NEURONETWORK FOR EMERGING THERAPIES

# THE EMERGING SCHOLARS PROGRAM

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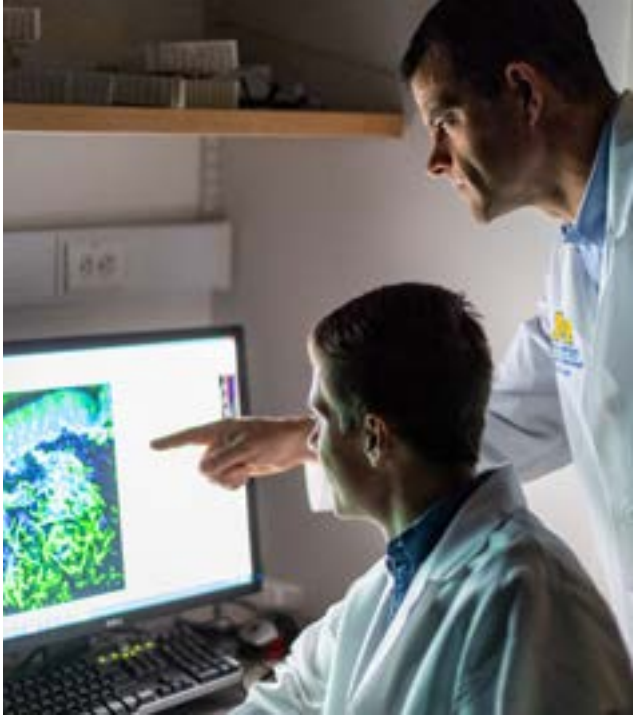

# THE EMERGING SCHOLARS PROGRAM

We have a breadth of talented young scientists who require the resources to pursue innovative research focused on the treatment of disease. This work will build the credentials they need to secure long-term financial support for their research from private foundations and the National Institutes of Health.

Emerging Scholar funding typically involves a $150,000 commitment, which is spread equally over three years. During that time, donors receive biannual reports from their Emerging Scholar about the research they are supporting, as well as an opportunity to meet with their Emerging Scholar to learn first-hand the impact their gift has made in the battle against disease.

Support for the Emerging Scholars Program also may be made as an endowment. A gift of $1 million allows for the establishment of a permanent, named Emerging Scholars Fund, which can support early-career scientists working in a designated field of medicine. This allows a donor's commitment to medical research to live on in perpetuity.

**“Guiding and supporting the future of the medical research field is central to the NeuroNetwork for Emerging Therapies’ efforts. The Emerging Scholars Program supports the next generation of medical science leaders and the many cures and treatments that will be their legacy.”**

**— EVA FELDMAN, M.D, Ph.D.**

James W. Albers Distinguished University Professor of Neurology
Russell N. DeJong Professor of Neurology

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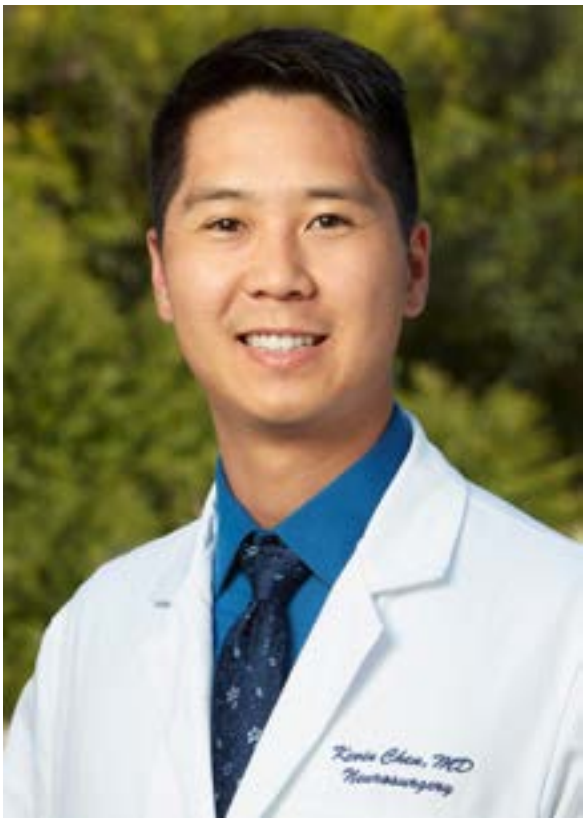
# CURRENT SCHOLARS



