Stanford Neurology Research Report

The Poston Lab

Dear members of our research community,

We at the Poston Lab and the Stanford Movement Disorders Center would like to take the opportunity to express our sincere gratitude for your time and participation in our research on Parkinson's disease and parkinsonian disorders. Your dedicated participation lies at the heart of our scientific research.

As a show of thanks, here is an update on our progress to date. We have been hard at work compiling and interpreting valuable information given to us by you, our research participants. The fruits of our efforts will soon be available for shared access in the scientific community.

POSTON RESEARCH LABORATORY

A·D·R·C for healthy brain aging

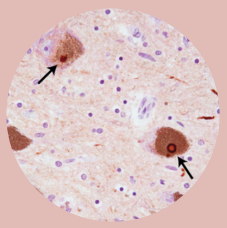
Stanford MEDICINE School of Medicine

LBDA LEWY BODY DEMENTIA ASSOCIATION RESEARCH CENTERS OF EXCELLENCE

THE Sue's Story PROJECT

Research Recruitment
Learn about some of our studies actively recruiting participants.

Helpful Resources
A list of websites offering various types of support.



Research Spotlight
Sharing updates from two of our new research projects!

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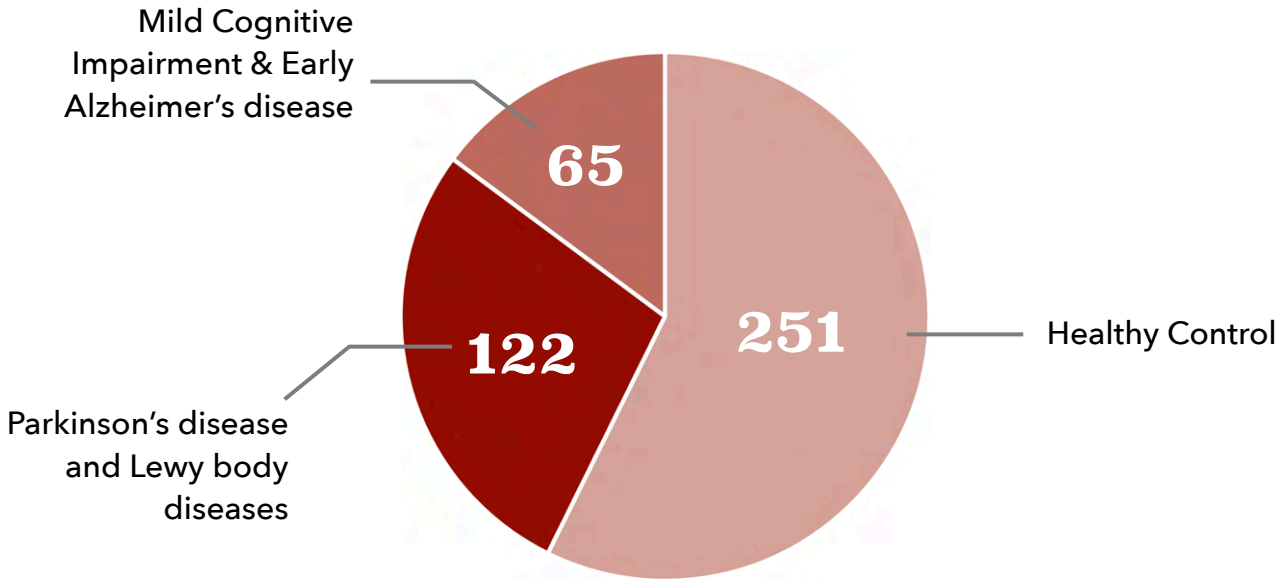
Recruitment for Research Studies

Our studies are possible thanks to patients and caregivers who participate in our research studies. We are grateful for your generosity as you are a key part of research.



With the help of our research assistants, we have considered **over 438** individual cases for research this year. **We are currently recruiting for the studies listed below. Join today!**

Tau PET Imaging Study

We are recruiting volunteers to participate in a PET imaging study of the brain to determine the impact of tau protein tangles on cognition. Study participants will be asked to come in for one 2 hour study visit, which includes a 40 minute combined PET-MRI scan.

For more information, contact: Alena Smith (alenaa@stanford.edu) or Hillary Vossler (hvossler@stanford.edu).

Facial Expression Biomarker Study

We are looking for volunteers to participate in a study looking at facial movements in neurodegenerative diseases. We hope to validate a diagnostic tool developed by Stanford Undergraduate, Erin Smith, for early detection of Parkinson's disease. Study participants will be asked to come in for one 30 minute study visit.

