It is my very distinct honor to lead the Department of Neurology at the Medical College of Wisconsin. I am very pleased to share this Impact Report to highlight our programs, our people, and our accomplishments. Our department boasts over 70 faculty who are locally, nationally, and internationally recognized for their excellence in clinical care, research, and education in all areas of Neurology and Neuropsychology. Our clinical programs provide extraordinary, specialized care for the spectrum of Neurologic disorders for all stages of life, from birth to geriatrics. We conduct innovative and groundbreaking research from bench to bedside, and our expanding educational programs help assure continued excellence in the future for all our missions. Research is burgeoning in the department. Our expanding portfolio includes investigator driven basic and translational research, in addition to collaborations at local, regional, national, and international levels to advance knowledge and provide opportunities for the most innovative experimental care. We assure the future of Neurologic care and research as well with ACGME accredited residency training programs in Adult and Child Neurology, and fellowships in Neuropsychology, Neuroimmunology, Clinical Neurophysiology, Epilepsy, Headache, Vascular Neurology, NeuroEndovascular Surgery, and Neurocritical Care.

We proudly join our partners Froedtert Health, Children’s Wisconsin, and the Zablocki VA Hospital to provide extraordinary, innovative, high-quality care for all aspects of Neurologic disorders for people of all ages throughout Wisconsin, the whole Midwest and beyond.

Please enjoy this Neurology Impact Report. For more information about our faculty and department, I invite you to visit www.mcw.edu/departments/neurology.

Ann Helms, MD, MS
Professor and Interim Chair
The Medical College of Wisconsin ALS program at Froedtert Hospital has been designated a Center of Excellence by the ALS Association since 2006 and remains a top tier center for patient care, education, and research. The ALS program serves most of Wisconsin, adjacent areas in Illinois, and the western UP of Michigan.

The ALS program is directed by Drs. David Shirilla and Dominic Fee. Dr. Paul Barkhaus started the first full multidisciplinary clinic to serve veterans in the VA system which has also been designated by the ALS Association as a Center of Excellence.

**MUNIX**

Motor Unit Number Indexing (MUNIX) is a novel neurophysiological tool to estimate motor neuron loss in ALS and related disorders. This was developed at MCW by Drs. Barkhaus and Nandedkar and is becoming an internationally used surrogate marker for ALS progression in treatment trials.

**HEADACHE**

Largest number of headache medicine providers for any institution in Wisconsin with 5 board-certified headache medicine physicians, 2 advanced practice providers, and a pain psychologist.

The Chronic Migraine program led to an 84% reduction in migraine disability days (MIDAS) and a 91% improvement in migraine quality of life score (MSQOL).

**Clinical trials in the past two years**

5

**Topics Published**

60

Dr. Barkhaus collaborates with a national consortium in writing the popular patient-oriented series ALSUntangled.

**Publications in the last two years**

22

**MUNIX**

Only UCNS accredited fellowship in headache medicine in Wisconsin

Only dedicated multi-disciplinary program for the treatment of chronic migraine in the state.
The Medical College of Wisconsin is home to comprehensive epilepsy programs for both adults and children. The Froedtert Hospital Comprehensive Epilepsy Program and the Children’s Wisconsin Comprehensive Epilepsy Program are accredited by the NAEC as Level 4 epilepsy centers. These centers provide patients access to multidisciplinary care teams with a full range of diagnostic and therapeutic options including both medical and surgical options.

**ADULT NEUROLOGY RESIDENCY**

Shaping the Future of Neurology

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**Neuromodulatory Devices**

Treatment Resistant Epilepsy

297 VNS devices implanted from 2010 to present

Devices implanted 2019-2020

39 VNS 10 RNS 3 DBS

Only magnetoencephalography (MEG) program in Wisconsin.

156 MEG studies for 2019-2020

**Epilepsy Surgery**

Treatment Resistant Epilepsy

178 epilepsy surgeries from 2010 to present

Epilepsy Surgery 2019-2020

22 Single Stage Surgeries

20 Intracranial EEG Studies

35 Intra-operative ECoG/Awake Mapping

Our residency graduates have gone on to fellowships in virtually all major subspecialties of Neurology

>800 Applicants for Match (March 2021)
MEMORY DISORDERS

Imaging Biomarkers in Mild Cognitive Impairment (MCI)

Drs. Malgorzata Franczak and Laura Umfleet, along with colleagues in neurology and neuroradiology, are conducting innovative research using cutting-edge brain MRI biomarkers to identify and study novel physiological mechanisms that predict cognitive dysfunction in patients with mild cognitive impairment.

