

NORTHWESTERN UNIVERSITY FEINBERG SCHOOL OF MEDICINE

# Mesulam Center NEWS

A Publication of the Mesulam Center for Cognitive Neurology and Alzheimer's Disease

FALL 2019



**Musical Memories:  
The Science of  
Music and the Brain**

PAGE 11

## MESULAM CENTER FOR COGNITIVE NEUROLOGY AND ALZHEIMER'S DISEASE

### ADVISORY BOARD

#### Executive Committee

Terry Chapman, Co-chair  
Craig C. Grannon, Co-chair  
David Moscow, Past Chair (2014-16)

#### Members

Jason Boschan  
Carole Feiger  
Joyce Gallagher  
Bill Goldberg  
Ivan Himmel  
Melissa Kahn  
David Mendelson

#### Life Members

Donna Elrod  
Gloria LaGrassa  
Linda Mendelson  
Robert Mendelson  
John Van Cleave  
Kay Van Cleave

The Mesulam Center Advisory Board was formed to increase public awareness and knowledge of the Center, and to help garner ongoing philanthropic support for the Center's programs and facilities. The Board helps promote the Center both locally and nationally, and assists in securing the funding necessary to position the Center among the premier Alzheimer's research and patient care facilities in the United States.

If you are interested in learning more about the Mesulam Center Advisory Board, please contact Thongsy Singvongsa at 312-503-2832 or visit our website: [www.brain.northwestern.edu/about/giving.html](http://www.brain.northwestern.edu/about/giving.html)

On the cover: Rosalie Fruchter, Good Memories Choir volunteer, singing with the Good Memories Choir at the Mesulam Center's 25th Alzheimer's Day.



**DEAR FRIENDS AND COLLEAGUES,** The precursor of the current Mesulam Center for Cognitive Neurology and Alzheimer's Disease was established in 1994. Now that the first 25 years are behind us, let me take this opportunity to outline some thoughts for the next 25 years.

My principal goal has been to build a multidisciplinary program where clinical care is integrated with research on cognition and neurodegeneration. The design of our new headquarters on Tarry 8 shows that this integration is not just conceptual but also structural. On Tarry 8, clinicians and researchers in multiple disciplines have offices and research laboratories located next to each other. The brain bank, microscopy suites, and tissue culture facilities occupy contiguous space with neuroimaging and cognitive neuroscience laboratories. Trainees in behavioral neurology, neuropsychiatry, social work, neuropsychology, neuropathology, and neuroscience learn from each other, and teach each other.

Across the street, the Neurobehavior Clinic on the ninth floor of the Arkes Pavilion is our principal venue for transmitting the benefits of research to patients and families. In turn, patients who volunteer for research allow us to make new discoveries on cognitive neuroscience and the neurobiology of Alzheimer's disease, frontal lobe dementia, primary progressive aphasia, Lewy body disease, and related conditions.

During the first 25 years, the faculty of the Mesulam Center and its precursors established the first NIH-funded Alzheimer's Disease Center at Feinberg (continuously funded since 1996), the first NIH-funded functional imaging laboratory (which led to the formation of the current Cognitive Brain Mapping Group), the first dedicated neurobehavioral clinic and fellowship training program, the first brain bank dedicated to dementia and aging, and the first application of PET-based biomarkers for Alzheimer's disease. These ventures have brought nearly \$100 million of funding and have attracted a stellar group of trainees.

Alzheimer's disease comes in several forms, some of which do not affect memory at all. The boundaries between brain aging and late onset Alzheimer's disease are very blurry. There are also dementias not related to Alzheimer's disease. Some of these cause changes of personality or word finding rather than memory. This is why clinicians should avoid being too narrowly focused on memory and Alzheimer's disease and should embrace a broad perspective. Our program considers heterogeneity a focus of research, not a nuisance to be avoided. It is only by appreciating heterogeneity that we can individualize patient care and research into disease mechanisms.

The triad of patient care, cognitive neuroscience, and neurobiology of disease will continue to fuel future growth. We will learn more about the neurocognitive networks that enable us to find the right word and recall recent experiences; we will learn more about the mechanisms of selective vulnerability in neurodegenerations; and we will learn more about the reasons why a specific disease causes a specific set of impairments in individual patients. My hope is that we will continue to be known for our culture of multidepartmental integration, emphasis on bridging the gap between detail and the large picture, and eagerness to raise questions that link impairments of cognition to their cellular and molecular origins. Through these interactive developments, we will be able to practice our own brand of personalized precision medicine.

#### **M. Marsel Mesulam, MD**

Mesulam Center for Cognitive Neurology and Alzheimer's Disease director and Ruth Dunbar Davee Professor of Neuroscience

# SuperAger Wins National Crossword Puzzle Contest for Her Age Group



Carol Siegler, SuperAger and winner of the 2019 American Crossword Puzzle Tournament senior division

## PROGRAM STUDIES OLDER ADULTS WITH HIGH COGNITIVE FUNCTION

It's no surprise Carol Siegler is a SuperAger. At 82, she's quick-witted and energetic—so much so that in March she won the American Crossword Puzzle Tournament for her age group. Siegler has had a long history of academic excellence. She skipped two grades and graduated high school at the age of 16, before going on to study music education, and later, pre-med, at the University of Illinois. Along the way, she earned her pilot's license at 23, got married, had two kids, and opened a successful manufacturing business with her husband.

While watching TV one night, Siegler came across a PBS special about the Mesulam Center's SuperAgers program. She contacted the center to find out if she qualified. "I think it's a fun program," she said. "I do it for the same reason I did the crossword puzzle contest: just to see if I could."

In order to be considered a SuperAger, an adult over the age of 80 must score highly on tests, which rate their memory abilities. SuperAgers also undergo MRI and PET scans so researchers can compare brain images to identify common trends. They return for research visits every two years.

Siegler has loved solving puzzles since she was young, but she started doing them more after her husband was diagnosed with pancreatic cancer as a way for her to pass the time during doctor's appointments and hospital visits. After her husband passed away in January 2018, Siegler decided to try her hand at the American Crossword Puzzle Tournament.

"I did it just as a gag," she said. "I thought, 'I haven't done anything like this in years, so I think I'll go do this.'" In the three months leading up to the contest, Siegler practiced by solving more than 600 puzzles. The two-day contest involved six 15-minute puzzles on the first day and a larger, 45-minute puzzle on the second day.

After Siegler's win, she called Emily Rogalski, PhD, professor of Psychiatry and Behavioral Sciences and the SuperAgers study principal investigator, to share the news. "It was just fantastic," Rogalski said. "How remarkable, right? The SuperAgers are an impressive group of individuals that I feel fortunate to have the opportunity to get to know and to work with to address really important scientific questions."

Rogalski notes the SuperAgers tend to show "engagement in life." "They all seem to have their own angle on this," she said. "Some of them really like to travel, others volunteer, lead social activities at their retirement community, or care for friends and family."

Siegler's trivia abilities go beyond crossword puzzles: she's currently in the running to appear on Jeopardy, a national television game show program.

*For more information about the SuperAgers program, please contact Beth Makowski-Woidan, senior research study coordinator, at [beth.makowski-woidan@northwestern.edu](mailto:beth.makowski-woidan@northwestern.edu).*

## UPDATES FROM THE SUPERAGERS PROGRAM:

Tamar Gefen, PhD, assistant professor of Psychiatry and Behavioral Sciences, published a paper called "Activated Microglia in Cortical White Matter across Cognitive Aging Trajectories" in *Frontiers in Aging Neuroscience* in May 2019. Gefen's research showed SuperAgers have levels of microglia brain cells consistent with people almost 30 years their junior. "The beauty of this paper is the center's ability to correlate data from both the living and the dead," Gefen said.

