

JANUARY 2022

# NeuroNExT

from the Departments of Neurological Sciences & Neurosurgery

## Happy New Year!

Welcome to NeuroNExT's new look. We are excited to recap aspects of 2021 neurology, neurosurgery and neuroscience progress and forthcoming opportunities on topics ranging from using real world behavior such as the automobile to index health and disease; teaching the next generation of caregivers, educators, and scientists; computing tools to analyze large brain and behavior data sets; new surgical tools and medical treatments; and new faculty and program growth.

The U.S. National Institutes of Health (NIH) is the world's largest public funder of biomedical research. Flagship programs such as its National Institute for General Medical Studies (NIGMS) Clinical and Translational (CTR) award to the University of Nebraska Medical Center (UNMC), led by us here in the Department of Neurological Sciences (DONS), enables teams of scientists and physicians, working at

medical schools and teaching hospitals, to discover new targets, treatments and cures, radiating from the laboratory to the bedside and the community, with valuable feedback to refine future approaches.

The SARS/COV-2 pandemic has underscored the power of an integrated national research network for biomedical discovery to address urgent and emerging public health issues. Providers and researchers in academic medicine at UNMC have been responding and working productively through the pandemic. Our academic research community has our nation's attention as not for decades, underscoring once in a generation organizational opportunities around clinical and translational science.

There has never been a better time to work on new knowledge, treatment, cures to enhance brain and CNS development, and health across the lifespan.



**Matthew Rizzo, MD, FAAN**  
*Frances & Edgar Reynolds Chair  
Professor, Department of  
Neurological Sciences*



**Aviva Abosch, MD, PhD**  
*Nancy A. Keegan & Donald R.  
Voelte, Jr. Chair  
Professor, Department of  
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**Howard Fox, MD, PhD**  
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# How's your driving?

## How car sensors monitor Alzheimer's disease

It's an unobtrusive way to track health, disease and how well a treatment works. And it's probably something you've used before: the car.

University of Nebraska Medical Center (UNMC) researchers use real-world behavior to potentially detect diseases like Alzheimer's disease. "How diseases play out in the real world is important," explains neurologist Matthew Rizzo, MD. "We have clinical tools to diagnose a disease like blood tests, physical exams, patient histories and thinking tests. But sometimes there's a mismatch between what you see in the clinic and what goes on in the real world."

Driving data may give "boots-on-the-ground" evidence of real-world brain health. "Driving is a marvelous laboratory for the brain," says Dr. Rizzo. "We call it 'brain in the wild.'"

Using driving habits and patterns to predict a disease — before a clinical test — could give patients precious time for intervention and treatment. Alzheimer's disease can start 15 to 20 years before someone is diagnosed. By the time a doctor can identify the disease in the clinic, it's often too advanced to treat. So the faster you catch Alzheimer's, the better.

Dr. Rizzo is joined by neurology researcher Jennifer Merickel, PhD, Daniel Murman, MD, Vaishali Phatak, PhD, and the research team at the Mind & Brain Health Labs. The team places accelerometers, pedal detectors, cameras and other unobtrusive



sensors into a participant's car. The sensors send driving data to the lab for analysis.

"Looking at these measurements over weeks and years, you can see how someone's behaviors change," explains Dr. Merickel. "Which is exactly what you need to know in someone who's declining." The research team uses these patterns to make informed inferences about a person's disease. The data can also show how a drug or therapy helps improve a person's life space and real-life experience.

"Alzheimer's changes a person's ability to act, decide and respond. It changes their ability to monitor themselves and their surroundings, as well as their situational and

self-awareness," says Dr. Rizzo.

For instance, a person with Alzheimer's may experience delayed reaction times to upcoming obstacles or traffic signals. With red flags like jamming the brakes or sudden swerves, along with video recordings of a person's reactions, the team can monitor a person's driving abilities over time. The team uses a machine-learning approach to sift through the firehose of data.

In time, Dr. Rizzo and Dr. Merickel hope to see if they can use a person's vehicle to monitor the progression of several diseases, including Parkinson's disease, diabetes and rheumatoid arthritis.

## Interested in joining the driving study?

Email the Mind & Brain Health Labs at [mbhl@unmc.edu](mailto:mbhl@unmc.edu) or call 402-559-6870. See this and other active neurology studies at [NebraskaMed.com/Mind-Research](https://NebraskaMed.com/Mind-Research)



# Renewal, largest research grant in UNMC history

The National Institute of General Medical Sciences (NIGMS) has awarded UNMC its largest research grant in the university's history.

Great Plains Institutional Development Award program for Clinical and Translational Research (IDeA-CTR) received the five-year, \$20.3 million award in November 2021 — a renewal of a then-record \$20 million National Institutes of Health (NIH) funding award from 2016. At \$4.3 million during year one and \$4 million for years two through five, this award will enhance clinical and translational science across the region.

Frances & Edgar Reynolds Chair and Professor Matthew Rizzo, MD, in the UNMC Department of Neurological Sciences, is leading the group representing all IDeA-CTR awardees.

"It's a privilege to have won the federal support we need to launch great, new scientific teams, plans and partnerships — to advance national biomedical science

and health for all the communities we serve," Dr. Rizzo said. "We are excited to be launching innovative programs in technology spanning medicine and engineering, an academic public-private board, a community-engaged clinical and translational research incubator, team science and other initiatives."

The 2021 renewal brings continued support for health-related research to serve unique populations in the Great Plains.

"This grant mechanism was very effective in building new infrastructure and collaborative research teams across the region," said Jennifer Larsen, MD, UNMC vice chancellor for research. "Dr. Rizzo is well poised to advance our collaborative clinical-translational research and resources over the next five years."

With this renewal, UNMC leads a regional consortium of partners, including:

- University of Nebraska-Lincoln
- University of Nebraska at Omaha
- University of Nebraska at Kearney
- Boys Town National Research Hospital
- Children's Hospital & Medical Center
- Creighton University
- Omaha VA Medical Center

Practice Based Research Network (PBRN) spans 68 clinical sites across the Great Plains

"We have a talented and dedicated scientific team and have made huge strides together over the past five years," Dr. Rizzo said.

"This award recognizes the strong work and endurance of all who contributed in the face of the pandemic."

## Medical Students Highlight

Medical students pursuing neurology received a Hammer from the American Academy of Neurology presented by Dr. Diego Torres professor and vice-chair of education in the Department of Neurological Sciences.