This work will inform future interventional studies to reduce the morbidity in the aging population.

The Gut-Brain Interactome

Recently, the memory disorders group has assembled a research team with expertise in evaluation the human gut microbiome, Alzheimer's Disease dysconnectivity, and Alzheimer's Disease symptomatology. Ongoing efforts will leverage shared innovative gut-brain models and state-of-the-art neuroimaging techniques to yield new discoveries in Alzheimer's Disease.

NEURO-IMAGING RESEARCH

MCW Neurology faculty are world leaders in research on how the brain processes language and speech. The Language Imaging Laboratory, directed by Dr. Jeffrey Binder, has been continuously funded by the National Institutes of Health for over 25 years and has produced landmark studies on how the brain perceives speech sounds, recognizes written words, and retrieves word meanings. For more information go to www.neuro.mcw.edu.

FATES

Dr. Binder and MCW faculty recently led a nationwide study called fMRI in Anterior Temporal Epilepsy Surgery (FATES), which tested these methods at 9 centers across the country and established the first standardized protocol for mapping language regions in the brain prior to surgery.

Other major NIH-funded studies led by Dr. Binder and colleagues include the Epilepsy Connectome Project, which aims to understand changes in brain network connectivity induced by epilepsy and Concept Representation in the Human Brain, which aims to understand how knowledge about the meaning of individual words is organized in the brain and how brain damage from stroke affects these networks.

NORMAL PRESSURE HYDROCEPHALUS (NPH) PROGRAM was established in 2009 by Dr. Franczak and is the only NPH program in the state of Wisconsin. The NPH program serves patients in Wisconsin, northern Illinois and Iowa.
MS & NEUROIMMUNOLOGY

Our comprehensive MS center is designated as a partner in care by the National MS Society and a member of the Consortium of MS centers.

We are a national destination for patients with multiple sclerosis (MS), central nervous system autoimmune inflammatory disease, inflammatory optic neuritis, chronic relapsing inflammatory optic neuritis (CRION), neuromyelitis optica spectrum disorders (NMOSD) including anti-MOG disease, autoimmune encephalitis (AE), and Susac disease.

MOVEMENT DISORDERS

75
Quarterly average number of new patients seen in Movement Disorders

30
Number of patients undergoing DBS implantation since July 2019

>200
Patients followed with DBS for Movement Disorders

We have the only fellowship training program in neuroimmunology and MS in Wisconsin.

10 Active Clinical Trials

- Trials of existing therapeutic agents
- Trials of novel therapeutic agents
- Integration of technology in the assessment of multiple sclerosis
- Active collaborations with the Engineering Department of Marquette University
The comprehensive Neuromuscular Diseases Program at MCW integrates both pediatric and adult patients with diverse neuromuscular disorders that are seen in dedicated Neuromuscular Clinics and the Muscular Dystrophy Association (MDA) Clinics. As they reach adulthood, the pediatric patients are transitioned from the MDA Clinic at Children’s Wisconsin to the adult clinic at Froedtert Hospital.

The Neuromuscular Diseases Program at MCW is one of the few such programs in the country to perform and read their muscle biopsies. The new and state-of-the-art Froedtert Hospital electroneuromyographic (EMG) laboratory is certified by the American Association of Neuromuscular and Electrodiagnostic Medicine (AANEM). Over 2,500 basic EMG and advanced clinical neurophysiologic procedures (e.g., single fiber EMG and laryngeal EMG) are performed annually at Froedtert Hospital, Children’s Wisconsin, and the VA Medical Center.

Dr. Michael Collins is an internationally-recognized authority on vasculitic neuropathies. He has chaired numerous workshops and committees on these disorders.

12 publications since 2019

Dr. Matt Harmelink, pediatric neuromuscular specialist, leads an expanding program utilizing cutting-edge therapies for such diseases as spinal muscular atrophy and Duchenne muscular dystrophy. The improvements and availability of genetic testing has facilitated making diagnoses in rare disorders. The NMDP program has also started a COLLABORATIVE PROGRAM with Plastic Surgery in the assessment and management of brachial plexus disorders in infants.