In 2017, SuperAgers principal investigator Emily Rogalski sat on a collaborative panel at the Cognitive Aging Summit. The summit published a collaborative paper in *Neurobiology of Aging*, titled "What Are the Later Life Contributions to Reserve, Resilience, and Compensation?"

Former graduate student Amanda Cook-Maher presented SuperAgers research at the Alzheimer's Association International Conference, held in Los Angeles on July 14-18, 2019.

In September 2019, Emily Rogalski presented at the inaugural Workshop on Research Definitions for Reserve and Resilience in Cognitive Aging and Dementia, held September 9-10 in Bethesda, Md.

# Advocating for Research and Care at the International, National, and Local Levels

While working at the cutting edge of Alzheimer's and dementia clinical care and medical research, Mesulam Center leaders also thrive at influencing policy at the state and local levels.

"The work that we do doesn't just stay here," said Emily Rogalski, PhD, professor of Psychiatry and Behavioral Sciences at the center. "We each play roles locally, nationally, and even internationally."

## International Leadership

---

- Rogalski was recently elected to the executive committee of the International Society for Frontotemporal Dementias (ISFTD), a nonprofit organization that brings together leaders in research on frontotemporal dementias from around the world.
- Center director Marsel Mesulam also sits on the ISFTD committee and is on the Scientific Advisory Board of the Association for Frontotemporal Degeneration, a patient advocacy group dedicated to improving the quality of life of both individuals with FTD and their caregivers.
- Darby Morhardt, PhD, research associate professor, was selected as an official delegate member of the 2019 Chicago-Shanghai Services Exchange in Shanghai and will represent Chicago leaders who support, advocate for, and educate older adults, their families, and their social networks.

## National Leadership

---

- The National Alzheimer's Project Act (NAPA), signed in 2011, created a roadmap to address and overcome Alzheimer's disease. Sandra Weintraub, PhD, professor of Psychiatry and Behavioral Sciences, was a speaker at a conference dedicated to addressing the NAPA mandates in fall 2018 called the National Institute on Aging's Summit Meeting on Alzheimer's Disease-Related Dementias. She appeared on a panel discussing dementia nomenclature.
- Mesulam was formerly a chair of and currently sits on the Medical Advisory Council of the Association for Frontotemporal Dementias.
- Mesulam is also an associate director of *Alzheimer's & Dementia*, the journal of the Alzheimer's Association.

## State Leadership

---

- Mesulam and Morhardt continue to serve on the Illinois Alzheimer's Disease Advisory Committee, after being appointed by the governor in 2000.
- The Illinois Cognitive Resources Network (ICRN) was formed in 2012 as a response to NAPA. The ICRN's mission is to leverage strengths of the Alzheimer's Association Illinois Chapter, Alzheimer's Disease Assistance Centers, (Northwestern, Rush and Southern Illinois Universities), and organizations in the Aging, Disability, and Public Health Networks to optimize the cognitive and functional well-being of Illinois residents and their families.
- As part of the ICRN, Mesulam Center leaders have also been at the heart of Dementia Friendly Illinois, part of the Dementia Friendly America Initiative, which aims to create communities that are responsive to the needs of individuals who have been diagnosed with dementia.

"The work that we do doesn't just stay here. We each play roles locally, nationally, and even internationally."

EMILY ROGALSKI, PhD, PROFESSOR OF PSYCHIATRY AND BEHAVIORAL SCIENCES

## Local Leadership

---

- Morhardt is a member of the Commission for an Age-Friendly Chicago and was part of the team to develop the City of Chicago's Dementia Capable Systems and Supports project. Launched in the summer of 2019, this project aims to identify people living alone with dementia through high-rise building management training and then connect them to supportive services. It also delivers behavioral symptom management training to the Department of Family and Support Services and develops services in support of people with intellectual and developmental disabilities living with dementia.
- Morhardt has been named to the Medical and Scientific Advisory Committee for the Alzheimer's Association - Illinois Chapter for the second year. This committee assists in furthering the Alzheimer's Association's mission to eliminate Alzheimer's disease through the advancement of research; to provide and enhance care and support for all affected; and to reduce the risk of dementia through the promotion of brain health.

# Global Impact

From its hub in Chicago, Illinois, the Mesulam Center's impact reaches around the globe. Each year, several postdoctoral fellows from countries around the world complete year-long fellowships at the Center. These talented scientists go on to work at the cutting edge of research, establish centers, and treat people around the world.



**Kia Nobre, PhD**

University of Oxford: Oxford, England

In a relationship spanning more than 25 years, Kia Nobre has collaborated with Mesulam and Weintraub on a variety of research that began even before the center

at Northwestern was established.

Nobre met the two investigators while working as a postdoctoral fellow in Harvard's Beth Israel Center in 1993. After conducting research on memory and attention with them for one year, she moved on to Oxford, but has maintained a close relationship, visiting the center almost every summer to conduct research and share ideas.

"The big overlap I have with Dr. Mesulam is in trying to understand the brain systems that support human cognition," Nobre said. "I think we share this view that it's really important to have an integrative approach to solving problems."

Nobre holds the Chair in Translational Cognitive Neuroscience at Oxford and heads its Department of Experimental Psychology. She also chairs the Oxford Neuroscience committee, which promotes the integration across more than 250 labs.

As director of the Oxford Centre for Human Brain Activity, Nobre looks to the Mesulam Center for inspiration. "To me, this center is the gem of the world in terms of how it takes basic science and applies it to clinical settings," she said. "Why not come and learn from the best?"

Although Nobre's work necessitates collaboration with many disciplines, she treasures her partnership with the Mesulam Center. "There's probably no scientific collaboration as meaningful to me as the one I have with Marsel," Nobre said.



**Letizia Borges, MD**

University of São Paulo: São Paulo, Brazil

Neurologist Letizia Borges completed her fellowship at the Mesulam Center in 2017. She is now based at the University of São Paulo in Brazil, where she conducts research on subjective cognitive decline and continues to study SuperAgers.

Borges was first exposed to SuperAgers during her fellowship, when she had the chance to give them neurological examinations. "This was a unique experience because these are very special elders," Borges said. Borges attended a neuroanatomy course taught by professor Changiz Geula. "It was fantastic to watch his unique way of teaching," she said. She learned how to write and edit scientific articles with professor Sandra Weintraub, who welcomed her and "showed me the importance of working as part of a team of different health professionals," she said.

Borges also had the opportunity to see people with center director Marsel Mesulam. "I was able to learn how to connect with a patient who has dementia, which is something I will never forget," Borges said. "I will always be grateful for all the doors Dr. Mesulam opened and for the respectful way he treated me."



**Rik Vandenberghe, MD, PhD**

Katholieke Universiteit (KU) Leuven: Leuven, Belgium

After completing a cognitive neurology fellowship at the Mesulam Center in 2000, Rik Vandenberghe returned to Belgium, where

he currently heads the neurology unit at the University Hospital of Leuven and is also the director of the cognitive neurology laboratory at the University of Leuven.

During his fellowship, he learned about and treated people with primary progressive aphasia (PPA), a form of dementia that primarily affects language. Back in Leuven, Vandenberghe established a frontotemporal dementia clinic that provides clinical care and support groups for individuals living with PPA. "This type of support is extremely valuable," he said. "There's a lot we can do, even if we can't prescribe a drug."

"Thanks to Dr. Mesulam, I learned how important pathology is," Vandenberghe said. "The time I spent with Drs. Mesulam and Weintraub influenced my career in a very positive manner, and I am still extremely grateful for the time I spent there."

# MESULAM CENTER RECRUITING PARTICIPANTS FOR CLINICAL TRIALS



Clinical trials not only advance the scientific community's understanding of Alzheimer's disease and other dementias—they can also fill gaps in clinical treatments, offering relief outside the mainstream.

"There's still this urgency factor," said Ian Grant, MD, director of clinical trials operations and assistant professor of Neurology at the Mesulam Center. "We know the number of people who are going to be dealing with Alzheimer's disease will continue to grow, and kind of explode, in the coming decades."

