacological and genetic approaches to manipulate Kv1.3, the group has identified the channels as a key regulators of neuroinflammatory responses in these diseases. The group has also developed novel in vivo tools to assess protein-associated (proteomic) mechanisms of disease specific to different brain cell types, in pre-clinical mouse models. To this end, the group has developed an approach called cell type-specific *in vivo* biotinylation of proteins (CIBOP) to identify early molecular changes occurring in neurons and glial cells, These changes may offer therapeutic targets for disease-modification.

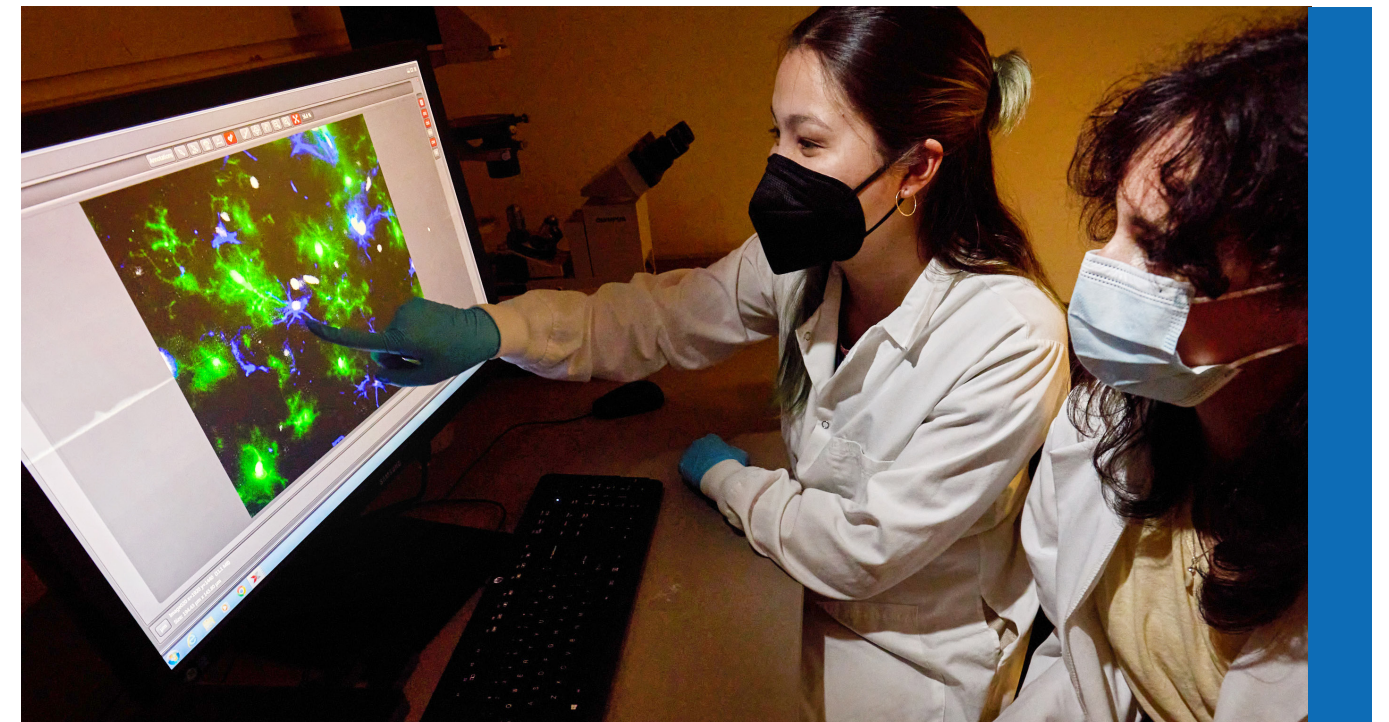
**The Rangaraju Lab**, continued from previous page

- Advances in proteomic phenotyping of microglia in neurodegeneration. *Proteomics*, 2023.
- Cell type-specific biotin labeling in vivo resolves regional neuronal and astrocyte proteomic differences in mouse brain. *Nature Communications*, 2022.
- BIN1 is a key regulator of proinflammatory and neurodegeneration-related activation in microglia. *Molecular Neurodegeneration*, 2022.

► **Richa Sharma, MD, MPH**, is an assistant professor of a neurology with a particular interest in leveraging advanced technology to improve stroke prevention. Her patient-centered research is funded by a NIH K23 award. Sharma is presently developing computational algorithms, using multimodal data sources, including electronic health records, serum protein expression levels, and neuroimaging to diagnose known as well as recently identified stroke etiologies.

► **The Sharma Lab** utilizes advanced computational approaches to understand the epidemiology of stroke risk factors; determine the underlying causes of strokes; and identify novel therapeutic targets in order to improve current approaches to stroke prevention and brain health.