## HANDLEMAN EMERGING SCHOLAR

## KEVIN CHEN, M.D.

Clinical Assistant Professor of Neurology and Neurosurgery

**Developing stem cell therapies to treat neurological diseases**

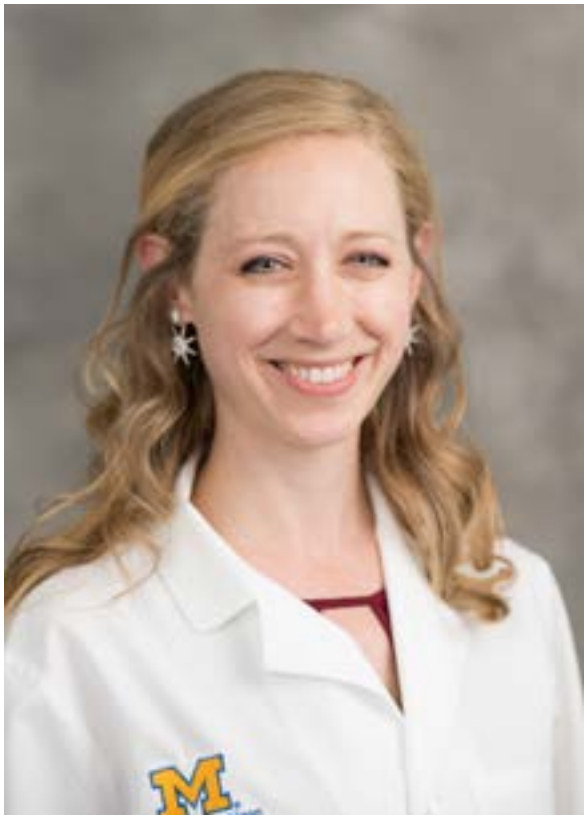
## ROSE C. AND NATHAN L. MILSTEIN FAMILY EMERGING SCHOLAR

## STEPHANIE EID, Ph.D.

Research Assistant Professor of Neurology

**Understanding how oxidants contribute to nerve injury in diabetes**

Awarded the Wolfe Neuropathy Research Prize by the American Neurological Association



EDITH BRISKIN EMERGING SCHOLAR

# SARAH ELZINGA, Ph.D.

Postdoctoral Fellow,
Department of Neurology

## Understanding how diabetes and obesity injure the brain and peripheral nerves

"Support from the Emerging Scholars Program allows early career researchers, like myself, to continue our research and expand it in ways we wouldn't be able to do otherwise. The breakthroughs made possible by the generosity of people like Edie Briskin can help advance our career as well as influence the lives of people affected by neurologic diseases."

ROBERT A. EPSTEIN AND JOAN M. CHERNOFF-EPSTEIN EMERGING SCHOLAR

# BENJAMIN MURDOCK, Ph.D.

Research Assistant Professor of Neurology

## Targeting the immune system to treat amyotrophic lateral sclerosis

# THE CANDIDATES

# MELISSA ELAFROS, M.D, Ph.D.

**Assistant Professor of Neurology**

## Increasing access to neurologic care for resource-limited populations

Dr. Elafros research is focused on improving the quality of neurologic care for resource-limited populations in the U.S. and low to middle-income countries. Her efforts include health services research and clinical research aimed at determining risk factors for neurologic conditions in these settings. For example, in 2009, Dr. Elafros began a project in Zambia to examine barriers to care for neuroinfectious diseases and people with epilepsy.

