VANDERBILT MEMORY AND ALZHEIMER'S CENTER

2021-2022 IMPACT REPORT

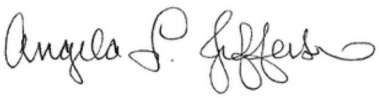
LETTER FROM THE DIRECTOR

YOUR SUPPORT IS ADVANCING ALZHEIMER'S RESEARCH

In August 2020, our Center achieved a major milestone when we were awarded a 3-year, $3.8M grant from the National Institute on Aging to establish an exploratory Alzheimer's Disease Research Center (ADRC). During the 2021-2022 academic year, we continued to see the many benefits of the ADRC designation, the first of its kind in the state of Tennessee.

In this 2022 Impact Report, you will read about some of the important discoveries made by our interdisciplinary research team, including genetic influences, racial disparities, and lifestyle prevention factors surrounding Alzheimer's disease and related dementias. We also highlight achievements in outreach, training, and a notable breakthrough for our Vanderbilt Memory and Aging Project.

We are grateful for your continued support of our research at the Vanderbilt Memory and Alzheimer's Center.



DR. ANGELA L. JEFFERSON

Herbert O. and Vineta Christopher Director in Alzheimer's Disease
Director, Vanderbilt Memory and Alzheimer's Center
Director, NIA Exploratory Vanderbilt Alzheimer's Disease Research Center
Vice Chair of Scientific Strategy and Innovation, Department of Neurology
Professor of Neurology

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Novel discoveries at the intersection of Alzheimer's risk and resilience

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Training the next generation of Alzheimer's disease scientists and clinicians

IN THE NEWS

VANDERBILT MEMORY AND AGING PROJECT GAINS NATIONAL ATTENTION

In 2020, the Vanderbilt Memory and Alzheimer's Center received two important grants from the National Institute on Aging to support a major expansion of the Vanderbilt Memory and Aging Project cohort. Over the past year, we have expanded outreach and engagement efforts as we work to add more than 600 new participants to the study, particularly people of color who are disproportionately impacted by Alzheimer's disease yet historically underrepresented in research.

As part of those efforts, the study gained national attention when actress, activist, and Vanderbilt Memory and Aging Project participant Kimberly Williams-Paisley joined Maria Shriver on NBC's TODAY Show in June. Kimberly shared how her mother's decade long struggle with Alzheimer's disease inspired her to join our research efforts. Her story inspired people across the country as we received more than 2,500 new participant inquiries immediately following the segment.

2,500+

PARTICIPANT INQUIRIES FOLLOWING THE SEGMENT

The Vanderbilt Memory and Aging Project seeks to identify risk factors for Alzheimer's disease and related dementias, emphasizing cardiovascular and cerebrovascular drivers of cognitive changes and memory loss in aging adults. Participation in research is crucial to understanding the multiple pathways that lead to Alzheimer's pathology and related dementias, which offers researchers a chance to identify intervention targets much earlier in the disease process.

Dr. Angela Jefferson

Kimberly WIlliams-Paisley

INTERESTED IN JOINING A STUDY?

PLEASE CONTACT OUR TEAM AT 615-322-8676 OR VMAC.RESEARCH@VUMC.ORG

DISCOVERIES AT VMAC

In August 2020, the Vanderbilt Memory and Alzheimer's Center was awarded a 3-year, $3.8M grant from the National Institute on Aging to establish an exploratory Alzheimer's Disease Research Center (ADRC) at Vanderbilt University Medical Center.

The P20 Center, which reflects the first of its kind in the state of Tennessee, supports the planning and infrastructure development for an eventual NIA-funded P30 ADRC designation for Vanderbilt and brings together more than 70 faculty from more than 20 departments, centers, and institutes across Vanderbilt University, Vanderbilt University Medical Center, and Meharry Medical College.

The benefit of increased institutional collaboration among our faculty has already been felt with multiple high-impact research publications by our interdisciplinary research teams. Below, you can read more about our Center's key discoveries in Alzheimer's disease and related dementias over the last year.