The Mesulam Center is currently working with other Alzheimer's Disease Centers around the country on six multi-site studies. These projects study a wide range of subjects, from an intervention-based project that studies the effects of a drug on people with mild to moderate Alzheimer's to a data-gathering, longitudinal study that simply observes disease progression and looks for new markers in people with early-onset Alzheimer's.

"I'm excited that we keep learning more about the disease—how it is actually progressing in the brain and what's causing it," Grant said. "The more we understand about that, the better we'll be able to figure out targets for therapies that actually make sense."

## NICOTINE PATCH STUDY

When thinking about health, tobacco is not the first substance that comes to mind. But one substance in tobacco, nicotine, is thought to stimulate brain activity and could potentially help with memory and cognition.

Since it began in late 2017, the Mesulam Center's nicotine patch study has been recruiting people over the age of 55 who are experiencing difficulty with memory or have been diagnosed with mild cognitive impairment and feel they could benefit from a daily dose of nicotine.

Jim, a Mesulam Center participant who's been enrolled in the study for just over a year, was having trouble remembering things while working as president of a local nonprofit community center. After receiving a diagnosis of mild cognitive impairment, Jim and his wife Katie decided to try a medical intervention. Mesulam Center staff recommended the nicotine patch study.

"I see no downside," Jim said. "I have good days and bad days, like anyone else. But [since receiving this treatment] I feel like I've plateaued."

People like Jim who feel they could benefit from receiving a daily dose of nicotine should be willing to wear a nicotine patch during their waking hours (about 16 hours) each day, have their blood drawn, and undergo cognitive testing upon return examinations. The duration of participation is two years.

Jim and Katie hope this study will not only help Jim, but others as well. "With this disease, we want to try to help others in any way we can," Katie said. "To me it's like, all hands on deck."

## A4: ANTI-AMYLOID TREATMENT IN ASYMPTOMATIC ALZHEIMER'S STUDY

The presence of amyloid, a protein that builds up in the brain, is one of the hallmarks of Alzheimer's disease. The A4 (Anti-Amyloid Treatment in Asymptomatic Alzheimer's) Study is a global trial testing the effects of an anti-amyloid treatment on the memory abilities of people whose brains have high levels of amyloid while having no problems with memory.

By the end of this year, the first Mesulam Center participant enrolled in the study is expected to complete the five-year, double-blind phase and enter the open label phase.

During the blind phase of the study, one half of participants received monthly infusions of solanezumab, an antibody directed against amyloid, while the other half of participants received a placebo. The study's goals are twofold: to measure whether solanezumab reduces the amount of amyloid in the brain, and to determine whether the infusions show promise for preventing memory decline in at-risk people.

"This study is a game changer," said Sandra Weintraub, PhD, professor of Psychiatry and Behavioral Sciences at the Mesulam Center. "If it works, then it's very exciting. And even if it doesn't work, it's going to tell us we need to go in a different direction."

*For more information about participating in a clinical trial, please contact Brittanie Muse at [brittanie.muse@northwestern.edu](mailto:brittanie.muse@northwestern.edu).*

# What Grows from a SEED

## SUPPORT GROUP PROGRAM LEADS TO FRIENDSHIP

A typical “Harold” support group session ends with hugs all around. Twice each month, a dozen people diagnosed with mild cognitive impairment or dementia and their care partners meet at the Harold Washington Library to discuss their lives and diagnoses, find support in one another, and, perhaps most importantly, socialize.

The group is an extension of the SEED (Support and Education for Early Dementia) Program, part of the Mesulam Center’s Miller Family Quality of Life Enrichment Program. The participants met in the fall 2018 session of SEED and got along so well that they continued to meet on a regular basis.

“People can be so isolated with this illness, so to see this group become so cohesive and intent on continuing to meet demonstrates the value of bringing people together,” said Darby Morhardt, PhD, research associate professor at the Mesulam Center.

“We feel very comfortable together, and we just kind of hit it off,” said Sheila, one of the group’s participants.

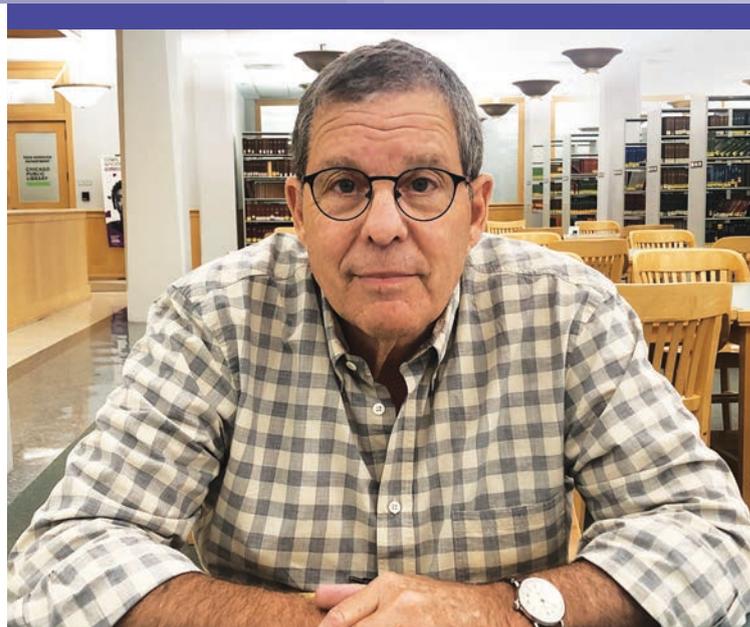
### Providing support for participants and caregivers

The SEED Program, which began in fall 2015, is designed to educate and provide social support for individuals navigating the early stages of dementia. It is one of the only programs in the area that offers support for a dyad—both the individual diagnosed with dementia and his or her care partner.

Each eight-session weekly program consists of two parts. First, the entire group meets for an educational presentation led by expert speakers about issues such as dealing with relationships or discussing a diagnosis to family and friends. Then participants break out into two groups—one for diagnosed individuals and another for their care partners—for peer support and discussions led by Mesulam Center social workers.

The “Harold group” follows a similar format to the original SEED programming. Diagnosed individuals meet in a group facilitated by a social worker from the Chicago Center for Cognitive Wellness, and their care partners meet in a separate group.

“This is a nice way to stay connected to ‘our peeps,’ if you will, the care providers and the folks like myself who are living with the diagnosis,” said Jim Butler, one of the program’s participants.



Jim Butler at a “Harold” group session in summer 2019.

“It’s been very helpful to know that life goes on and that there are programs that will help you continue to live a full life, despite this diagnosis.”

BILL, SEED PROGRAM CARE PARTNER

### Finding dear friends who understand

Since Butler was diagnosed with mild cognitive impairment three years ago, he says he and his wife Lisa have “plugged in” to just about any program intended to help. “I like being with people who understand and will pick you up when you lose your train of thought,” he said. “They’ve become dear friends.”

Sheila and Bill drive from the western suburbs to meet with their “Harold group” friends. “It really helps to be with people who understand what’s going on, even if it means driving downtown,” Sheila said.

Sheila, a self-proclaimed extrovert, benefits from the group’s social support. “We really are bonded,” she said. “We really know each other and understand each other.”

Bill, her care partner, agrees. “It’s been great to have an element of support in this crazy journey,” he said. “It’s been very helpful to know that life goes on and that there are programs that will help you continue to live a full life, despite this diagnosis.”

*The Mesulam Center holds multiple SEED Program sessions each year. For more information or to join a SEED Program session, please contact Debbie Dyslin at [deborah.dyslin@northwestern.edu](mailto:deborah.dyslin@northwestern.edu).*

# Looking to the Future of Dementia Research and Care



Illinois Lt. Gov. Juliana Stratton meets with 15 Mesulam Center participants and their families during her July 26 visit to the center to talk about the future of dementia care in Illinois.