Left to right, Dr. Torres, Nathan Zaroban, Gabriella Rizzo, Hannah Maldonado, Joseph Benes and Phylon Gatchoff



Anna Dunaevsky, PhD  
Professor, Developmental  
Neuroscience, Department of  
Neurological Sciences

## Cognitive Neuroscience of Development and Aging Center acquires a high-performance computing cluster

Neuroscience research increasingly relies on high-performance computing resources because of the enormous volumes of data generated by modern neuroscience methods and because of the sophisticated processing necessary for analyses of those data.

The Cognitive Neuroscience of Development and Aging (CoNDA) Center for Biomedical Excellence in Research (COBRE) is engaged in research activities that in fact produce vast amounts of digital data. For example, current studies of the human brain that use MRI methods generate data at much higher spatial and temporal resolution than past work, and the complexity of new methods and expectations for multiple analysis paths has also increased.

The same considerations also apply to other neuroscience methods used by CoNDA investigators including multidimensional microscopy data sets (volumetric, multiple channels, time-lapse) of brain cell structure and function, video recordings of animal behavior, small-animal MRI, human

magnetoencephalography, and more.

The CoNDA Center received an NIGMS Administrative Supplement, in the amount of \$249,978 towards a purchase of a CoNDA Center dedicated HPC cluster.

The cluster will include eight compute “nodes” (each with 40 CPU cores and 1 TB of RAM), two GPU nodes (each with four NVIDIA Ampere A100 GPUs) and high-volume online rack-mounted storage (two PB/2000 TB before accounting for redundancy). The CoNDA cluster would be administered by UNMC’s Research Information Technology Office (RITO) personnel who have expertise in administration of HPC resources. The HPC cluster will be available to users of CoNDA center supported cores.



# An expanding research network

by Vicky Cerino, UNMC strategic communications , and others | October 29, 2021

The Great Plains Primary Care Practice-Based Research Network (PBRN), a collaboration between clinicians and researchers across the region, was developed to expand research into rural and medically-underserved populations.

Led by UNMC's Matthew Rizzo, MD, Jeffrey Harrison, MD, Keyonna King, DrPH, MA, and others, the group looks to expand the network, which was launched in 2016 to improve access to health care resources and promote primary care research across the region. The mission of the PBRN is to engage clinicians, investigators and patients through research, collaboration and community involvement to improve the health and quality of life in the Great Plains.

"We are working to improve and strengthen the network to build connections for doing translational research in communities," said Dr. Rizzo. "Clinical research is typically done at large academic health science centers, which is part of our mission, but we want to include more physicians in the community where most of the population is getting most of their care, most of the time."

He said collaboration provides an opportunity to expand knowledge of health issues in the community, for example Alzheimer's disease, cancer, diabetes, obesity, drug and alcohol misuse, and exposure to toxins.

A recent renewal of the Great Plains IDeA-CTR — a collaborative effort between eight partner institutions across Nebraska with links to institutions in North Dakota, South Dakota and Kansas — will increase opportunities for UNMC faculty to collaborate with rural physicians on investigator-initiated studies and clinical trials, as well as expand recruitment of under-represented communities.

Already, more than 70 primary care sites across the region participate in the network. The majority of these are in Nebraska, but there also are participating sites in North and South Dakota.

Community Engagement and PBRN Coordinator, Emily Frankel, MPH, has provided crucial administration insight and development of the



Emily Frankel, MPH  
*Community Engagement & PBRN Coordinator*

PBRN network. "Working intimately with clinic sites across the state has highlighted the disparities in healthcare and research resources in rural and nearby communities. The PBRN strives to address these inequities by providing professional development opportunities, needed resources and leveraging CTR infrastructure to improve the health and quality of life of all Nebraska residents," says Frankel.

"We want to increase awareness of this network, encourage collaboration and drive enrollment," Dr. Rizzo said. "Rural community physicians have much to contribute. They have their ear to the ground on what health problems affect their communities, have research ideas to explore and provide value on what's happening outside of an academic medical center."

Participating in the PBRN also yields additional benefits, he said. "It's an opportunity for intellectual curiosity and growth, contribution to science, a chance to collaborate with likeminded clinicians and researchers, share ideas and hypotheses, and contribute to science-based care through authorship in publications."

# Studying Post-COVID Cognitive Complaints in Nebraska and Beyond

by David E. Warren, PhD

People who recover from COVID-19 often report lingering health issues. This phenomenon has many names, among them “long COVID,” “post-COVID syndrome,” and “post-acute sequelae of COVID-19” or “PASC.” Whatever name is preferred (we use “post-COVID” at UNMC/Nebraska Medicine), the perceived problems appear to be common, valid and persistent.

Some frequent physical complaints include changes with breathing, heart rate and fatigue among others. In addition, many people who recover from COVID-19 report changes in how they think or feel. These cognitive and psychiatric complaints can include “brain fog”, anxiety, depression, PTSD and sleep disturbances. UNMC’s Department of Neurological Sciences (DONS) is teaming with researchers and clinicians at our institution and beyond to help study these lasting effects of COVID-19.

With support from DONS chair Matthew Rizzo, MD and Associate Dean for Research Howard Fox, MD, PhD, David E. Warren, PhD, is contributing to post-COVID research on the UNMC campus. In collaboration with faculty in UNMC’s Department of Internal Medicine (IM) and many others, this summer Dr. Warren developed and deployed a symptom questionnaire for individuals with post-COVID complaints. Information gathered through this questionnaire was an important contribution to the development of UNMC’s post-COVID clinic, led by Andrew Vasey, MD, IM with important support from Debra Romberger, MD, IM chair. Furthermore, Dr. Warren teamed with Dr. Vasey and John Dickinson, MD, PhD, also of IM, to pursue opportunities for UNMC/Nebraska Medicine to contribute to national studies of

the post-COVID syndrome. In collaboration with a consortium of IDeA-CTR sites, UNMC/Nebraska Medicine anticipates contributing to a large-scale, nationwide study of post-COVID syndromes beginning in early 2022.

Jerrold Anzalone, MS, DONS, along with Jim McClay, MD, MS, Emergency Medicine, has provided clinical informatics expertise on COVID-19 discoveries, particularly in the areas of rural health and patients with immunosuppression. His focus over the past six months has increasingly shifted to studying the Long COVID and vaccine efficacy in at-risk populations using real-world data. His research utilizes local EHR data from UNMC’s Clinical Research Analytics Environment (CRANE) and national efforts, including the National COVID Cohort Collaborative (N3C), both of which are open and available to UNMC researchers NOW. To learn more or get involved, please reach out to Jerrod (alfred.anzalone@unmc.edu).