LARGE SPACES AROUND BRAIN BLOOD VESSELS TIED TO MEMORY LOSS

In a comprehensive review published in the journal, *Neurology*, Drs. Angela Jefferson and Matthew Schrag summarized the importance of perivascular spaces in the aging brain.

Perivascular spaces are fluid filled compartments that are part of the cerebral blood vessel wall and support fluid transport in and out of the brain. These spaces are considered a form of small vessel disease when they become large enough to be seen on a magnetic resonance imaging brain scan.

When perivascular spaces become widespread in the brain, they can contribute to memory loss and other cognitive problems.

Understanding what causes perivascular spaces may contribute to new prevention strategies for Alzheimer's disease and related dementias.

HEALTHY LIFESTYLE BENEFITS SOME AMERICANS MORE

Drs. Laura Keohane and Danxia Yu found healthy lifestyles, including not smoking, increased leisure-time exercise, low-to-moderate alcohol consumption, adequate sleep, and a healthy diet reduce the risk of Alzheimer's disease.

The researchers studied insurance claims data from participants of the Southern Community Cohort Study. Of the 17,209 participants seen over four years at health clinics in the rural south, 1,694 participants developed some form of dementia.

The results showed that regardless of race, ethnicity, income, education, or pre-existing health conditions, engaging in healthier lifestyle habits reduced the risk of developing dementia.

DIFFERENCES IN LIPID PROFILES BETWEEN RACIAL AND ETHNIC GROUPS

Lipids are thought to play a key role in the pathology of Alzheimer's disease. However, Vanderbilt researchers noticed very few studies focused on lipids have included samples from African American/Black adults.

Drs. Logan Dumitrescu, Timothy Hohman, and Renã Robinson compared the lipid profiles of African American/Black individuals to non-Hispanic White individuals who were either cognitively normal or diagnosed with Alzheimer's disease.

They found differences in the lipidome across racially and ethnically diverse groups. In particular, they found notable differences in lipids unique to African American/Black participants compared to non-Hispanic White participants.

This important study expands the growing body of evidence identifying health factors that contribute to the unequal burden of Alzheimer's disease in racially and ethnically diverse groups.

GENETIC NEUROPROTECTION IN AGING ADULTS

A group of researchers at the Vanderbilt Memory and Alzheimer's Center, including Drs. Logan Dumitrescu, Angela Jefferson, and Timothy Hohman, have identified a new region of a gene that changes the association between the beta-amyloid protein and cognitive decline.

Genes are portions of deoxyribonucleic acid (DNA) that act as a recipe for cells to build materials needed for life, and the recipe to make a particular protein may be slightly different for each person.

Using data from the Vanderbilt Memory and Aging Project, researchers discovered that people with the genetic trait rs62263260 have faster rates of brain shrinkage when there are already signs of amyloid build-up in the brain.

If there was no amyloid build-up, those individuals with rs62263260 had slower brain shrinkage.

The results from this study shed evidence on new possible targets for drug therapies and expand our knowledge of how our genes impact our brain health.

AMINO ACID REDUCES SIGNS OF ALZHEIMER'S IN MICE

Researchers, including Drs. Fiona Harrison and Wellington Pham, have shown mice who were fed ergothioneine, an amino acid mostly found in fungi, like mushrooms, had fewer signs of Alzheimer's disease compared to other mice.

In the experiment, a group of mice bred to develop signs of Alzheimer's disease with age were fed a diet high in ergothioneine. Their brains had fewer amyloid plaques, less oxidative stress, and better use of sugar when compared to other mice who were not given ergothioneine.

The researchers believe ergothioneine potentially can help protect the brain from Alzheimer's disease and hope to continue experiments to better understand its impact on the brain.

NEW BIOMARKER SHOWS PROMISE

Biomarkers are measurable changes in the body that help determine if a person has a disease. The most well-known biomarkers of Alzheimer's disease are amyloid beta and phosphorylated tau.

Previous researchers have shown that soluble triggering receptor expressed on myeloid cells 2 (sTREM2) levels in the cerebral spinal fluid change at the same time levels of tau change.