- Predictors of Recurrent Venous Thrombosis After Cerebral Venous Thrombosis: Analysis of the ACTION-CVT Study. *Neurology*, 2022.
- Development and Validation of a Model to Identify Critical Brain Injuries Using Natural Language Processing of Text Computed Tomography Reports. *JAMA Network Open*, 2022.
- Acute Ischemic Stroke, Depressed Left Ventricular Ejection Fraction, and Sinus Rhythm: Prevalence and Practice Patterns. *Stroke*, 2022.



The division investigates novel translational approaches to more effective acute stroke treatments, implement better secondary stroke prevention strategies, and improve stroke recovery and rehabilitation.



► **N. Abimbola Sunmonu, MD, PhD**, is an assistant professor of neurology, a cerebrovascular geneticist with interests that include genetics, equitable global health, and the continuum of cerebrovascular neurology. In addition to global health and education, Sunmonu has a strong background in the neurosciences and translational neurology, primarily studying genetic control of neurodevelopment, neuroimaging, and the development of murine models of disease. She recently moved into clinical research, investigating genetic and hereditary stroke syndromes, vasculopathies, and cerebrovascular manifestations of systemic disease. At Yale, she is using computational genomics to investigate the genetic bases of cerebrovascular disease (risk, severity, and recovery) and other significant questions at the population level. Sunmonu is deeply committed to the conviction that medicine and research should benefit all people.

- Understanding Patterns of Missingness in Acute Ischemic Stroke Trials: A Secondary Analysis of Pooled Participant-Level Follow-Up Data. *Stroke*, 2023.
- Accurate Prediction of Persistent Upper Extremity Impairment in Patients with Ischaemic Stroke. *Archives of Physical Medicine and Rehabilitation*, 2022.



The division's multidisciplinary approach to world-class patient care is informed by cutting-edge research techniques developed in the lab.

## CLINICAL

The YNHH Advanced Comprehensive Stroke Center accepts the most complex neurovascular patients in the region, and provides direction and support for all Yale New Haven-affiliated hospital programs. The Stroke Center continues to be recognized for its clinical excellence by the American Heart Association, receiving awards for meeting target metrics in the evaluation and treatment of acute stroke patients.

The stroke service provides both a dedicated inpatient service and a consultative service. The primary inpatient service offers evaluation, treatment, and transitions of care plans to patients with a primary diagnosis of stroke. The team is led by a Yale Medicine board-certified vascular neurologist, and includes a fellow, two residents, an intern, a nurse practitioner, a nurse navigator, a medical student, and visiting trainees. The consultation service provides acute stroke evaluations to patients in the YNHH Emergency Department; neurovascular specialty consultations to patients not on the stroke service; and emergent telemedicine evaluations to patients at 14 clinical sites. The consultative service is also led by a Yale School of Medicine board-certified vascular neurologist and includes a stroke fellow and a practitioner.

The Yale New Haven Telestroke Program provides emergent stroke consultations to patients suspected of having a stroke in 12 hospital sites across Connecticut and Rhode Island. The program continues to grow. Last year, more than 2,500 teleconsultations were performed throughout the region.

**CLINICAL TRIALS:** The division is a hub for the NIH StrokeNet and runs many clinical trials in acute treatment, prevention, and recovery.

## PROVIDERS:

**Safa Abdelhakim, MD**, *assistant professor, neurology*

**Hardik Amin, MD**, *associate professor, neurology; medical stroke director, Yale New Haven Hospital, St. Raphael campus*

**Adam de Havenon, MD, MSCI**, *associate professor, neurology*

**Rachel Forman, MD**, *assistant professor, neurology*

**James Giles, MD, PhD**, *assistant professor, neurology*

**Adam Jasne, MD**, *assistant professor, neurology*

**Srinath Kadimi, MD**, *associate professor, clinical neurology*

**Caitlin Loomis, MD**, *assistant professor, neurology; medical director, stroke, Greenwich Hospital*

**Nishant Mishra, MD, PhD**, *assistant professor, neurology*

**Reshma Narula, MD**, *assistant professor, neurology; director, vascular neurology fellowship program; department director, diversity, equity, and inclusion*

**Dhasakumar Navaratnam, MD, PhD**, *associate professor, neurology and neuroscience*

**Srikant Rangaraju, MBBS, MS** *associate professor, neurology; academic chief, division of stroke and vascular neurology*

**Lauren Sansing, MD, MS**, *professor, neurology; vice-chair, faculty affairs, department of neurology*

**Joseph Schindler, MD**, *professor, neurology and neurosurgery; clinical chief, division of stroke and vascular neurology; director, Yale New Haven Comprehensive Stroke Center*

**Richa Sharma, MD, MPH**, *assistant professor, neurology*

**N. Abimbola Sunmonu, MD, PhD**, *assistant professor, neurology*

## FELLOWSHIP TRAINING

The ACGME Yale vascular neurology fellowship is one of the most competitive stroke fellowships in the country. It places fellows into highly desired medical directorships and faculty positions after the completion of their fellowship. Under Reshma Narula's direction, the fellowship has expanded to four vascular neurology fellows per year.