## CHILD NEUROLOGY

Our Child Neurology program is the largest in Wisconsin with specialists in neurogenetics, epilepsy, neurocritical care, neonatal neurology, and neuromuscular medicine.

Our group participates in NIH, industry, and investigator sponsored trials ranging from addressing acute flaccid myelitis to the use of near infra-red spectroscopy in epilepsy to exploring genetic modifying therapies in neuromuscular disease. We provide a year-long research experience for all of our Child Neurology Residents (PGY2).
NEURO-ONCOLOGY

1,000+ Patient cases are presented each year at the weekly comprehensive multi-disciplinary brain tumor board.

11 Clinical trials currently open for patients with brain tumors

12 Publications in the past year from the Neuro-oncology Translational Research Team

The Neuro-oncology team administers and hosts one of the largest brain banks of its kind to support brain cancer research. Because of the generosity of patients and their families, the Neuro-oncology team participates in groundbreaking research funded by the National Cancer Institute and the National Institutes of Health.

NEUROPSYCHOLOGY

>100 fellows trained in the >40 year history of the Neuropsychology Fellowship Program

Active research in multiple areas with over 100 publications in the past 5 years

- Technology and psychometrics in neuropsychological assessment - Dr. Umfleet
- Cognitive outcome in the pediatric brain tumor - Dr. Koop
- Performance and symptom validity - Dr. Vogt
- Congenital heart disease and cognition across the lifespan - Drs. Loman and Umfleet
- Neuropsychological outcomes in preschool age children with medical disorders - Dr. Heffelfinger
- Acute effects, recovery and outcome from traumatic brain injury in civilians, athletes and military service members - Drs. Brett, McCrea, and Nelson
- Aphasia Research and Recovery - Dr. Pillay
- Neuroimaging, the microbiome and neurodegenerative conditions - Dr. Umfleet
- Neuroimaging & cognitive outcome after epilepsy surgery - Drs. Swanson, Janecek, Koop, Pillay, and Conant
- TBI and neurological sequelae later in life - Dr. Brett
- Post COVID cognitive outcome - Drs. Bobholz, Swanson, and Umfleet
- Functional neuroimaging of typical and atypical reading development - Dr. Conant
- Concept representation in the human brain - Drs. Conant and Pillay
- How to operate a pediatric neuropsychology practice during the COVID-19 pandemic: Real tips from one practice’s experience - Drs. Heffelfinger, Koop, Loman, and Vogt
Froedtert Hospital is a Comprehensive Stroke Center designated by The Joint Commission with 7 specialists in vascular neurology.

Door-to-needle (DTN): Froedtert Hospital consistently achieves some of the fastest times in the nation for acute ischemic stroke treatment with thrombolysis.

### Door to Needle - Eligible Cases

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<th>Year</th>
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>180 Active Research Studies

- ALS
- Autonomics
- Child Neurology
- Epilepsy
- Headache Medicine
- Language and Cognition
- Memory Disorders
- Movement Disorders
- Multiple Sclerosis & Neuroimmunology
- Neuromuscular Medicine
- Neuropsychology
- Stroke

DEPARTMENT OF NEUROLOGY

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Ann Helms, MD, MS

Vice Chair, Research
Jeffrey Binder, MD

Vice Chair, Education
Chad Carlson, MD, FAAN

Vice Chair, Clinical Affairs
Dominic Fee, MD, FAAN, FAANEM

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Naveen Addagatla, MD
Christopher Anderson, MD
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Paul Barkhaus, MD, FAAN, FAANEM
Humberto Battistini, MD
Patrick Bauer, MD
Ryan Brennan, DO
Staley Brod, MD
Chad Carlson, MD, FAAN
Thomas Chelimsky, MD, FAAN
Michael Collins, MD, FAANEM
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Sheila Eichenseer, MD
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Jonathan Florczak, MD
Malgorzata Franczak, MD
Frederick Freitag, DO, FAHS, Emeritas
Elias Granadillo Deluque, MD
Sam Hooshmand, DO
Eric Jackowiak, MD
Ahmed Obeidat, MD, PhD
Manoj Raghavan, MD, PhD
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Alexandria Lutley, MD
Niyati Mehta, MD
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Lisa Conant, PhD
Amy Heffelfinger, PhD, MPE
Julie Janecek, PhD
Jennifer Koop Olsta, PhD
Michelle Loman, PhD
Sara Pillay, PhD
Laura Umfleet, PsyD
Elisabeth Vogt, PhD

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