More recently, her focus has turned to polyneuropathy—a condition that occurs when peripheral nerves in the body malfunction, causing debilitating effects. Polyneuropathy accounts for about a tenth of neurology visits in the U.S. each year. However, in under-resourced populations here in the U.S., and in many developing countries, polyneuropathy is often overlooked and under-studied.

Last year, Dr. Elafros launched a groundbreaking study to examine polyneuropathy's prevalence and risk factors in low-income populations of Flint, MI, in partnership with Hurley Medical Center. In parallel, she is evaluating this population's understanding of polyneuropathy and its management. Early data support the fact that neuropathy is common and under-recognized in this low-income population in Flint. Dr. Elafros believes that increasing this population's awareness of polyneuropathy is imperative to reduce its debilitating effects and prevalence and improve outcomes.

**13 PUBLICATIONS**

**5 AWARDS**

B.S., Human Biology, Lyman Briggs College & BA, Spanish, Michigan State University, 2008

M.S., Bioethics, Michigan State University, 2008

Ph.D., Epidemiology, Michigan State University, 2014

M.D., Michigan State University, 2016

Residency, Adult Neurology, Johns Hopkins Hospital, 2020

Fellowship, Neuromuscular Medicine, University of Michigan, 2021

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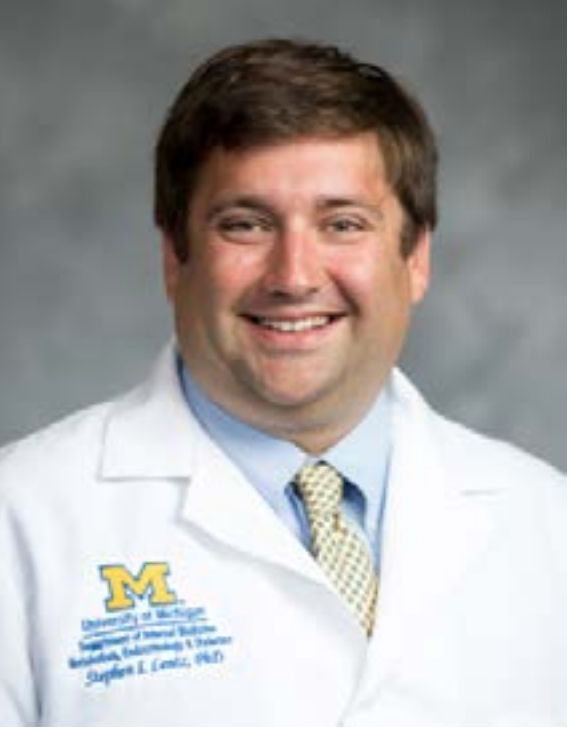

# EVAN REYNOLDS, Ph.D.

## Postdoctoral Fellow

Diabetes and metabolic impairment are both increasingly problematic worldwide pandemics. In 2019, an estimated 463 million people worldwide had diabetes, with 31 million cases in the U.S. At the same time, metabolic syndrome (MetS), which includes obesity, high blood pressure, and alterations in blood fat and glucose levels, was a problem for approximately 34% of adults. Both conditions are associated with multiple debilitating complications, including nerve damage and cognitive decline, which can severely impact the quality of life. However, while it is clear to scientists that diabetes and MetS are associated with these complications, severe metabolic interventions—weight loss through diet, surgery, or exercise—have been unsuccessful in totally reversing nerve damage and cognitive decline. Thus, Dr. Reynolds is interested in understanding if an individual's metabolic history can help predict future complication risk to support development of targeted and much needed interventions.

He is one of the first to look at whether details of long-term metabolic trajectories (measurements of metabolic risk factors over time) can be predictive of future diabetes complications, including neuropathy and cognitive impairment. Dr. Reynolds seeks to understand the big picture, and recently received a Pathway to Independence Award from the National Institutes of Health to examine decades of measurements in a uniquely systematic way. Dr. Reynolds will use three powerful and complementary databases that contain computer records of clinical histories for hundreds to thousands to millions of participants, and leverage the three databases together to see whether metabolic trajectories are in fact associated with neuropathy and cognitive impairment. Then, he will use cutting-edge machine-learning algorithms to predict which patients are most likely to develop neurologic complications following a diabetes diagnosis. Dr. Reynolds believes his work looking earlier in the patient's clinical and metabolic history is the answer to avoiding the onset of devastating complications. Through his research, he hopes to identify the key risk period where we could apply an intervention to these individuals, thus preventing complications.