# Neurology Leadership

## DEPARTMENT LEADERSHIP



**David A. Hafler, MD,**  
*Chair, Neurology*



**Joachim Baehring, MD,**  
*Vice-Chair, Clinical Affairs*



**Babar Khokhar, MD, MBA,**  
*Vice-Chair, Operations*



**Jennifer Mulligan, MBA,**  
*Lead Administrator; Senior Director, Finance & Administration*

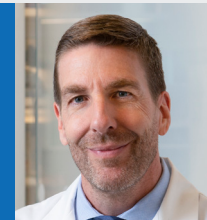
## SECTION CHIEFS



**Emily Sharp, PhD,**  
*Chief, Neuropsychology*



**Christopher Gottschalk, MD,**  
*Clinical Chief, General Neurology*



**Clemens Scherzer, MD, MBA,**  
*Academic Chief, Movement Disorders*



**Katherine DeStefano, MD, MS,**  
*Clinical Chief, Neuro-Immunology*



**Emily J. Gilmore, MD, MS,**  
*Clinical Chief, Neurocritical Care and Emergency Neurology*



**Lawrence Hirsch, MD,**  
*Academic Chief, Epilepsy*



**Antonio Omuro, MD,**  
*Chief, Neuro-Oncology*



**Daniel DiCapua, MD,**  
*Clinical Chief, Neuromuscular Medicine*



**Guido Falcone, MD, ScD,**  
*Academic Chief, Neurocritical Care and Emergency Neurology*



**Sayed (Ausim) Azizi, MD, PhD,**  
*Academic Chief, Neurocritical Care and Emergency Neurology*



**Joseph Schindler, MD,**  
*Clinical Chief, Vascular Neurology*



**Serena Spudich, MD, MA,**  
*Chief, Neurological Infections and Global Neurology*



**Stephen Strittmatter, MD, PhD,**  
*Academic Chief, Neurodegenerative Disorders*



**Veronica Santini, MD, MA,**  
*Clinical Chief, Movement Disorders*



**Sasha Zivkovic, MD, PhD,**  
*Clinical Chief, Movement Disorders*



**Hamada Hamid Altalib, DO, MPH,**  
*Chief of Neurology, VA CT*



**Srikant Rangaraju, MBBS, MS,**  
*Academic Chief, Vascular Neurology*

## POSTGRADUATE EDUCATION + TRAINING PROGRAMS (Residency Program Directors)



**Jeffrey Dewey, MD, MHS,**  
*Associate Program Director, Neurology Residency, Director of Wellness, Neurology Residency*



**Jeremy J. Moeller, MD, MSc,**  
*Vice-Chair of Education, Neurology; Neurology Residency Program Director*



**Sara Schaefer, MD, MHS,**  
*Associate Neurology Residency Program Director*



**Darren Volpe, MD,**  
*Associate Program Director, Neurology; VA Site Director, Yale Neurology Residency Program*

## FELLOWSHIP PROGRAM DIRECTORS



**Joachim Baehring, MD,**  
*Director, Neuro-Oncology Fellowship Program*



**Daniel DiCapua, MD, FAAN,**  
*Director, Neuromuscular Medicine Fellowship Program*



**Christopher Traner, MD, MHS-Med Ed,**  
*Associate Director; Clinical Neurophysiology ACGME Fellowship Program; Associate Director, Epilepsy ACGME Fellowship Program*



**Emily J. Gilmore, MD, MS, MS,**  
*Co-Director, Critical Care EEG*



**Jeffrey Dewey, MD, MHS,**  
*Director, Neurology Clerkship*



**Lawrence Hirsch, MD,**  
*Program Director, Clinical Neurophysiology ACGME Fellowship Program; Program Director, Epilepsy ACGME Fellowship Program; Co-Director, Critical Care EEG Fellowship Program*