After studying the cerebrospinal fluid of Vanderbilt Memory and Aging Project participants, Center researchers found when a person had high levels of sTREM2 in the cerebrospinal fluid, they also had high levels of amyloid beta accumulation in the brain and performed worse on memory and thinking activities.

Based on this research led by Drs. Logan Dumitrescu, Katherine Gifford, Angela Jefferson, and Timothy Hohman, this new biomarker may help scientists and clinicians better identify people at risk for Alzheimer's disease.

ALZHEIMER'S GENETIC RISK AND COGNITION

A group of Vanderbilt Memory and Alzheimer's Center investigators have learned of an important connection between Alzheimer's disease genetic risks and everyday memory.

Episodic memory is memory for everyday events and activities and is well known to decline in individuals with Alzheimer's disease. However, executive functions are one of the first cognitive abilities to decline in middle-aged adults.

Researchers including Drs. Daniel Gustavson and Timothy Hohman found early decline of both memory and executive function related to Alzheimer's genetic risk factors, especially the apolipoprotein E e4 allele.

PILOT AND FEASIBILITY FUNDING PROGRAM

At the Vanderbilt Memory and Alzheimer's Center, interdisciplinary research is at the core of our mission to untangle the complexities surrounding Alzheimer's disease and related dementias.

Established in 2020, the Vanderbilt Memory and Alzheimer's Center Pilot and Feasibility Funding Program supports new research directions among investigators across Vanderbilt University Medical Center, Vanderbilt University, and Meharry Medical College.

Last year, we were fortunate to award $175,000 in funding for four pilot projects focused on Alzheimer's disease and related dementias. As part of a special grant from the National Institutes of Health, our colleagues at the Vanderbilt Diabetes Research and Training Center awarded $250,000 to seven additional pilot projects focused on Alzheimer's disease.

11 Awards

$425,000
Funds Awarded

Catie Chang, PhD

Tameka Clemons, PhD

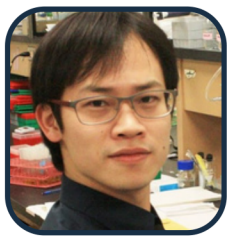
Alexander Conley, PhD

Danielle Dean, PhD

Brad Grueter, PhD

Alyssa Hasty, PhD

A.J. Hinton, PhD



Kung-Hsien Ho, PhD

Ethan Lippmann, PhD

Jason MacGurn, PhD

Xue Zhong, PhD

LEAVING A LEGACY IN ALZHEIMER'S RESEARCH

In honor of his late wife, Vineta Christopher, who battled Alzheimer's disease, Tennessee native Herbert Christopher created the Herbert O. and Vineta Christopher Directorship to support Alzheimer's disease and related dementia outreach and research. This recent gift is in addition to support Mr. Christopher has provided to other specialties at Vanderbilt University Medical Center.

Vanderbilt Memory and Alzheimer's Center Director, Angela Jefferson, PhD is the inaugural holder of the directorship. "I am so grateful to have been chosen as one of the recipients of Mr. Christopher's generous gifts," Dr. Jefferson said.

"There's someone out there that needs this treatment, and that's what drives me. I don't think there's a better feeling a human being can have than to know that they have been responsible for other people's benefit."

-Herbert O. Christopher

"With the support of this directorship, our Center will be able to continue to be on the forefront of cutting-edge outreach and research in Alzheimer's disease and related dementias."

Philanthropy and financial donations help the Vanderbilt Memory and Alzheimer's Center create meaningful change in the Alzheimer's research space.

Grant funds received from the National Institutes of Health and other agencies do not cover all the costs associated with running an excellent, sustainable research center, and the Center relies on private donations to make up the difference.

When you give to the Vanderbilt Memory and Alzheimer's Center, you are funding discoveries in early diagnosis and prevention that will help future generations avoid the extraordinary burden of Alzheimer's disease and related dementias.