According to the World Health Organization, more than 50 million people worldwide have Alzheimer's disease or another disease that causes dementia. In the United States, almost 6 million people are affected.

While a recent downward trend in new cases seems promising, the social and economic burden of Alzheimer's and other dementias will continue to grow as the population ages.

Alzheimer's disease contributed to an estimated \$290 billion in formal health care costs in 2018. Even more profound is the emotional toll dementia takes on families, friends, and loved ones. In 2018, care partners spent a total of 18.5 billion hours caring for loved ones who have dementia.

At the Alzheimer's Disease Centers across the country, including the one in the Mesulam Center, discovering a cure is the ultimate goal. In the interim, refining treatments can mitigate the impact of this life-changing illness, both for people dealing with it and their loved ones.

We asked our experts where the field is headed next.

---

## Sandra Weintraub

Professor of Psychiatry and Behavioral Sciences

### LIFESTYLE FACTORS

"I think the field has to really diversify, rather than everybody running in the same direction to find 'the cure.' Research from the 2019 Alzheimer's Association International Conference shows that lifestyle factors can affect brain cells as the brain ages. Social networking, exercising, getting enough sleep, and eating a healthy diet can all play a part. This is an exciting direction for researchers to explore. There is unlikely to be a single agent that will stop or reverse the disease; thus, reduction of risk is an important development."

---

## Darby Morhardt

Research Associate Professor of the Mesulam Center

### FOCUS ON QUALITY OF LIFE

"Until we have better ways of treating this disease, a major focus must be on how the person with dementia lives with and adapts to their changing abilities and what we as clinicians, care professionals, and the community at large can do to support them and their caregiving families. Non-medical opportunities, such as the creative arts (music, art, theatre, storytelling), support groups, social programs, and involvement in a mentoring program such as The Buddy Program have demonstrated evidence for building confidence and enhancing quality of life. Dementia capable and friendly communities allow for persons living with dementia and their families to feel supported, safe, and respected."

---

**Emily Rogalski**

Professor of Psychiatry and Behavioral Sciences

**SPEECH THERAPY**

"Of course, the ultimate goal is to find a cure and define a treatment for people with primary progressive aphasia and related dementias. In the interim, we needed to do something, and there was enough evidence bubbling up that speech language therapy could be helpful. The Communication Bridge program came out of a real desire to do something now, that has the potential to change quality of care and access to care in the future."

---

**Marsel Mesulam**

Center Director

**BIOMARKERS**

"On one side of the coin, it's easy to say that we haven't found a cure, therefore nothing has happened. But under the hood, a tremendous amount of progress has happened. This includes understanding the biology of the disease much more deeply, and also this revolution of biomarkers. In the past the diagnosis was by exclusion, and now we can diagnose the disease before there is even memory loss. I think this is revolutionary and helps a great deal with prevention."

---

**Ian Grant**

Assistant Professor of Neurology

**AMYLOID RESEARCH**

"I'm excited that we keep learning more about dementia: how it actually progresses in the brain and what causes it. The more we understand about that, the better we'll be able to figure out targets for therapies that actually make sense. I think the A4 study will determine, once and for all, if amyloid really is the most important factor in the development of dementia. There's still the urgency factor. We know the number of people who are going to be dealing with Alzheimer's Disease is going to continue to grow and kind of explode as the population gets older because we're nearing a time where all of the Baby Boomers are nearing that age group. So we're going to have more people affected by dementia."

---

**Bob Vassar**

Davee Professor of Alzheimer's Research

**GENETIC MUTATIONS**

"As a geneticist, I follow the paradigm started by Joe Goldstein and Mike Brown, whose discovery of cholesterol pathways led to the development of statin drugs. Very rare genetic mutations, although they only cause disease in a small number of people, are a gateway into how disease works. Alzheimer's disease research has been a rough road for a long time. It's a desperate situation. But we have to keep working hard. We can't give up."

---

**LIEUTENANT GOVERNOR VISITS  
MESULAM CENTER**

On Friday, July 26, 2019, the Mesulam Center welcomed Lt. Gov. Juliana Stratton. As part of her statewide listening tour, the newly elected lieutenant governor stopped by to meet participants, learn about the center's initiatives, and discuss opportunities for making Illinois more responsive to the needs of people with dementia.

Stratton, inspired by her mother's struggles with Alzheimer's disease, has declared making Illinois a more "dementia-capable" state as one of her top priorities. Her "#LGCares Through our Eyes Listening Tour," held in collaboration with the Alzheimer's Association, kicked off in June 2019.

During Stratton's visit to the Mesulam Center, she met with 15 participants and their care partners. They spoke openly about their experiences and the challenges they face with their diagnoses.

The group represented a diverse range of perspectives, not only racially and ethnically, but also in terms of age and diagnosis: members included those diagnosed with early-onset Alzheimer's disease, as well as those living with a variety of types of frontotemporal dementia.

Stratton shared her own experiences with feeling lost and disconnected from resources as her mother's primary caregiver.

"Everyone was very open and felt grateful to have her ear," said Darby Morhardt, associate professor at the Mesulam Center who arranged the visit. "I think this visit helped the lieutenant governor gain a broader understanding of the challenges individuals with dementia face."

# Understanding and Diagnosing PPA

**P** rimary progressive aphasia, or PPA, is a form of dementia that degrades language capabilities, while keeping memory and other cognition intact, at least initially.

PPA is a syndrome, or a set of symptoms—not a disease itself. Because it is rare and often overshadowed by other forms of dementia or written off as normal memory problems, it is often underdiagnosed. PPA typically affects a younger population than other types of dementias. As PPA progresses, individuals experience changes with their ability to recall words and communicate. Ultimately, it renders them unable to communicate, and eventually affects other areas of memory, as well.

## Most cases of PPA fit one of three main categories:

**Semantic:** Trouble understanding what words mean.

**Agrammatic:** Difficulty with understanding and using proper grammar.

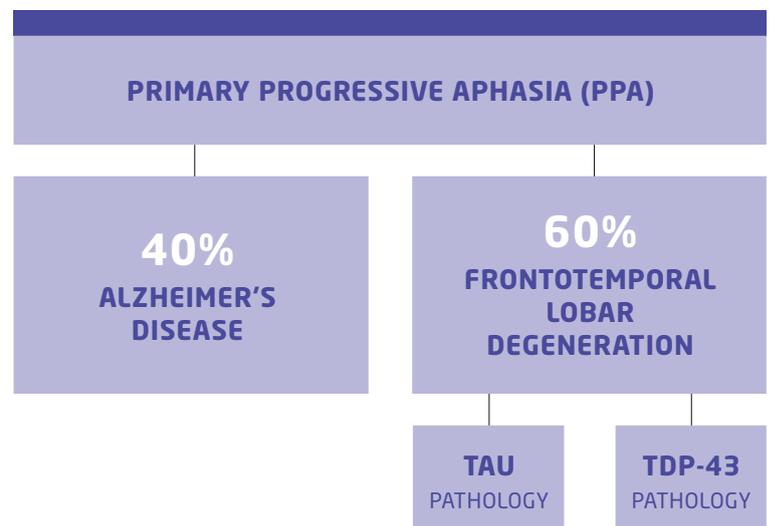
**Logopenic:** Difficulty with word retrieval.

There is no one disease that causes PPA. Instead, it is caused by one of three main identified pathologies, the underlying physical conditions that cause a particular disease.

Approximately 40 percent of PPA cases are caused by Alzheimer's disease pathology. The other 60 percent are caused by frontotemporal lobar degeneration, or FTLN. The two main types of FTLN-caused pathology fall under the groups of tau or TDP-43, the proteins that cause the underlying condition (see diagram).

Subtypes help predict pathology, but they are not 100 percent accurate. The only way to tell for sure which pathology caused PPA is by examining the brain during autopsy.