For more information, contact: Alena Smith (alenaa@stanford.edu) or Kristen Wheeler (kjwheele@stanford.edu)

Gut Microbiome and Parkinson's Disease Study

The Gut Microbiome is the community of bugs (viruses, bacteria, fungi) that live inside the digestive tract. Studies show that the Gut Microbiome in people with Parkinson's disease is different from that in people without Parkinson's disease. Studies also suggest that these differences may contribute to inflammation, constipation, and Parkinson's disease symptoms. We are actively recruiting people with Parkinson's disease and their spouse (or other cohabitating family member) to join this study. Participants are asked for a blood and stool sample (taken from the comfort of your home!).

For more information, contact: Gabriella Green (gzmg1@stanford.edu) or Erin Brooks (efbrooks@stanford.edu)

Biomarker for Diagnosis of Corticobasal Degeneration

The purpose of this study is to identify potential molecular biomarkers from plasma in corticobasal degeneration (CBD) patients. Currently, clinical diagnosis of CBD remains challenging, and not much is known about specific CBD pathology at molecular level. Our goal is to discover potential CBD biomarkers in patients' blood, gain knowledge about the molecular pathology of CBD. We are recruiting patients with Corticobasal Syndrome and Healthy Control participants, aged 30 years or older. Study participants will be asked to come in for one 30 minute study visit and blood draw.

For more information, contact: Ze Yang (yangze@stanford.edu)

Stanford Healthy Brain Aging Project sponsored by the NIH Alzheimer's Disease Research Center (ADRC)

We are still actively recruiting people with Parkinson's disease, Lewy body dementia, and healthy older adults for our longitudinal research studies.

For more information, contact: Veronica Ramirez (vramirez1@stanford.edu) or Isabelle Yi (isabelleyi@stanfordhealthcare.org

Decision-Making in Parkinson's Disease

Decision-making impairment is especially associated with the early stages of Parkinson's disease. Patients have an impaired ability to integrate previously learned information with sensory information to inform perceptual decisions. This study endeavors to show how much of of the decision-making impairment in Parkinson's disease patients is due to memory problems, attention, or visual processing. (cont.)

Also, it will assess how these cognitive processes affect your gait. These results can provide early detection of Parkinson's disease by analyzing decision-making. Moreover, it can show the effect of dopamine on decision-making.

Patients eligible for this project must be cognitively normal with Parkinson's Disease; enrollment will occur only at Stanford University. To participate, you will need to be able to come onsite to SNHC (213 Quarry Rd, Palo Alto) for two consecutive Fridays, for approximately 2.5 hrs each day. On one of those days, you will be asked to be ON PD medication, and the other day, you will be asked to be off PD medication for 12 - 24 hours before your visit. If you decide to participate in this study, Dr. Montaser Kouhsari, or a designated representative, will describe the procedure to you. Your participation in this study is entirely voluntary. You will also receive an apple watch to participate.

For more information, contact: Stephanie Tran (trans@stanford.edu)

SAVE THE DATE

April 15th, 2023: Parkinson's Moving Day

Moving Day is an inspiring and empowering annual fundraising walk event that unites people around the country living with Parkinson's disease, their care partners and loved ones to help beat Parkinson's disease. Moving Day is more than just a walk. It's a celebration of movement – proven to help manage Parkinson's symptoms.

WHEN: April 15th at 9am PST

WHERE: Evergreen Valley College in San Jose, CA 95125

Register to walk today! https://movingdaywalk.org/event/moving-day-san-jose/register-type

June 2nd, 2023: Willow Glenn Parkinson's Support Group

Dr. Poston will be giving a talk at the Willow Glenn Parkinson's Support Group in San Jose. The Willow Glenn Parkinson's Support Group is open to caregivers and patients. They meet monthly to share information and support one another.

WHEN: June 2nd from 10am to 12pm PST

WHERE: St. Francis Episcopal Church

1205 Pine Avenue

San Jose, CA 95125 (corner of Pine and Newport in Willow Glen)

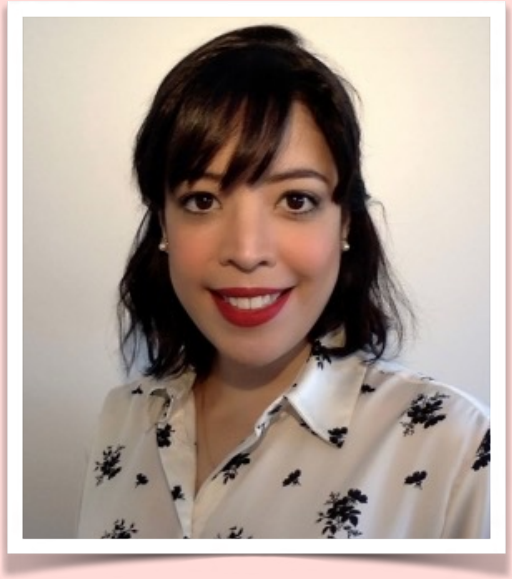
More information: http://parkinsonssupport.weebly.com

Meet Our New Lab Members

This year, four new members joined our team, bringing their various backgrounds to the Poston lab.