## Using algorithms and machine learning to prevent complications from diabetes and metabolic syndrome

**18 PUBLICATIONS**

**1 AWARD**

B.S., Statistics and Political Science, Michigan State University, 2013

M.S., Biostatistics, University of Michigan, 2015

Ph.D., Biostatistics, University of Michigan, 2018

Postdoctoral Fellowship, Clinical Neuroscience, University of Michigan, 2019-20

# BHUMSOO KIM, Ph.D.

**Research Scientist**

## Understanding how diabetes and obesity affect brain health

Dr. Kim studies how obesity and diabetes, common components of the metabolic syndrome, affect amyloid and tau proteins, two prominent pathological proteins involved in the development and progression of Alzheimer's disease. He discovered that high levels of glucose and fat, the two main factors involved in the development of diabetes and obesity, induce biochemical changes in amyloid and tau proteins that are similar to those seen in Alzheimer's disease. In parallel, he has shown that obesity and diabetes affect cognitive function in animal models. This research was chosen as a "Hot Topic" at the Society for Neuroscience's 2019 conference.

Dr. Kim's continuing efforts are focused on identifying common factors affected by both metabolic syndrome and Alzheimer's disease to support the development of more effective therapeutic approaches for both diseases. One way he is addressing this is through the study of exosomes, a type of vesicle that serves as a messenger between cells. Specifically, he is interested in understanding how diabetes and obesity affect exosome secretion and determining if exosomes secreted in a disease state can spread diseases to other cells. This insight could provide an important new therapeutic target for neurological conditions connected to diabetes and obesity, including Alzheimer's disease. Notably, this work could also have implications elsewhere.

**24 PUBLICATIONS**

**3 AWARDS**

B.S., Seoul National University, South Korea, 1986

M.S., Seoul National University, South Korea, 1988

Ph.D., Neuroscience, University of Michigan, 1998

Postdoctoral Fellowship, Joslin Diabetes Center, Harvard Medical School

Postdoctoral Fellowship, Neurology, University of Michigan

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# MOHAMED NOURELDEIN, Ph.D.

## Postdoctoral Fellow

The world's population is aging at record levels, leading to a corresponding record number of individuals with cognitive decline and dementia. To understand the causes of dementia, Dr. Noureldein is studying oligodendrocytes, a type of glial cell that provides metabolic support to nerve cells in the brain. Dr. Noureldein's preliminary studies indicate that oligodendrocytes play an important role in Alzheimer's disease. He found that these support cells are metabolically impaired in Alzheimer's disease and unable to supply energy to nerve cells in the brain. Nerve cells require a lot of energy, and when they lack energy they cannot function properly, causing symptoms like dementia. Dr. Noureldein contends that if we can salvage oligodendrocyte function or find a way to replace their energy supplying capacity, we could halt or possibly even reverse the damage caused by Alzheimer's disease.

# Understanding brain metabolism in Alzheimer's disease and dementia

Dr. Noureldein is also well-trained in bioinformatics, an approach that uses computers to analyze and understand large amounts of biological data. Dr. Noureldein leads many of the NeuroNetwork for Emerging Therapies' gene transcript profiling initiatives, and through bioinformatics analyses he can show which genes are upregulated or downregulated in a particular condition. This offers insight into diseases on a molecular level, and can identify new biomarkers for early diagnosis and targets for therapeutic interventions.

Other research led by Dr. Noureldein includes looking at the effect of bacteria in the gut – also known as the microbiome – on brain and nerve health. He is currently working to understand if a reduction in microbial diversity in the gut alone can alter nerve physiology and induce neuropathy, and if fatty acid metabolism contributes to this process. This knowledge could provide a new therapeutic target to prevent or improve the debilitating symptoms of neuropathy, as well as inform future efforts looking at how the microbiome impacts brain health.