**THE MESULAM CENTER** is world-renowned for researching and treating PPA. In 2007, the center was awarded a R01 grant for PPA research, which has enabled it to establish an observational PPA program. The center also offers a variety of support groups, clinical treatment for PPA, and the Communication Bridge program.



## Biomarkers

New biomarker technology, however, is allowing physicians to test for what causes PPA while a person is alive. "It's really important to be able to predict pathology during a person's lifetime, because it will help us create more targeted treatments," said Christina Coventry, clinical research associate and manager of the observational PPA research programs.

Currently, there is no blood test for PPA. But with the advent of new biomarker technology, including cerebrospinal fluid (CSF) obtained through lumbar puncture, and tau and amyloid PET scans, clinicians are able to predict Alzheimer's disease pathology in about 95 percent of cases in those individuals with that pathology underlying their symptoms. If these tests indicate that Alzheimer's is unlikely to be the cause, then clinicians can assume that one of the FTLN diseases is more likely.

"At our center right now, we're understanding how useful amyloid and tau PET scans are in determining this disease and tracking its progression over time," said Emily Rogalski, PhD, professor of Psychiatry and Behavioral Sciences and principal investigator of the study. Biomarkers for PPA caused by FTLN pathology are not quite as advanced, but new PET imaging has shown promise in research.

## Rate of Progression

Another challenge in PPA treatment is the rate at which the disease progresses, which can range from 2 to 20 years.

"We're interested in researching different markers of disease to understand who might be a fast progressor and who might be a slow progressor," Rogalski said. "This can help us better target the disease, and we can better inform people and families about what to expect about their prognosis."

# Telemedicine Intervention Improves Communication Confidence for People Living with PPA

## NEW ONLINE PROGRAM INCREASES ACCESS TO CARE

**F**or individuals living with rare conditions like primary progressive aphasia (PPA), getting help locally can be a challenge. That's why researchers at the Mesulam Center have developed a speech therapy program that can be completed at home, from anywhere in the world.

Communication Bridge is an online speech therapy clinical trial for people who have been diagnosed with PPA, a rare form of dementia that affects language capabilities rather than memory. Individuals living with PPA often have difficulty recalling words or understanding conversations, but interventions can help them develop effective communication strategies to use in their daily lives.

"The idea here is that we can improve access to care through telemedicine, using technology to meet people where they're at," said Emily Rogalski, PhD, associate professor of Psychiatry and Behavioral Sciences and principal investigator of the study.

After completing a pilot study (CB-1) with participants from multiple states and countries, the program moved on to the CB-2, a randomized clinical trial funded by the National Institute on Aging. Enrollment began in May 2018 and is expected to continue through 2021. Several dyads—a person with PPA and their care partner—have already completed the one-year program.

### Exercising language skills

The program includes 15 video-chat speech therapy sessions with a certified speech-language pathologist. In addition, participants are instructed to participate in online individualized activities for 30 minutes, five days per week.

The online program consists of four distinct types of exercises: flash cards, word pronunciation, matching words with pictures, and script practice for common situations, like scheduling an appointment or ordering food at a restaurant.

The program is designed to involve not only an individual diagnosed with PPA, but also his or her care partner. Preliminary results have shown that having an engaged partner improves outcomes for people with PPA.

For one participant (who was diagnosed with PPA four years ago and who wished to remain anonymous), exercising his mind is like exercising his muscles. He and his wife were the third dyad to complete the year-long Communication Bridge program in June 2019, and though the activities became rote, "so is exercising my muscles," he said. "I do the same thing 75 percent of the time I go to the gym."

Communication Bridge has helped him develop a script to explain his condition and offer strategies for communication. He also benefited greatly from the video conference speech therapy sessions.

"It's a tool that keeps my mind sharp and keeps me connected to people I care about," he said.

According to the participant's wife, before Communication Bridge, his communication was scarce. He wasn't reading for fun like he used to, and he was writing one or two-sentence emails. Now, she said, he writes three- or four-paragraph emails. "It's keeping those communication channels open with people he cares about," she said.

### Maximizing communication abilities

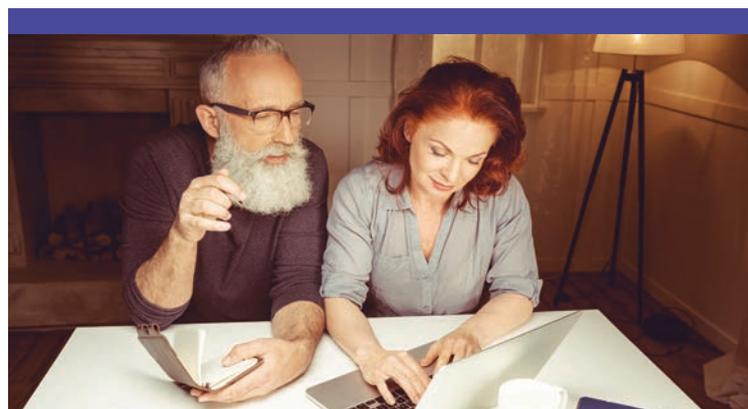
The program bridges a gap in traditional speech therapy training, which often either doesn't include PPA because it is so rare, or focuses too much on regaining language, the standard therapy for people who have had a stroke or coma.

"It's not a cure," Rogalski said. "Instead, we're trying to maximize their communication abilities, as this disease is still in motion."

Although the ultimate goal is to find a cure, in the interim, Rogalski wanted to create a program that helps people now. Using an online tool was the perfect way to achieve that. "It's a labor of love," she said.

*Communication Bridge is recruiting participants. For more information about participating, email [communicationbridge@northwestern.edu](mailto:communicationbridge@northwestern.edu) or call Libby Rogers at (312) 503-4012.*

*If you are interested in participating in the PPA research study, register at [www.brain.northwestern.edu/join/index.html](http://www.brain.northwestern.edu/join/index.html) or email [ppa.research@northwestern.edu](mailto:ppa.research@northwestern.edu) or call Christina Coventry, MS, RN at (312) 908-9681.*



# Arts for Brain Health Coalition Inspires and Engages



An Art Institute employee leads an Art in the Moment discussion of Dali's Venus de Milo with Drawers.

## CONSORTIUM IMPROVES LIVES OF THOSE WITH MEMORY LOSS

**O**n a cloudy afternoon in June, 16 people with dementia and their care partners gathered in the Art Institute of Chicago's Modern Wing for "Art in the Moment," an inquiry-based art viewing experience for individuals diagnosed with dementia and their care partners.

"Everyone has permission to say what they want," art therapist Deb DelSignore gently reminded the group as she led a tour of surrealist works by Dali, Magritte, and others. Some participants critiqued the pieces, while others reflect on their historical or personal context. Others remained silent. Each person's experience with the artwork was as unique as their experience with their diagnosis.

Art in the Moment, led by the Art Institute of Chicago and CJE SeniorLife, is part of the Arts for Brain Health Coalition, a city-wide consortium of arts and health care leaders dedicated to improving the lives of people with memory loss and those who care for them. Its mission is to unlock the potential for a meaningful quality of life by curating moments of joy for individuals experiencing memory loss.

"There's increasing evidence that the creative arts positively impact one's quality of life," said Darby Morhardt, PhD, research associate professor at the Mesulam Center. "Until we have better ways of treating dementia, we need to rely on non-medical opportunities to help people live with this disease, and these changes."

## From art to improv

Founded in 2016, the coalition originally reached out to the Mesulam Center to provide clinical expertise on the cognitive benefits of art therapies. It has since grown to include partnerships with the Art Institute of Chicago, Chicago Dance Therapy, Good Memories Choir, Hubbard St. Dance Chicago, LaBrocha, Lookingglass Theatre, the Mesulam Center for Cognitive Neurology and Alzheimer's Disease, Old Town School of Folk Music, and Rush University's Alzheimer's Disease Center.