Research on post-COVID cognitive complaints is essential to the potential development of therapies to address these issues. A critical element of all post-COVID studies will be determining whether and how post-COVID complaints differ from complaints from survivors of other respiratory diseases. Perhaps supporting a unique effect of this virus, there is recent

evidence from peer-reviewed studies showing that the SARS-CoV-2 virus that causes COVID-19 can be found in post mortem brain tissue. This could suggest that the virus alters the brain and related cognitive processes by affecting brain tissues. However, much more research will be necessary to test this speculative account. In the meantime, researchers in DONS and other UNMC departments are eager to contribute to national and local studies of COVID-19 with the goals of first characterizing how this disease affects the brain and cognition and then working to develop treatments, rehabilitation approaches or compensatory strategies to help individuals who suffer from post-COVID cognitive deficits. Our team is gratified to be able to make this small contribution to larger efforts seeking to combat the current COVID-19 pandemic.

For more information on current or future post-COVID research in the UNMC Department of Neurological Sciences, please feel free to contact Dr. Warren at [david.warren@unmc.edu](mailto:david.warren@unmc.edu)



# Behavioral Neurology & Memory Disorder Program Update

by Daniel Murman, MD, Director of Memory Disorders & Behavioral Neurology Program and Division Chief of Neuropsychology/Behavioral/Geriatric Neurology

## Alzheimer's Disease Clinical Trials

Over the past 15 years, the Memory Disorders Program has been active in numerous, multicenter clinical trials for Alzheimer's disease (AD). Currently, we are participating in a 4.5-year prevention trial for patients at risk for AD based upon elevated levels of brain amyloid on an amyloid PET scan (i.e., the Anti-Amyloid Treatment in Asymptomatic Alzheimer's Disease or "A-4 Study"). Also, we are participating in a 2-year anti-amyloid immunotherapy trial for subjects with prodromal to mild AD comparing gantenerumab to placebo (Graduate II Study). We are actively recruiting subjects for the ADvance II Study investigating deep brain stimulation (DBS) of the fornix as a treatment for mild AD and a separate pilot study of David Warren, PhD, looking at non-invasive brain stimulation using repetitive, transcranial magnetic stimulation (rTMS) in subjects with amnesic, mild cognitive impairment. Finally, we are recruiting for the Green Memory Study of a naturalistic treatment that modifies the gut microbiome and may decrease brain inflammation in subjects with mild to

moderate AD who are not taking symptomatic treatments for AD (e.g., Aricept, Namenda). Deb Heimes, Nick Miller and Haley Kampschnieder coordinate these AD trials.

For more information about any of these studies, you can contact the research teams at [adtrials@unmc.edu](mailto:adtrials@unmc.edu).

## Great Plains, Institutional Development Award for Clinical and Translational Research

The Great Plains, Institutional Development Award for Clinical and Translational Research (GP IDeA-CTR) received supplemental NIH funding to develop the Great Plains Cognitive Network Registry (GP CogNET), to identify subjects interested in research related to cognitive health, brain aging, and degenerative diseases such as Alzheimer's disease and related disorders. GP CogNET is designed to inform subjects about potential research opportunities that they might qualify for and provide updates on research advances in mind and brain health. Emily

Frankel coordinates the GP CogNET Registry. Adults 19 years or older can enroll themselves or enroll a loved with cognitive impairment at <https://gp.cognet.unmc.edu>.

Checkout Fall 2021 GP CogNET Newsletter for more information about studies recruiting subjects: [unmc.edu/neurologicalsciences/news/cognetnewslettervol1.pdf](https://unmc.edu/neurologicalsciences/news/cognetnewslettervol1.pdf)

## Lewy Body Dementia Initiative

With philanthropic support, we have launched a Lewy Body Dementia (LBD) Initiative in 2021. LBD consists of two related clinical syndromes, specifically Dementia with Lewy Bodies (DLB) and Parkinson's Disease with Dementia (PDD). The goal of the LBD Initiative is to build sustainable LBD programs at UNMC focused on providing innovative clinical care for patients with LBD; delivering educational programs for patients, families and healthcare providers to improve their awareness and ability to manage LBD symptoms; and developing a clinical research program focused on early diagnosis and more effective treatments for patients suffering from a LBD. Julie Pavelka, APRN-AP has begun a focused LBD outpatient clinic and has initiated a Lewy Body Dementia Support and Wellness Group that meets monthly.

## Memory Disorders Clinic

The Memory Disorders Clinic evaluates and treats older adults who are experiencing cognitive decline related to a brain disorder, most commonly a degenerative disease such as Alzheimer's disease (AD) and related disorders. The Memory Disorders Team



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# Neurosurgery Residency Update

The Department of Neurosurgery is currently in the annual resident-selection process.



William Thorell, MD  
Professor, Department of  
Neurology

The annual selection process began on September 15, 2021, when medical students could begin registering for the match and will conclude on Match Day, March 19, 2022. Neurosurgery trains two residents per year in the seven-year training program. The program, which has a combination of UNMC, MDWestONE, Children's Hospital & Medical Center and Boys Town National Research Hospital neurosurgeons, will interview 40 applicants selected from 264 applicants. This was the largest number of applications the program has received.

groups in medical education weighed in, and virtual was agreed upon as the best method.

Using virtual platforms for interviews is a significant change from the long-standing process with travel, a day's worth of interviews and campus tours. These have been replaced with video tours, breakout rooms, website upgrades and podcasts. The Department of Neurosurgery holds four virtual interview days with ten applicants participating in the interviews with most, if not all, the faculty and some residents. After completion of all interviews, the faculty meet to discuss a rank list that will be sent to the National Residency Match Program that manages the matching process.

While most neurosurgeons have mixed feelings about the virtual format, it certainly is more economical for the applicants and time lost from educational activities is lessened.

Program director, William Thorell, MD, says: "I must admit that I enjoy the in-person interview days and would like them to return. However, there are advantages to the virtual interviews, and they are likely going to be part of the match process in the future."

The Covid19 pandemic has led to virtual interviews for the second year in a row. While neurosurgery and other specialties considered returning to in-person interviews or a hybrid model, ultimately, AAMC and other

*Program Update from pg. 7*

consists of two fellowship-trained behavioral neurologists, Daniel Murman, MD and Matthew Rizzo, MD; two advanced practice nurse practitioners, Rebekkah Thomas, APRN and Julie Pavelka, APRN-AP; a nurse case manager, Denise Struble, RN; and a medical assistant, Jessica Zagata, MA. The Memory Disorders Clinic evaluates and treats over 300 new patients each year with over 1000 patient follow-up visits. Approximately 42% of patients seen in the Memory Disorders Clinic have Alzheimer's disease, 28% Mild Cognitive Impairment and 30% other causes cognitive decline (e.g., a Lewy Body Dementia, Frontotemporal Dementia, Vascular Dementia). We strive to utilize the latest diagnostic tools, provide the best evidence-based treatments and assist patients and their families in getting information about living with the disorder and finding caregiving resources.