TO LEARN HOW TO DONATE TO THE VANDERBILT MEMORY AND ALZHEIMER'S CENTER AND ADVANCE RESEARCH EFFORTS HERE IN TENNESSEE, VISIT **WWW. VUMC.ORG/VMAC/DONATE.**

ADDRESSING RACIAL INEQUITIES IN ALZHEIMER'S RESEARCH

Despite being disproportionately impacted by Alzheimer's disease and related dementias, people of color have been historically underrepresented in research. At the Vanderbilt Memory and Alzheimer's Center, we affirm the urgent need to end the disproportionate burden of Alzheimer's disease on families of color and increased participation in research is one important pathway to achieving that goal.

We have committed to recruiting at least 25% people of color to participate in our new cohort studies, such as the Vanderbilt Memory and Aging Project and the Tennessee Alzheimer's Project.

"Many African Americans do not participate in these types of studies. I felt like if I participated, I could convince others to do the same."

-Tonya Wilkins, VMAP participant

That is nearly double the percent of Black individuals in Tennessee according to the 2021 census. Though this step will not eliminate racial inequity in research, it represents our commitment toward more equitable representation among underrepresented communities within our studies.

FOR BLACK PEOPLE, MEMORY LOSS COSTS MORE THAN MEMORIES

"Racism in medical care puts us at risk of not getting the right evaluation for memory loss, putting us at higher risk for a misdiagnosis or a late diagnosis. For Black folks, Alzheimer's is a crisis. We need to learn more about our risks and advocate for quality, timely, and appropriate care for ourselves and our family members."

-Pam Cowley, VMAC Outreach and Engagement Manager

ALZHEIMER'S EDUCATION IN THE BLACK COMMUNITY

Aside from participation in research, education is one of the most valuable tools in helping to reduce the burden of Alzheimer's disease on families of color. Over the past year, we have made an intentional effort to engage Black communities in Alzheimer's education through monthly Lunch and Learns, our partnership with the Meharry-Vanderbilt Alliance, and community events including:

- Memory Sunday
- Nashville Black Market
- 40th Annual African Street Festival

TRAINING THE NEXT GENERATION

One of our core missions at the Vanderbilt Memory and Alzheimer's Center is providing a rich training environment for the next generation of scientists to continue unraveling the mysteries surrounding Alzheimer's risk, resilience, prevention, and treatment.

This past year, we celebrated multiple achievements by our trainees, including undergraduate students, graduate students, medical students, and postdoctoral fellows, as they further their career in Alzheimer's research. Below, we highlight just a few of their successes.

VMAC TRAINEES EARN DOCTORAL DEGREES

This past year, we were fortunate to celebrate multiple trainees who completed their doctoral degrees including Kylie Balotin, PhD, Corey Bown, PhD, Elizabeth Moore, PhD, MD, Mabel Seto, PhD, and Rebecca Winfree, PhD.

TRAINEES EXCEL IN THEIR AREAS OF FOCUS

Corey Bolton, PsyD

Postdoctoral fellow, Dr. Corey Bolton, received a competitive Clinician Scientist Fellowship Program Grant from the Alzheimer's Association. This grant focuses on best practices for disclosing dementia risk information using a novel blood-based biomarker, plasma p-tau.

Lauren Drake

Under the mentorship of Dr. Ethan Lippmann, Lauren Drake received a competitive National Science Foundation award. Lauren is a PhD student in biomedical engineering, and her grant is focused on engineering a microdevice of a brain cell to model tau accumulation.

Marissa Gogniat, PhD

In addition to her research on the neuroprotective effects of health and wellness factors in aging, Dr. Marissa Gogniat was selected as the 2021 Bright Focus Alzheimer's Fast Track Mock Grant Winner.

Jordan Wilcox, PhD

Under the mentorship of Dr. Fiona Harrison, Dr. Jordan Wilcox completed her postdoctoral fellowship and accepted a faculty position at Belmont University. As an Assistant Professor of Neuroscience, Dr. Wilcox leads a research program and trains undergraduate students.

Photo: Kristin Luna

THANK YOU FOR YOUR SUPPORT

From participation in research studies to financial donations, we want to thank you for the continued support of our Center. Our advancements in Alzheimer's research would not be possible without your contributions.

VANDERBILT MEMORY AND ALZHEIMER'S CENTER

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