"Chicago is a city rich in culture, and the opportunity to collaborate with these cultural institutions and offer these programs has been extraordinary," Morhardt said.

During a typical event, participants have the option of choosing from art therapy sessions, music, yoga, dance, or improvisation. In the improvisation activity, based on work of the Memory Ensemble\* and led by Lookingglass Theatre teaching artists, partners choose three household objects. One partner pretends the object is three different objects, and each time, the other partner affirms that statement by saying, "Yes, it is"—no matter how silly or unusual the imagined object seems. This activity encourages both the person with dementia and their care partner to choose empathy over insight.

Several times throughout the activity participants repeat a mantra that empowers them both during this activity and in their everyday lives: "I am a creative person. When I feel anxious or uncertain, I can stop, breathe, observe, and use my imagination."

## Learning how to wing it

"It teaches you how to wing it when you lose your train of thought," said Jim Butler, a Memory Ensemble participant who has been diagnosed with mild cognitive impairment.

"This program is an opportunity for persons with dementia to succeed in a world where that doesn't happen often," Morhardt said.

The coalition hosted three events in late summer 2019: one at the National Museum of Mexican Art on Saturday, August 17; another at the Woodson Regional Library on Saturday, September 7; and a third at the Reflections Festival of Lifelong Learning at the Art Institute of Chicago on Wednesday, September 18.

*\*The Memory Ensemble is an improvisational theatre experience for individuals living with dementia co-founded by Lookingglass Theatre and the Mesulam Center in 2010. Several classes are offered a year. Contact Kim Sangster at [kimberly.sangster@northwestern.edu](mailto:kimberly.sangster@northwestern.edu) for more information.*

# Musical Memories

## MUSIC TEARS DOWN WALLS PUT UP BY DEMENTIA

**T**he sound of Chicago Lyric Opera musician Frank Babbitt's viola soared high over Borna Bonakdarpour's murmuring piano notes as they played Ralph Vaughan Williams's classical composition, "Romance."

The occasion wasn't a concert at the opera house—it was the 25th Annual Alzheimer Day event, hosted by the Mesulam Center at Feinberg Pavilion on May 9, 2019. Babbitt and Bonakdarpour were demonstrating the positive effects of music for more than 350 scientists, participants, and their families in attendance.

In the last 20 years, a growing body of research has shown music's positive effects on a range of brain diseases, including dementia, Parkinson's, epilepsy, coma, childhood psychiatric disorders, and more. Bonakdarpour, MD, assistant professor of Neurology at the Mesulam Center, is working to measure just how positive those effects can be. A trained pianist who has been playing for more than 33 years, he also minored in music during his pre-med studies at the Tehran University.

Since his dissertation, where he brought melodic intonation therapy to Persian-speaking people with aphasia for the first time, his career has partly focused on facilitating positive treatment outcomes through music. He is currently investigating and developing musical intervention programs to help improve quality of life in people with dementia.

### Improving social engagement

Bonakdarpour provides expertise to the Institute for Therapy Through the Arts' "Musical Bridges to Memory" program. The program, which has been held at two local assisted living centers since spring 2018, is showing promise in reducing agitation and improving social behaviors in people with advanced dementia.

For three months, participants attended a weekly music intervention program. Each session was 90 minutes long and included both an educational component and 45 minutes of music from an ensemble of 4 or 5 musicians, during which patients and their care partners often sang, performed, or danced together. After the session, groups took a coffee break to discuss the music.

Care partners and staff reported enhanced verbal and nonverbal communication in the participants after engaging with the musical intervention. Non-social behaviors, like speaking at inappropriate times, decreased, while social behaviors, like maintaining eye contact, increased. "Because music processing remains intact in people with advanced dementia, in the context of music, these people can socialize and communicate, so it actually improves their social engagement," Bonakdarpour said.



The Good Memories Choir, under the direction of Jonathan Miller, performs at the Mesulam Center's 25th Annual Alzheimer Day.

**"In the context of music, these people can socialize and communicate, so it actually improves their social engagement."**

**BORNA BONAKDARPOUR, MD, ASSISTANT PROFESSOR OF NEUROLOGY**

### Bringing back positive memories

Incorporating the music participants listened to when they were younger is important because "memories associated with favorite pieces remain intact in people with dementia until very late in the disease process," Bonakdarpour said. "For some reason the disease doesn't hit those networks that hold on to that information."

When a person listens to music it passes through the ears to the auditory cortex, where it is processed primarily in the right hemisphere of the brain, although according to Bonakdarpour, "almost everywhere in the brain is involved in processing." The limbic system, particularly the amygdala—the part of the brain that regulates emotional responses—is also highly activated when listening to music. This explains why music causes such strong emotional responses, such as goosebumps.

"Music has a lot to do with emotion," Bonakdarpour said. "That's why when you bring back positive memories from earlier times people feel safer, and it decreases their agitation."

### Creating innovative approaches to treatment

Music interventions and therapy are becoming more accessible to the people who benefit from them, but there's still a long way to go until they are considered a mainstream form of treatment.

"I want to see more research into the neurobiology of music and the brain, and into innovative approaches to this kind of treatment," Bonakdarpour said.

# The Future of Medicine: Shaping Hearts and Minds



Postdoctoral fellow Jackie Bonds (left) with her Buddy Program mentor, Gloria (right), at the program's match day in October 2018.

## **BUDDY PROGRAM PAIRS STUDENTS WITH PARTICIPANTS TO INCREASE AWARENESS AND EMPATHY**

**T**he rigorous medical school curriculum includes classes about the inner workings of anatomy and chemistry, but there is no class that encourages students to become friends with people like the people they treat.

The Buddy Program, a partnership between the Mesulam Center and the Feinberg School of Medicine, fills that gap, and helps future physicians develop a more personal awareness of dementia. The program pairs a medical student with a person with dementia, with the person with dementia positioned as the mentor. The program is also open to pre- and post-doctoral students conducting research in the labs who often do not have the opportunity to come into contact with those whose work their research may ultimately benefit.

Buddy pairs spend time together throughout the year, visiting with each other, participating in activities, and forming intergenerational friendships. The program recently completed its 22nd year, with 18 pairs involved in this session and a total of 260 pairs matched since its inception. It has been replicated in 15 universities across the country.

"The goal is to increase awareness and knowledge in medical students about dementia—to help them understand the remaining capacities and strengths of people living with this diagnosis," said Darby Morhardt, PhD, research associate professor at the Mesulam Center who developed and leads the Buddy Program. "This program helps students learn to see the person beyond the diagnosis, and to realize that people are more than their diagnosis."

### **Gloria and Jackie**

When Jackie Bonds, a postdoctoral fellow in the neurology department at Northwestern University, met her Buddy Program mentor, Gloria, and Gloria's daughter, Gia, it was an instant bond.

The three have spent time together almost every week since they first met in October 2018, much more often than the program's once-a-month requirement. Their meetings have consisted of "lots of brunches and lunches," Jackie said, as well as visits to Gloria's home, where she and Gia showed Jackie photos of her past, including her many awards.

The women all live near each other in Chicago and bonded over their love of education and high career aspirations. Gloria was an architectural engineer who designed bridges and railroads throughout Chicago, while Gia worked in digital marketing management for many years.

Jackie says Gloria and Gia have helped her own her identity as a woman pursuing an advanced STEM degree. They've also helped her see the personal implications of her research.

"As a basic scientist, it's easy to lose sight on the impact of what you're doing. We study one thing in such excruciating detail, and you can sometimes lose sight of the big picture," Jackie said. "This experience has helped me understand the impact of my research. I'm grateful that I could be reminded of that, and I hope it will stay with me for a long time."

### Keerthi and Joe

When Joe was diagnosed with early-stage Alzheimer's disease last year, he was devastated. Then Joe's partner, Doug, suggested the Buddy Program. Joe was matched with Keerthi, a second-year medical student who's interested in geriatrics.