## Mind and Brain Health Lab

One important study that is actively recruiting subjects is the Mind and Brain Health Lab's Driving Study of older adults to investigate the impact of aging, Mild Cognitive Impairment and early Alzheimer's disease symptoms on driving abilities, sleep and mobility. This research study may increase our knowledge of how to detect and diagnose the early clinical signs of AD.

## UNMC Behavioral Neurology and Neuropsychiatry Fellowship

The UNMC Behavioral Neurology and Neuropsychiatry (BNNP) Fellowship is a United Council of Neurologic Subspecialties (UCNS)-accredited BNNP Fellowship program and the only such program in the area. Residents who have successfully

completed a neurology or psychiatry residency are eligible to apply for the BNNP Fellowship. After the first clinical year of BNNP Fellowship training, fellows are eligible to sit for the UCNS BNNP board examination and receive subspecialty certification. Daniel Murman, MD, is the BNNP fellowship director and Amelia Nelson Sheese, PhD, ABPP-CN, Thomas Magnuson, MD, Matthew Rizzo, MD, FAAN, and Steven Wengel, MD serve as core faculty. Our first BNNP fellow, Sasha Rai, MD, graduated in 2021 and our second fellow, Erin Kindred, MD, will graduate in 2022.

Find our UNMC BNNP Fellowship flyer at: [unmc.edu/neurologicalsciences/education/fellowships/bnnpfellowshipflyer.pdf](https://unmc.edu/neurologicalsciences/education/fellowships/bnnpfellowshipflyer.pdf)



# New Faculty

## Department of Neurological Sciences



### John O'Hara, PsyD

Dr. O'Hara joined the Department of Neurological Sciences in December as an assistant professor in neuropsychology.

He completed his residency at the Institute of Living at Hartford Hospital. His professional interests include memory disorders, stroke, right hemisphere syndromes/disorders, evaluation of social cognition and psychoeducational groups for caregivers/patients with cognitive disorders.

Dr. O'Hara has professional memberships with the National Academy of Neuropsychology (Student and Post-Doctoral Resident Committee, Leadership Ambassador Development Program (LEAD) Task Force, American Academy of Clinical Neuropsychology (Affiliate Member), International Neuropsychological Society, American Psychological Association and Illinois Psychological Association.

We are excited to have Dr. O'Hara join the team and advance the DONS' efforts in neurological health.

## Department of Neurosurgery

### Rig Das, PhD



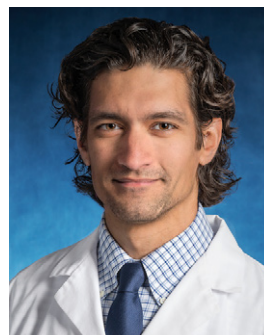
Dr. Das joined the UNMC Department of Neurosurgery as an instructor in December 2021.

A native of India, Dr. Das received his PhD in applied electronics engineering with European Doctorate Label from Roma Tre University, Rome, Italy, April 2018. He completed his Bachelor of Technology and Master of Technology degree in computer

science and engineering, 2007 and 2012, respectively, from India. After completion of his PhD, he worked as a post-doctoral researcher at University of Luxembourg, Luxembourg (2018 – 19) and Technical University of Denmark, Denmark (2019 – 21). He was a visiting researcher at Bar-Ilan University, Israel, in 2016 and worked on EU H2020-MSCA-RISE-2015 project, titled [ENCASE](#), as a researcher.

Dr. Das's research interests include EEG signal processing, sleep study, brain-computer interface deep learning, image and video processing, steganography and steganalysis, signal processing, pattern recognition and machine learning. His doctoral research goals and PhD thesis were directed towards the application of deep learning methods in biometric traits, such as EEG signal, finger-vein, and face, which won the [European Biometric Research Award](#).

### Joaquin Hidalgo, MD



Dr. Hidalgo will join the UNMC Department of Neurosurgery and the UNMC/Omaha Children's Division of Pediatric Neurosurgery in September of 2022.

He was born in Venezuela and completed medical school at Universidad de Zulia in Venezuela, followed by a neurosurgery residency at the University of Mississippi Medical Center and then

completed a pediatric neurosurgery fellowship under the mentorship of Dr. Alan Cohen at the Johns Hopkins University Medical Center, where he served as the Carson-Spiro Fellow in pediatric neurosurgery. Dr. Hidalgo's clinical and research interests focus on the treatment of pediatric brain tumors.

Currently, Dr. Hidalgo serves as staff pediatric neurosurgeon for North Mississippi Health Services (Tupelo), which is the largest rural hospital in the U.S.

We look forward to welcoming Dr. Hidalgo and his family to Omaha.

# 2021 Event Recaps

## 2021 Virtual Parkinson's Disease Conference

by Julie Pavelka, APRN-NP



Julie Pavelka, APRN-AP

The UNMC Parkinson's Disease in 2021: A Conference for Parkinson's Disease (PD) Patients, their Families and Care Partners on October 18, 2021, was a very successful event that utilized a new format consisting of a live webinar. The webinar was also recorded and distributed to all attendees and others who were unable to join the live session.

The attendees included a combination of individuals experiencing all stages of PD, including newly diagnosed people who have experienced symptoms for many years. The webinar featured PD experts from UNMC/ Nebraska Medicine who are passionate about educating, inspiring and empowering all individuals affected by PD, including: a multi-disciplinary approach by our movement disorder specialists and fellows, memory and behavioral therapy, nutrition therapy, and physical and occupational therapy. Prior to the webinar beginning, all participants were provided access to the presenter's power point slides to enhance their experience.

The conference included opening remarks and a warm welcome by UNMC's Frances & Edgar Reynolds Chair & Professor Matthew Rizzo, MD, FAAN from the Department of Neurological Sciences. The conference included topics that are

common to the Parkinson's disease community including a combination of motor and non-motor symptoms. Sessions included an introduction to PD, sleep disturbances, depression/anxiety, orthostatic hypotension/autonomic dysfunction, cognition/psychosis, nutrition, Parkinson's wellness recovery (including demonstration of exercises), care partner coping mechanisms and strategies, advanced therapies and a PD research update. The conference also included two panel discussions — one after the morning session and one following the afternoon session that included participants submitting questions that were answered by the experts. The question/answer panel discussions were extremely informative, and many participants were able to interact with our speakers resulting in a more personal experience. Many positive comments have been received regarding the virtual event; however, one common theme from many attendees was that they are looking forward to "being together in person again."