**11 PUBLICATIONS**

**7 AWARDS**

B.S., Pharmaceutical Sciences, Ain Shams University, Cairo, Egypt, 2011

M.S., Biochemistry, Ain Shams University, Cairo, Egypt, 2016

Ph.D., Biomedical Sciences/Physiology, American University of Beirut, 2020

Exchange, Bioinformatics & Molecular Genetics, Aarhus University, Denmark, Spring 2020

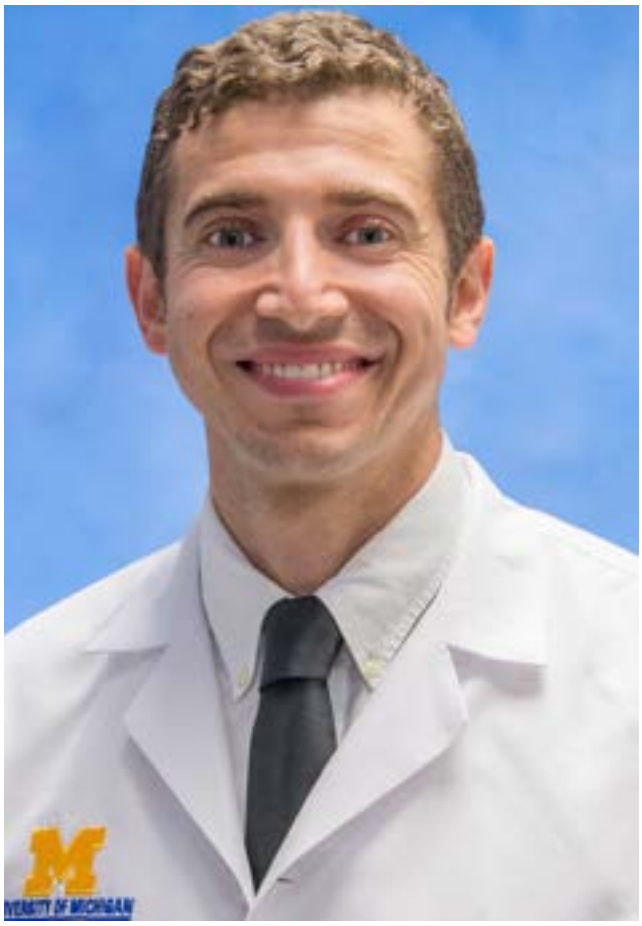
# OSAMA KASHLAN, M.D.

**Clinical Assistant Professor of**
**Neurosurgery and Orthopaedic Surgery**

## Advancing neurosurgical approaches to treat Alzheimer's disease

The unique multidisciplinary team of scientists, clinicians, and neurosurgeons in the NeuroNetwork for Emerging Therapies is advancing cellular therapy for brain diseases through work focused on establishing innovative strategies to develop and safely deliver effective therapies to the central nervous system without inducing further damage.

Dr. Osama Kashlan, a highly skilled neurosurgeon with a clinical practice focused on all aspects of spinal disease and a special interest in minimally-invasive spinal surgery, is partnering with Drs. Eva Feldman and Kevin Chen on a National Institutes of Health-funded study to understand the therapeutic effect of stem cells in Alzheimer's disease. Multiple studies have supported the feasibility and shown beneficial effects of transplanting stem cells into the brain of mouse models of Alzheimer's disease, and Dr. Kashlan now aims to utilize his extensive skill set and expertise in neurosurgical approaches to push this research further. The ultimate goals are to translate this therapy to humans and to find a cure for this terminal illness.



**29 PUBLICATIONS**
**9 AWARDS**

B.S., Chemical and Biomolecular Engineering, Georgia Institute of Technology, 2006

M.D., Emory University, 2010

MPH, Epidemiology, University of Michigan, 2016

Residency, Neurosurgery, University of Michigan, 2017

Fellowship, Spine Surgery, Emory University, 2018

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