**Erin Longbrake, MD, PhD,**  
*Director, Neuro-Immunology/Multiple Sclerosis Fellowship Program*



**Reshma Narula, MD,**  
*Director, Vascular Neurology Fellowship Program*



**Sara Schaefer, MD, MHS,**  
*Director, Movement Disorders Fellowship Program*



**Christopher Gottschalk, MD, FAHS,**  
*Director, Headache & Facial Pain Center Fellowship Program*



**Stephanie Towns, PsyD, ABPP,**  
*Training Director, Neuropsychology Postdoctoral Residency Program*



**Rachel Beekman, MD,**  
*Director, Neurocritical Care Fellowship Program*



**Emily Sharp, PhD, ABPP,**  
*Associate Training Director, Neuropsychology Postdoctoral Residency Program*



**Darren Volpe, MD,**  
*Director, Behavioral Neurology and Neuropsychiatry Fellowship Program*

## CLERKSHIP



# Neurology Leadership

## 2022-2023 CHIEF RESIDENTS

### Education



Aaron Bower, MD



Harry Sutherland, MD

### Recruitment



Kathryn Zuchowski, MD



Annie Yang, MD

### Clinical



Barbara Gordon-Kundu, MD



Melissa Mariscal, MD

### Scheduling



Anisha Garg, MD, MA



Victor Bushlyar, MD

### Research

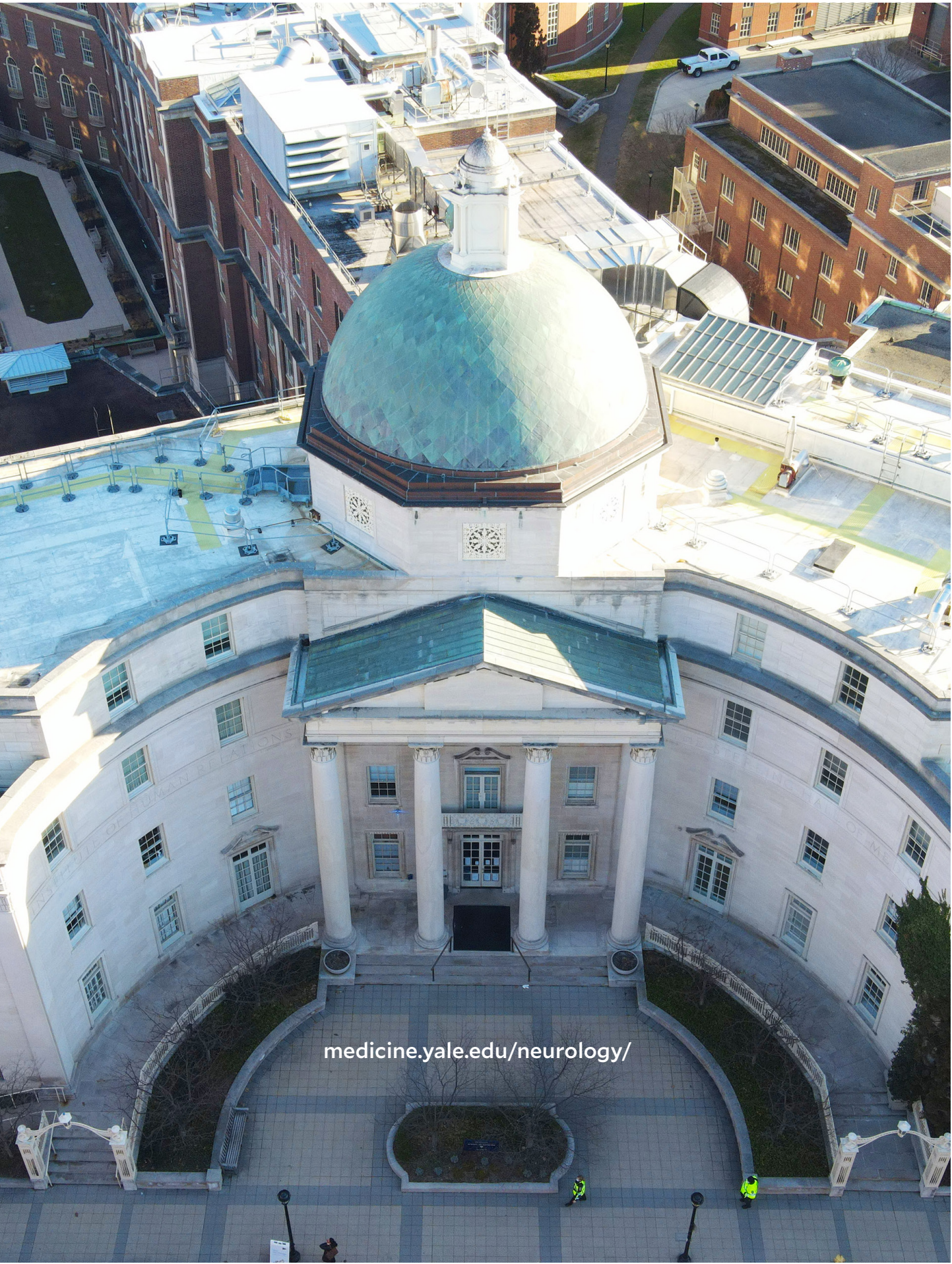


Sloane Heller, MD

### Wellness



Lindsey Houghton, MD, MA





Yale SCHOOL OF MEDICINE  
*Department of Neurology*