The Movement Disorder Team is excited for the next conference in October 2022 at the Scott Conference Center, which will be a hybrid format including in-person and webinar options in an attempt to reach as many people as possible who are affected by Parkinson's disease!

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## Nebraska Neurological Society Meeting

by Michael Pichler, MD

The Nebraska Neurological Society (NNS) held its inaugural meeting on Nov. 5. The event was held at the Henry Doorly Zoo aquarium in Omaha and was the first meeting of the new state neurological society. With more than 70 registered attendees, the meeting was an opportunity to bring together a diverse group of Nebraska health care professionals, with the common goal of improving care for patients with neurologic disorders. The event featured an engaging talk on wellness/burnout by Jennifer Bickel, MD, chair of the American Academy of Neurology (AAN) wellness subcommittee. Afterward, Diego Torres-Russotto, MD, FAAN, led a panel discussion on wellness/burnout, highlighting local resources in Nebraska and strategies for dealing with burnout at an individual level. The event also included a panel discussion on functional neurologic disorders, with local experts sharing their insight into how to approach these patients and different resources available in Nebraska.

Those in attendance represented many subspecialties and came from different healthcare

organizations within Nebraska, both private and academic. The NNS is open to anyone who supports the mission of the society – to promote the neurological health of Nebraskans and to advance the profession of neurology through collaboration, education and advocacy. This includes all clinical roles that interact with neuro patients and also extends to those involved in neuroscience research in Nebraska.

Several DONS faculty have leadership positions within the society including Michael Pichler, MD (president), Danish Bhatti, MD, FAAN (member-at-large, committee co-chair) and Elizabeth Hartman, MD (member-at-large, committee co-chair). The NNS is a platform to collaborate and educate one another, share resources and enhance public policy in Nebraska.



If you would like to learn more about the society or are interested in becoming a member, please check out the website at [www.NENeuroSociety.org](http://www.NENeuroSociety.org). You can also follow on Twitter @NENeuroSociety or Facebook to stay informed about upcoming events.



# Annual Scientific Meeting

by Amanda Fletcher & Pam Flax-Laws

We were pleased to hold the 5th Annual Great Plains IDeA-CTR Scientific Meeting on October 6 & 7.

The virtual event featured distinguished speakers and a CTR Superstar competition aimed at catalyzing clinical and translational research. This two-day event was held in conjunction with the UNMC College of Medicine research retreat. Matthew Rizzo, MD, FAAN, principal investigator of the GP IDeA-CTR, moderated the event.

Distinguished speakers and presentations included:

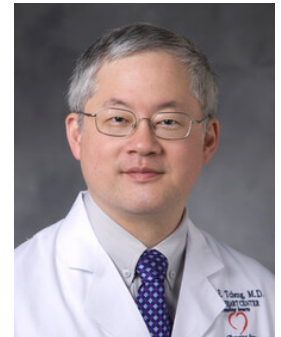
- Hal Stern, PhD, *Statistical approaches for studying early-life experiences and their impact*
- James Tcheng, PhD, *Data makes the difference — the journey to “good data”*
- Keyonna King, DrPH, MA, *Leveraging community partnerships to develop innovative research designs*
- Richard Miller, PhD, *Creating engineering innovators: remaking engineering education to prepare engineering “stem-cells”*

The CTR Superstar competition featured four promising finalists who presented innovative research pitches. A panel of esteemed judges including, Alice Ammerman, PhD (Mildred Kaufman Distinguished Professor, Department of Nutrition, Gillings School of Global Public Health and Director, Center for Health Promotion and Disease Prevention, University of North Carolina Chapel Hill); Michael Dixon, PhD (president and chief executive officer, UNeMed); Major General, USAF (Ret.), Richard J. Evans III (executive director, NSRI); and Michael Yanney (founder and chairman emeritus of Burlington Capital, formerly America First Companies LLC), presided over the event. Bin Duan, PhD, presented a research pitch on “Sprayable multifunctional hydrogel for postoperative abdominal adhesions prevention” and was our CTR Superstar winner and will receive pilot funding to develop his work.

The annual scientific meeting continues to be an effective conduit for sharing ideas, networking, and advancing clinical and translational research.



Hal Stern, PhD



James Tcheng, MD



Keyonna King, DrPH, MA




Richard Miller, PhD

For more information and to view recordings of the presentation, please visit our website at <https://gpctr.unmc.edu/>. We look forward to next year, and hope that we will be able to meet in person!

## MD Edge Expert Interview with DONS Professor Dr. Kathy Healey on the Multiple Sclerosis a Home Access Program

Topics covered in the interview:

- What barriers to coordinated comprehensive care do patients with progressive multiple sclerosis (MS) face under current health care delivery models?
- What is the Multiple Sclerosis at Home Access (MAHA) program and what are its goals?
- What are the outcomes of the MAHA program in terms of patient response, quality indicators and financial sustainability?
- Beyond in-home care, what opportunities exist to improve comprehensive care of MS patients via telehealth?
- Has the coronavirus pandemic presented challenges to delivering in-home care? If so, how have you managed these challenges?

 To read the full interview, log into MD Edge here: [mdedge.com/jcomjournal/article/227657/kathleen-healey-aprn-phd-multiple-sclerosis-home-program?sso=true](https://mdedge.com/jcomjournal/article/227657/kathleen-healey-aprn-phd-multiple-sclerosis-home-program?sso=true)



# 2021 Research Grants

The UNMC College of Medicine received grant and funding awards representing \$9.3 million in new funding awards. Select research grants listed below:

## Neurological Sciences

**Award Year(s):** 2021 – 2026; 2016 – 2020

**PI:** Matthew Rizzo, MD

**Funding Source:** National Institutes of Health (NIH U54GM115458)

**Title:** Great Plains IDeA-CTR

**Award Year(s):** 2020 – 2025; 1999 – 2020

**PI:** Matthew Rizzo, MD

**Funding Source:** National Institutes of Health (NIH R01AG017177)

**Title:** Monitoring Real-world Driver Behavior for Classification and Early Prediction of Alzheimer's Disease

**Award Year(s):** 2017 – 2022; 2000 – 2016

**PI:** Howard Fox, MD, PhD

**Funding Source:** National Institutes of Health (NIH P30MH062261)

**Title:** Chronic HIV Infection and Aging in NeuroAIDS (CHAIN) Center

**Award Year(s):** 2021 – 2023

**PI:** Anna Dunaevsky, PhD

**Funding Source:** National Institutes of Health (NIH R21NS122157)

**Title:** Developing an Astroglial Model for Fragile X Syndrome

**Award Year(s):** 2021 – 2023

**PI:** Howard Fox, MD, PhD

**Funding Source:** National Institutes of Health (NIH R21MH128057)

**Title:** Macrophages and Microglia, Gene Expression and Chromatin: Illuminating the Myeloid Viral Reservoir in the Brain through Single Cell Analyses