Joe and Keerthi have since explored Chicago—riding bikes, going to the zoo, taking walks in the Wicker Park Community Garden—and have developed what they call a "lovely friendship."

"It's been such an awesome way to meet someone who's at a different stage of life," Keerthi said. "It's really helped me get out of the medical school bubble."

Both Joe and Keerthi agree that one of their favorite visits was walking through the Modern Wing at the Art Institute of Chicago. For Joe, who had closed his chiropractic practice and returned to painting after his diagnosis, taking turns talking about the art and interspersing it with talking about more personal topics was a healing experience.

"To find someone who you trust and feel comfortable with sharing whatever's on your mind, that's been wonderful," Joe said. "Between Keerthi, Doug, and my family and friends, I have a great support system."

Keerthi agrees, and recommends the program to any medical student, whether they are interested in geriatric care or not. "Physicians should constantly cultivate and work on developing empathy," she said.

*Funding for the Buddy Program and other quality of life programs are funded by the generous support of the Glen and Wendy Miller Family Foundation.*

"To find someone who you trust and feel comfortable with sharing whatever's on your mind, that's been wonderful."

JOE, BUDDY PROGRAM PARTICIPANT



Medical school student Keerthi Bandi (left) and her Buddy Program mentor, Joe.

### LASTING IMPACT

When Adam Romeiser III signed up for the Buddy Program during his first year of medical school 16 years ago, he didn't know the lessons he'd learn would stay with him throughout this entire career. Romeiser, who's now an internist at Columbia St. Mary's Hospital in Wauwatosa, Wis., still tries to form a personal connection with every person he treats.

"The program was my first introduction to the importance of getting to know patients," Romeiser said. "Not just their medical problems—but also getting to know them on a deeper level."

In 2003, as a first-year medical student at Northwestern's Feinberg School of Medicine, Romeiser was paired with a person who had primary progressive aphasia. Through visits like ice skating in a family member's backyard, a bike ride to the Chicago Botanical Garden, and lunches, the pair formed a strong bond. This bond was so strong that they continued to visit with one another throughout Romeiser's second and even third years of medical school.

While talking about their families, they even discovered that Romeiser's mentor had dated his aunt years before they both met their respective spouses. "It was a funny coincidence," Romeiser said. "It helped me recognize that this is not just a patient—this is someone who very well could have been a family member. And it gave me a deeper sense of connection with him."

Romeiser says the program helped him develop a tangible sense of the biopsychosocial model he learned in medical school. "This experience informs me on a regular basis," he said.

## STAFF SPOTLIGHT:

### Christina Coventry, RN

CLINICAL RESEARCH ASSOCIATE AND MANAGER  
OF THE OBSERVATIONAL PPA PROGRAM



Christina Coventry worked as a research manager for the Mesulam Center from 2006 to 2014, when she left to pursue a graduate degree in nursing. She also holds a bachelor's

degree in behavioral neuroscience. In April 2018, Coventry returned to the Mesulam Center as a clinical research associate and manager of the observational PPA research programs.

#### **Why did you decide to go back to school?**

I loved what I was doing at the Mesulam Center, but I wanted to pursue a clinical degree to be able to have more of a hands-on impact.

#### **Why did you return to the Mesulam Center?**

While I loved the work I was doing in the hospital and at the bedside, I missed the long-term relationships I formed with participants in the PPA research programs. I also missed the multidisciplinary nature of clinical research and care at the Mesulam Center.

#### **What is your favorite part of your job?**

I like educating participants and families about PPA and helping them to understand their diagnosis. I spend a lot of time on the phone talking to people who have found the center on the Internet and who are looking for information about their loved one's diagnosis. I think in the absence of a cure, education is the best way to help our participants. I love talking about PPA to anyone who will listen.

## STAFF SPOTLIGHT:

### Brittanie Muse

CLINICAL RESEARCH PROJECT MANAGER



Brittanie Muse joined the clinical trials team as clinical research coordinator in December 2018. She completed both her bachelor's degree in psychology and her master's degree in public health

at the University of Alabama at Birmingham.

#### **What does a typical day look like for you?**

To me, there is no typical day! I spend some days working with physicians and nursing staff to complete lumbar punctures, some days with radiologists to conduct PET scans, and others doing data entry. With six active studies, there is a lot of variety and a lot to do. I love the fast pace.

#### **What do you want participants and families to know?**

The most important thing I'd like them to know is how appreciative we are for their participation. Participating in research is a truly altruistic task. Despite little personal benefit, it helps develop our understanding of these diseases and possibly develop treatments in the future. Research is so important, but we absolutely could not do it without the help of our participants. For those participants and families who are hesitant about participating in research, I would like them to know that we value them and take their privacy seriously. There are lots of misconceptions about research, but we are always happy to answer any and all questions that a potential participant might have. We encourage people to learn more about research and participate if interested.

#### **What do you like to do for fun?**

I just moved to Chicago less than a year ago, so I like to explore the city. My favorite thing to do this summer has been to go to the beach and enjoy the good weather. When I'm not exploring Chicago with friends, I am usually going to the gym or binge-watching television.

# Latest Results from the Behavioral Neurology Lab

Bob Vassar, PhD, is the scientific director of behavioral neurology in the Department of Neurology. In October 2018, Vassar became the director of the Alzheimer's Disease Core Center and the P30 grant, which funds a portion of the research that occurs in the Mesulam Center.

As a basic and translational scientist, he and his lab members study the cellular and molecular mechanisms in the brain that are responsible for Alzheimer's disease. "We must study the basics to understand their function in humans," he said.

## Discovering side effects of current treatments

In the late 1990s, Vassar was part of a team that discovered an enzyme called beta secretase, or BACE, that cuts other proteins. "BACE is like a pair of molecular scissors," Vassar said. "Molecular cutting of those proteins is important for brain function." Although BACE is involved in much of the brain's normal functioning, increased amounts are present in people who have Alzheimer's disease. Vassar and his lab are trying to further understand BACE's function by studying mice. With Phase III clinical trials of BACE inhibitors already underway in humans, understanding the potential side effects of these drugs is necessary.

When a person has memory loss, the wiring of the hippocampus, the part of the brain responsible for memory, becomes distorted. In a brain without memory loss, close homologue of L-1 (CHL1) is a molecule that helps neurons form synapses to communicate with one another, even from areas of the brain that are far apart.

"When you stop that cutting, the wiring gets messed up," Vassar said. Vassar and his lab removed BACE from the mice, making their brains similar to a person who is taking a BACE inhibitor drug. They found that those mice experienced issues with the wiring of their hippocampi.

A paper about this research was published in September 2018 in *Science Translational Medicine*. A grant received in July 2019 will help Vassar and his lab investigate further.

## Newly identified genes implicated in Alzheimer's

Angiotensin converting enzyme, or ACE, is a molecule often found in blood vessels that are responsible for regulating blood pressure. Vassar's lab is trying to figure out the role ACE has in the brain, particularly in memory. They, along with a group at Harvard, found an ACE mutation that's implicated in Alzheimer's disease.



Bob Vassar, MD

"Although it's a rare mutation, it's highly associated with the occurrence of Alzheimer's disease," Vassar said.

To determine this, the investigators mutated the ACE gene in a group of mice. They found that these mice had more neurodegeneration

as they aged. Furthermore, after breeding those mice with another group of mice that had a mutation for high levels of amyloid, a protein that occurs naturally but that builds up in the brains of people with Alzheimer's, the neurodegeneration accelerated at double the normal rate.

"Amyloid buildup may just be an inevitable consequence of aging. But some people are sensitive to it and others are not," Vassar said. "And this ACE mutation may make people sensitive to the amyloid."