**Award Year(s):** 2021 – 2026

**PI:** Howard Fox, MD, PhD; Shilpa Buch, PhD

**Funding Source:** National Institutes of Health (NIH U01DA053624)

**Title:** Uncovering HIV/Opioid Effects in the Brain at the Single Cell Level: Transcription, Chromatin Accessibility, and Reservoir Analysis in the SIV/cART/Morphine/Rhesus Monkey Model

**Award Year(s):** 2021 – 2026

**PI:** Diane Ehlers, PhD

**Funding Source:** National Institutes of Health (NIH R37CA252060)

**Title:** Enhancing Cognitive Function in Breast Cancer Survivors through Community-based Aerobic Exercise Training

**Award Year(s):** 2021 – 2024

**PI:** Padmashri Ragnathan, PhD

**Funding Source:** Creighton University

**Title:** Translational Hearing Center

**Award Year(s):** 2021 – 2022

**PI:** Olga Taraschenko, MD, PhD

**Funding Source:** National Institutes of Health (NIH P20GM130447)

**Title:** Cognitive Neuroscience of Development and Aging (CoNDA) Center: The Role of Hippocampal Neurogenesis in the Development of Cognitive Deficits in Autoimmune Encephalitis with Seizures

**Award Year(s):** 2021

**PI:** Amy Hellman, MD

**Funding Source:** Huntington's Disease Society of America

**Title:** Huntington's Disease Society of America

**Award Year(s):** 2021 – 2022

**PI:** Lindsey Page, MS

**Funding Source:** American College of Sports Medicine

**Title:** Prospective Study of the Effects of Androgen Deprivation Therapy on Neurocognition and Frailty in Prostate Cancer

**Award Year(s):** 2021 – 2022

**PI:** Kelly Stauch, PhD

**Funding Source:** The Michael J. Fox Foundation for Parkinson's Research

**Title:** Determining PINK1 and PRKN Enzyme Activities *in vivo*

**Award Year(s):** 2021

**PI:** Kelly Stauch, PhD

**Funding Source:** Nebraska Bankers Association

**Title:** Seahorse Core Equipment Grant

**Award Year(s):** 2021

**PI:** Joseph Americo Fernandes, MD

**Funding Source:** Massachusetts General Hospital

**Title:** Regimen-Specific Appendix D for Pridopidine Double-Blind Phase

**Award Year(s):** 2021 – 2022

**PI:** Nadia Pare, PhD

**Funding Source:** City University of New York-Brooklyn

**Title:** Novel Multimodal Assessment of Practical Judgment across the Alzheimer's Continuum: Toward a Better Understanding of how to Predict Risk in the Elderly

## Neurosurgery

**Award Year(s):** 2020 – 2025

**PI:** Aviva Abosch, MD, PhD

**Funding Source:** National Institutes of Health (NIH UH3NS113769)

**Title:** Adaptive Neurostimulation to Restore Sleep in Parkinson's Disease: An Investigation of STN LFP Biomarkers in Sleep Dysregulation and Repair

**Award Year(s):** 2021 – 2023

**PI:** Stephen V Gliske, PhD

**Funding Source:** National Institutes of Health (NIH R01NS094399)

**Title:** Characterizing High Frequency Oscillations as an Epilepsy biomarker with Big Data tools

**Award Year(s):** 2020 – 2022

**PI:** Stephen V. Gliske, PhD

**Funding Source:** National Institutes of Health (NIH R61HL154095)

**Title:** Real-time state of vigilance monitor for the neonatal intensive care unit

**Award Year(s):** 2021 – 2023

**PI:** Jamie Wilson, MD

**Funding Source:** University of British Columbia / Vancouver Coastal Health Authority

**Title:** The Canadian-American Spinal Cord Perfusion Pressure and Biomarker Study - CASPER

# 2021 Faculty Publications

## Aviva Abosch, MD, PhD

Baumgartner AJ, Kushida CA, Summers MO, Kern DS, **Abosch A**, Thompson JA. Basal Ganglia Local Field Potentials as a Potential Biomarker for Sleep Disturbance in Parkinson's Disease. *Frontiers in Neurology*. 2021 October 28. doi:10.3389/fneur.2021.765203.

Ung TH, Kahn L, Hirt L, Chatain G, Humes E, David-Gerech P, Drees C, Thompson JA, Ojemann S, **Abosch A**. Using a Robotic-Assisted Approach for Stereotactic Laser Ablation Corpus Callosotomy: A Technical Report. *Stereotact Funct Neurosurg*. 2021 August 17:1-6. Doi: 10.1159/000518109.

Davis RA, Giordano JJ, Hufford B, Sheth SA, Warnke P, Widge AS, Richardson RM, Rosenow J, Rossi PJ, Storch EA, Winston H, Zboyan J, Dougherty DD, Foote KD, Goodman WK, McLaughlin NCR, Ojemann S, Rasmussen S, **Abosch A**, Okun MS. Restriction of Access to Deep Brain Stimulation for Refractory OCD: Failure to Apply the Federal Parity Act. *Frontiers in Psychiatry*. August 2021.

## Michele Aizenberg, MD

Zima L, Baine MJ, Sleightholm R, Wang B, Punsoni M, **Aizenberg M**, Zhang C. Pathologic Characteristics Associated With Local Recurrence of Atypical Meningiomas Following Surgical Resection (2021) *Journal of Clinical Medicine Research*, 13 (3), pp. 143-150. JOCMR/article/view/4444

White ML, Zhang Y, Kazmi SAJ, **Aizenberg MR**, Shonka NA, Yu F, Appiah AK. Evaluating Survival in Subjects with Astrocytic Brain Tumors by Dynamic Susceptibility-Weighted Perfusion MR Imaging. *PLoS ONE*. 2021. doi:10.1371

Ellis DG, **Aizenberg MR**. (2021) Trialing U-Net Training Modifications for Segmenting Gliomas Using Open Source Deep Learning Framework. In: Crimi A., Bakas S. (eds) Brainlesion: Glioma, Multiple Sclerosis, Stroke and Traumatic Brain Injuries. *BrainLes* 2020.

Lecture Notes in *Computer Science*, vol 12659. Springer, Cham. doi:10.1007/978-3-030-72087-2\_4

## Jerrod Anzalone, MS

Sun J, Zheng Q, Madhira V, Olex AL, **Anzalone AJ**, Vinson A, Singh JA, French E, Abraham AG, Mathew J, Safdar N, Agarwal G, Fitzgerald KC, Singh N, Topaloglu U, Chute CG, Mannon RB, Kirk GD, Patel RC; National COVID Cohort Collaborative (N3C) Consortium. Association Between Immune Dysfunction and COVID-19 Breakthrough Infection After SARS-CoV-2 Vaccination in the U.S. *JAMA Intern Med*. 2021 Dec 28. doi: 10.1001/jamainternmed.2021.7024. Epub ahead of print.

Vinson AJ, Dai R, Agarwal G, **Anzalone AJ**, Lee SB, French E, Olex AL, Madhira V, Mannon RB; National COVID Cohort Collaborative (N3C) Consortium. Sex and organ-specific risk of major adverse renal or cardiac events in solid organ transplant recipients with COVID-19. *Am J Transplant*. 2022 Jan;22(1):245-259. doi: 10.1111/ajt.16865. Epub 2021 Nov 1. <https://onlinelibrary.wiley.com/doi/10.1111/ajt.16865>.

## John Bertoni, MD, PhD

Siddiqui MS, Jimenez-Shahed J, Mari Z, Walter BL, De Jesus S, Panov F, Schwab JM, York MK, Sarva H, **Bertoni JM**, Patel N, Zhang L, McInerney J, Rosenow JM. (2021) North American survey on impact of the COVID-19 pandemic shutdown on DBS care. *Parkinsonism Relat Disord*. 92:41-45.

## Anna Dunaevsky, PhD

Padmashri R, Ren B, Oldham B, Jung Y, Gough R, **Dunaevsky A**. Modeling human-specific interlaminar astrocytes in the mouse cerebral cortex. *J Comp Neurol*. 2021 Mar;529(4):802-810. doi: 10.1002/cne.24979. Epub 2020 Jul 29.

## Diane Ehlers, PhD

Johnson N, Bradley A, Klawitter L, Johnson J, Johnson L, Tomkinson GR, Hackney KJ, Stastny S, **Ehlers DK**, McGrath R. (2021). Examining the impact of a telehealth intervention on activity profiles in older adults during the COVID-19 pandemic: A pilot study. *Geriatrics*, 6, 68. doi: 10.3390/geriatrics6030068

Arem H, Duan X, **Ehlers DK**, Lyon M, Rowland JH, Mama SK. (2021). Provider discussions about lifestyle by cancer history: A nationally representative survey. *Cancer Epidemiology, Biomarkers & Prevention*, 30, 278-85. doi: 10.1158/1055-9965.EPI-20-1268

## Americo Fernandes, MD

Grassmeyer JJ, **Fernandes JA**, Helvey JT, Kedar S. Radiation-Induced Bilateral Oculomotor Nerve Palsy 20 Years After Radiation Treatment. *Neurology*. May 2021, 96 (20) 955-957; DOI: 10.1212/WNL.00000000000011936

## Howard Fox, MD, PhD

Wu N, Morsey BM, Emanuel KM, **Fox HS**. Sequence-specific extracellular microRNAs activate TLR7 and induce cytokine secretion and leukocyte migration. *Mol Cell Biochem*. 2021 Nov;476(11):4139-4151. doi: 10.1007/s11010-021-04220-3. Epub 2021 Jul 27.

Morsey B, Niu M, Dyavar SR, Fletcher CV, Lamberty BG, Emanuel K, Fangmeier A, **Fox HS**. Cryopreservation of microglia enables single-cell RNA sequencing with minimal effects

on disease-related gene expression patterns. *iScience*. 2021 Mar 25;24(4):102357. doi: 10.1016/j.isci.2021.102357.

Naveed Z, **Fox HS**, Wichman CS, Alam M, May P, Arcari CM, Meza J, Totusek S, Baccaglini L. Neurocognitive status and risk of mortality among people living with human immunodeficiency virus: an 18-year retrospective cohort study. *Sci Rep*. 2021 Feb 12;11(1):3738. doi: 10.1038/s41598-021-83131-1.

## Stephen Gliske, PhD

Stovall T, Hunt B, Glynn S, Stacey WC, **Gliske SV**. Interictal high frequency background activity as a biomarker of epileptogenic tissue. *Brain Communications*, Volume 3, Issue 3, 2021, fcab188, <https://doi.org/10.1093/braincomms/fcab188>

## Miki Katzir, MD

Blakaj D, Palmer J, Dibs K, Olausson A, Bourekas E, Boulter D, Ayan A, Cochran E, Marras W, Mageswaran P, **Katzir M**, Yildiz V, Grecula J, Arnett A, Raval R, Scharschmidt T, Elder J, Lonser R, Chakravarti A, Mendel E, Postoperative Stereotactic Body Radiotherapy for Spinal Metastasis and Predictors of Local Control, *NEUROSURGERY* – Feb 11, 2021.

## Bethany Lowndes, PhD, MPH

Kennel V, Rosen MA, **Lowndes BR**. (2021). Virtual teamwork in healthcare delivery: IO psychology in telehealth research and practice. *Industrial and Organizational Psychology*. 14(1-2), 235-238.

Honcoop AC, Kerns EK, McCulloh RJ, **Lowndes BR**, Clarke MA. (2021, July). Improving the Usability of Visual Displays for a COVID-19 Household Screener. In International Conference on Applied Human Factors and Ergonomics (pp. 861-868). Springer, Cham.

## Pamela May, PhD, ABPP

Szymkowicz SM, **May PE**, Weeks JW, O'Connell D, Nelson Sheese AL. (2021) Psychometric properties of the Montreal Cognitive Assessment (MoCA) in inpatient liver transplant candidates. *Applied Neuropsychology: Adult*. 10.1080/23279095.2021.1986510

Szymkowicz SM, Ellis LJ, **May PE**. (2021). The 3-Item "Apathy" Subscale Within the GDS-15 Is Not Supported in De Novo Parkinson's Disease Patients: Analysis of the PPMI Cohort. *Journal of Geriatric Psychiatry and Neurology*. <https://doi.org/10.1177/0891988720988908>



### Jennifer Merickel, PhD

Mikulis T, **Merickel J**, Gwon Y, Sayles H, Petro A, Cannella A, Snow M, Feely M, England B, Michaud K, Rizzo M. (2021). Vehicle control as a measure of real-world driving performance in patients with rheumatoid arthritis. *Arthritis Care & Research*. doi.org/10.1002/acr.24769

Wang S, Sharma A, Dawson J, Rizzo M, **Merickel J**. (2021). Visual and cognitive impairments differentially affect speed limit compliance in older drivers. *Journal of the American Geriatrics Society*. doi: 10.1111/jgs.17008.