This finding has the implications for new treatments. Many existing drugs lower blood pressure by blocking ACE. When Vassar's lab treated mice with ACE-blocking drugs, it actually prevented neurodegeneration. "We were able to rescue those mice by treating them with these drugs," Vassar said.

The lab has submitted these findings for publication. The next step is to understand why this happens. "Our hypothesis is that this mutation is increasing ACE in the brain, and that increases the amount of angiotensin that's produced, and when there's too much it becomes toxic and it starts killing neurons."

Vassar's hopes to find Alzheimer's treatments by following pathways of rare genetic mutations. "Although they only cause disease in a small number of people, they are a gateway into how the disease works," Vassar said. "As a geneticist, that's the paradigm I follow."

With several setbacks in Alzheimer's research in the past few years, Vassar called it "a rough road." But for Vassar, the research is personal, after experiencing the struggles his mother went through with Alzheimer's. "We have to keep working hard," Vassar said. "We can't give up. Because in the end, science will always find the truth."

# Brain Donation Advances Scientific Research

## ONE HUMAN BRAIN CAN PROVIDE THOUSANDS OF TISSUE SAMPLES FOR EXPERIMENTS

**A**t the Mesulam Center, 79 percent of research participants agree to donate their brain post-mortem. Brain donation helps investigators identify pathological patterns that determine what caused the disease while providing valuable tissue for neurodegenerative disease research.

"Without brain donation, research would be difficult. So far, no animal model for Alzheimer's disease mimics the disease completely," said Eileen Bigio, MD, the neuropathology core leader and medical director of the neuropathology division of the Department of Pathology. "Patients who are involved in Alzheimer's Disease Center clinical research, and donate their postmortem brains, generously provide valuable tissue for research."

People who are cognitively normal and volunteer their brains for research also provide a valuable resource for comparison to those with cognitive decline.

### Understanding benefits of brain donation

The center's brain bank currently holds nearly 1,000 brains, which can be used indefinitely for research. One human brain can provide thousands of tissue samples for experiments.

After a brain is donated to the Mesulam Center, Bigio and her neuropathology core team examine it and complete a neuropathologic diagnosis, providing clinicians and family members with valuable information about the underlying disease.



Professor Changiz Guela gives Lt. Gov. Juliana Stratton a tour of the Mesulam Center's brain bank and lab.

---

The Mesulam Center brain bank holds more than **1,000** brains

---

**ONE BRAIN** can provide thousands of tissue samples

---

**79 percent** of total Mesulam Center participants are brain donors

---

Since the center specializes in primary progressive aphasia, which tends to affect the left side of the brain, it is one of few Alzheimer's Disease Centers that histologically examines both sides of the brain. Donated brains have even enabled Bigio to describe several rare types of dementia for the very first time.

The center, like all Alzheimer's Disease Centers, is not only interested in the brains of people who had dementia, but also healthy controls and SuperAgers. But brain donation can be an intimidating and taboo topic involving religious and social concerns.

Bigio encourages people to consider the long-term benefit. "Even if it doesn't do the donor any immediate good, it might help the field down the line and help their children, their grandchildren, and the world avoid or delay Alzheimer's disease," says Bigio, who is also the Paul E. Steiner Research Professor of Pathology. "We respect even the consideration somebody gives to donating their brain for research. We are very grateful when we get these brains, and we treat them with the utmost respect."

### Considering racial and ethnic groups' attitudes toward brain donation

Nationwide, white deceased research participants had the highest rates of brain donation (60 percent), compared with 47 percent for Hispanic subjects, 24 percent of African American participants, and 15 percent of Asian participants, according to a 2015 study of four Alzheimer's Disease Centers.

At the Mesulam Center, rates are much higher across all groups, but still, several ethnic groups report high rates of “considering,” rather than a definite “yes” or “no” to brain donation after their death.

When Tiffany’s mother, Dolores, was diagnosed with frontotemporal dementia two years ago, the family sought support from the Mesulam Center. As part of the center’s protocol for research participants, Dolores was asked if she would be willing to donate her brain after her death.

For Tiffany, who conducts research herself, brain donation seemed like an obvious choice. For her parents, attending a Mesulam Center focus group helped address their concerns. After a few conversations as a family, Dolores made the decision to donate her brain. “She said if it could help somebody else, she would do it,” Tiffany said. “For me, it is imperative that African Americans, and people of all diverse ethnicities, participate. We have to be a part of the research being done so we and our future generations can benefit from it.”

### **Understanding concerns among ethnically diverse communities**

To address ethnic disparities, Miller Social Work Fellow Debbie Dyslin, along with two co-facilitators, held focus groups at Northwestern University and at the Atlas Senior Center. There, groups separated by brain donation status and cognitive status shared their thoughts and fears about brain donation.

“There was an expressed need for wanting additional information about how brain donation contributes to research, more understanding of the donation process, and for additional and continued rapport between research staff and participants,” said Sara Dunlop, a second-year graduate student in the Interdepartmental Neuroscience Program who helped facilitate the program. “Pieces of information like these are priceless in informing us how to better serve our participants.”

The investigators are now in the midst of analyzing the groups’ conversations. Once completed, these data will inform new programming and approaches that account for different groups’ diverse needs.

“The point of these focus groups is to respond to what the needs in communities actually are, rather than what we think they are,” Dyslin said. “I have every hope that this will translate to real impact on the work we do with people who are considering brain donation.”

## **AWARDS AND PUBLICATIONS**

Mesulam Center investigators continue to receive several awards and publish cutting-edge research on dementia and Alzheimer’s disease.

**August 2018 - August 2019**

---

### **46 PUBLICATIONS**

---

### **11 EXTRAMURAL PRESENTATIONS**

---

### **4 EDITORIALS, REVIEWS, CHAPTERS, BOOKS, PREVIEWS, AND COMMENTARIES**

---

### **7 NEW GRANTS:**

#### **NACC New Investigator Award, Site PI: Tamar Gefen**

Clinicopathologic Substrates of Dementia Syndromes with FTLD-tau, Funded via U01 AG016976 (University of Washington)

#### **R24 NS104160, PI: Changiz Geula**

Characterized Adult Primary Human Microglia Cells for Research

#### **Early Onset AD Consortium - the LEAD Study (LEADS), Site PI: Emily Rogalski**

Subcontract on U01 AG057195 (Indiana University)

#### **3P30 AG013854-23S2, PI: Robert Vassar**

Supplement to add Imaging Core to NU Alzheimer’s Disease Center (Core Leader: Emily Rogalski)

#### **Prot# BHV4157-203, Site PI: Ian M. Grant**

Subcontract from University of California, San Diego

#### **Early Onset AD Consortium - the LEAD Study (LEADS), Site PI: Emily Rogalski**

Subcontract on R56 AG057195 (Indiana University) (Superseded previous project funded on R56)

#### **PPA Tele-Savvy: Support and Education for Caregivers of Persons with Primary Progressive Aphasia, Pilot PI: Darby Morhardt**

Subcontract on P30 AG064200 (Emory University)

# M Northwestern Medicine®

Feinberg School of Medicine

## Mesulam Center for Cognitive Neurology and Alzheimer's Disease

300 East Superior Street, Tarry 8th Floor  
Chicago, Illinois 60611-2923  
brain@northwestern.edu

## SAVE THE DATE: UPCOMING CONFERENCES



### PPA CONFERENCE: COMMUNICATION AND CONNECTION

An education and support conference for persons living with primary progressive aphasia, their families, and professionals

**Monday, March 23, 2020**

Northwestern University  
Robert H. Lurie Medical Research Center  
Chicago, IL

### 26TH ANNUAL ALZHEIMER DAY

Thursday, May 14, 2020

11:30 a.m. - 4:00 p.m.

Northwestern Memorial Hospital  
Chicago, IL

### MENDELSON LECTURE

William Jagust, MD, Professor of  
Public Health and Neuroscience,  
University of California, Berkeley