### Daniel Murman, MD, MS, FAAN

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Phipps CJ, **Murman DL**, Warren DE. Stimulating Memory: Reviewing Interventions Using Repetitive Transcranial Magnetic Stimulation to Enhance or Restore Memory Abilities. *Brain Sci*. 2021 Sep 28;11(10):1283. doi: 10.3390/brainsci11101283.

Wiesman AI, **Murman DL**, May PE, et al. Visuospatial alpha and gamma oscillations scale with the severity of cognitive dysfunction in patients on the Alzheimer's disease spectrum. *Alz Res Therapy*. 13, 139 (2021). https://doi.org/10.1186/s13195-021-00881-w

### Matthew Rizzo, MD, FAAN

Mikulis TR, Merickel J, Gwon Y, Sayles H, Petro A, Cannella A, Snow MH, Feely M, England BR, Michaud K, **Rizzo M**. Vehicle Control as a Measure of Real-World Driving Performance in Patients with Rheumatoid Arthritis. *Arthritis Care Res (Hoboken)*. 2021 Aug 16.

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### Afshin Salehi, MD, MS

Mahlkoczera T, Patel B, Chen H, Desouza P, Qu X, Mao DD, Hafez D, Yang W, Taiwo R, Paturu M, **Salehi A**, Gujar AD, Dunn GP, Mosammaparast N, Petti AA, Yano H, Kim AH. Competitive binding of E3 ligases TRIM26 and WWP2

controls SOX2 in glioblastoma. *Nat Commun*. 2021 Nov 3;12(1):6321. doi: 10.1038/s41467-021-26653-6.

### Kelly Stauch, PhD

**Stauch KL**, Totusek S, Farmer T, Lamberty BG, Dyball KN, Almikhlaifi MA, Fox HS. Applying the RatWalker System for Gait Analysis in a Genetic Rat Model of Parkinson's Disease. *J Vis Exp*. 2021 Jan 18;(167). doi: 10.3791/62002.

George JW, Mattingly JE, Roland NJ, Small CM, Lamberty BG, Fox HS, **Stauch KL**. Physiologically Relevant Concentrations of Dolutegravir, Emtricitabine, and Efavirenz Induce Distinct Metabolic Alterations in HeLa Epithelial and BV2 Microglial Cells. *Front Immunol*. 2021 May 20;12:639378. doi: 10.3389/fimmu.2021.639378.

### Arun Swaminathan, MD

**Swaminathan A**. Three Dimensional Brain Reconstruction Optimizes Surgical Approaches and Medical Education in Minimally Invasive Neurosurgery for Refractory Epilepsy. *Front Surg*. 2021;8:630930. Published 2021 Sep 27. doi:10.3389/fsurg.2021.630930

### Olga Taraschenko, MD, PhD

**Taraschenko O**, Fox HS, Zekeridou A, Pittock SJ, Eldridge E, Farukhuddin F, Al-Saleem F, Devi Kattala C, Dessain SK, Casale G, Willcockson G, Dingleline R. Seizures and memory impairment induced by patient-derived anti-N-methyl-D-aspartate receptor antibodies in mice are attenuated by anakinra, an interleukin-1 receptor antagonist. *Epilepsia* 62:3, (2021) 671-682.

**Taraschenko O**, Fox HS, Eldridge E, Wang W, Dowd SW, Al-Saleem F, Kattala CD, Dessain S, Dingleline R. Monoclonal antibodies from anti-NMDA receptor encephalitis patient as a tool to study autoimmune seizures. *Front Neurosci* 26:15 (2021).

### Pariwat Thaisetthawatkul, MD

Cheshire WP, Freeman R, Gibbons CH, Cortelli P, Wenning GK, Hilz MJ, Spies JM, Lipp A, Sandroni P, Wada N, Mano A, Ah Kim H, Kimpinski K, Iodice V, Idiáquez J, **Thaisetthawatkul P**, Coon EA, Low PA, Singer W. Electrodiagnostic assessment of the autonomic nervous system: A consensus statement endorsed by the American Autonomic Society, American Academy of Neurology, and the International Federation of Clinical Neurophysiology. *Clin Neurophysiol*. 2021 Feb;132(2):666-682. doi: 10.1016/j.clinph.2020.11.024. Epub 2020 Dec 22. Erratum in: *Clin Neurophysiol*. 2021 May;132(5):1194.

### Dave Warren, PhD

Phipps CJ, Murman DL, **Warren DE**. (2021). Stimulating Memory: Reviewing Interventions Using Repetitive Transcranial Magnetic Stimulation to Enhance or Restore Memory Abilities. *Brain Sciences*, 11 (10), 1283.

**Warren DE**, Rangel AJ, Christopher-Hayes NJ, Eastman JA, Frenzel MR, Stephen JM, Calhoun VD, Wang YP, Wilson TW. (2021). Resting-state functional connectivity of the human hippocampus in periadolescent children: Associations with age and memory performance. *Human Brain Mapping*, 42 (11), 3620-3642.

### Jamie Wilson, MD

Zipser CM, Margetis K, Pedro KM, Curt A, Fehlings M, Sadler I, Tetreault L, Davies BM; AO Spine RECODE DCM Steering Committee; Members of the Diagnostic Criteria Working Group. Increasing awareness of degenerative cervical myelopathy: a preventative cause of non-traumatic spinal cord injury. [pubmed.ncbi.nlm.nih.gov] *Spinal Cord*. 2021 Nov;59(11):1216-1218. doi: 10.1038/s41393-021-00711-8. Epub 2021 Oct.

Chan V, Wilson JRF, Ravinsky R, Badhiwala JH, Jiang F, Anderson M, Yee A, **Wilson JR**, Fehlings MG. Frailty adversely affects outcomes of patients undergoing spine surgery: a systematic review. [pubmed.ncbi.nlm.nih.gov] *Spine J*. 2021 Jun;21(6):988-1000. doi: 10.1016/j.spinee.2021.01.028. Epub 2021 Feb 4.

Martin AR, Jentzsch T, **Wilson JRF**, Moghaddamjou A, Jiang F, Rienmueller A, Badhiwala JH, Akbar MA, Nater A, Oitment C, Ganau M, Massicotte EM, Fehlings MG. Inter-rater Reliability of the Modified Japanese Orthopedic Association Score in Degenerative Cervical Myelopathy: A Cross-sectional Study. [pubmed.ncbi.nlm.nih.gov] *Spine (Phila Pa 1976)*. 2021 Aug 15;46(16):1063-1069. doi: 10.1097/BRS.0000000000003956.



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