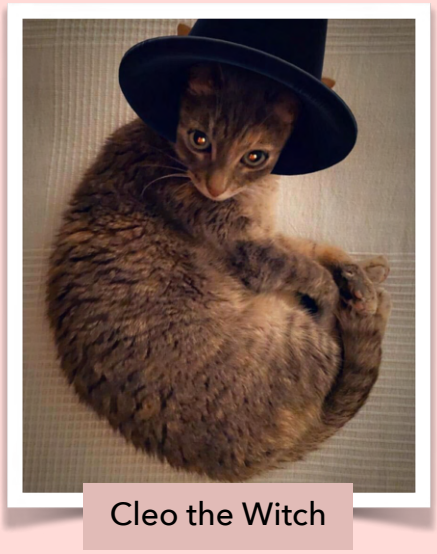
CARLA ABDELNOUR, MD, PHD

Postdoctoral scholar



Originally from Caracas, Venezuela, Dr. Carla Abdelnour received her medical degree at the Central University of Venezuela, and then completed her neurology residency training at the University Hospital Príncipe de Asturias in Madrid, Spain. She conducted her doctorate in Medicine at the Autonomous University of Barcelona working with Drs. Dag Aarsland, Javier Pagonabarraga and Jaime Kulisevsky. Her thesis focused on the influence of Alzheimer's disease copathology in atrophy patterns, longitudinal cognitive decline, and heterogeneity of patients with dementia with Lewy bodies.

Carla's main interest is the study of neurodegenerative diseases, especially Lewy body disease. As a Sue Berghoff LBD Research Fellow, her plan is to investigate the impact of different comorbidities in the clinical presentation, cognitive profile, and disease progression of Lewy body disease. Additionally, she wants to study the biological underpinnings of prodromal Lewy body disease to identify potential biomarkers for diagnosis and prognosis. She was member of the steering committee of the European dementia with Lewy bodies consortium (E-DLB), and is a current member of the Board of Directors of the Lewy Body Dementia Association.



Cleo the Witch

Outside the lab, you will find Carla learning new things and adding hobbies to her list. In particular, she likes traveling, making her own clothes, and is currently learning to play the guitar.

ELNAZ GHASEMI

Research Assistant

Elnaz received her B.A.Sc. in Electrical and Computer Engineering from the University of Toronto. During her undergraduate studies she completed the Summer Undergraduate Research Fellowship (SURF) at California Institute of Technology. She was also selected as one of the five international engineers/scientists to participate in a two-week simulated Mars mission as a crew engineer. After her engineering studies, she worked with different technology startups and also in the film and theatre industry.

Her involvement in an artificial cognition project spiked her interest to learn about the neural basis of natural cognition that inspires AI. Since then, she has completed some neuroscience studies and has helped with several cognitive neuroscience projects at the Stanford University School of Medicine and the Psychology Department to enhance her knowledge in the field. Her recent research topics include: neural basis of risky decision making, executive function deficits in children with genetic disorders, and the effects of attention lapsing on recognition memory. She is currently a Research Data Analyst at the Poston lab, analyzing MR scans of patients with Parkinson's disease.

When not analyzing brain data, she enjoys traveling and spending time with her family. Her hobbies include exploring nature, practicing yoga, skiing, swimming, oil painting and playing the piano.

ALENA SMITH

Research Assistant

Alena graduated from the University of Southern California with a B.S. in Neuroscience and minor in Business Administration. During her time as an undergraduate research assistant at the USC Brain and Creativity Institute, Alena learned to blend her experiences as an artist and scientist to investigate the neurological correlates of creativity. She is excited to apply these understandings and learn more about the cognitive changes associated with Parkinson's disease…

... continued

Alena is passionate about empirically connecting PD pathology to patient anecdotes of sudden bursts of artistic creativity. Above all, she is driven to better understand the symptomatic and neurophysiological bases of PD to help develop more effective treatments. She hopes to pursue graduate education where she can obtain greater clarity in her role as a researcher and artist. Outside of research, Alena spends her time painting and drawing. She runs her own small art business and hosts annual art shows to raise money for the Epilepsy Foundation.

VIKTORIJA PRATUSEVICIUTE

Research Assistant

Originally from Vilnius, Lithuania, Viktorija graduated with a BSc (Hons) in Psychology from the University of Edinburgh where she completed her honor thesis exploring the development of working memory with Dr. Candice Morey. She then completed her MSc in Speech and Language Therapy in London and explored individual differences in the development of language processing networks under the supervision of Dr. Rachel Holland.

"The Little Old Alfie that wasn't afraid of anything"

She has worked as a speech and language pathologist specializing in adult neurological communication disorders across acute inpatient, rehabilitation, and outpatient settings. Viktorija joined the Mormino and Poston labs in February 2022 and hopes to use her specialist clinical knowledge to continue exploring language processing and features underlying speech comprehension and production.

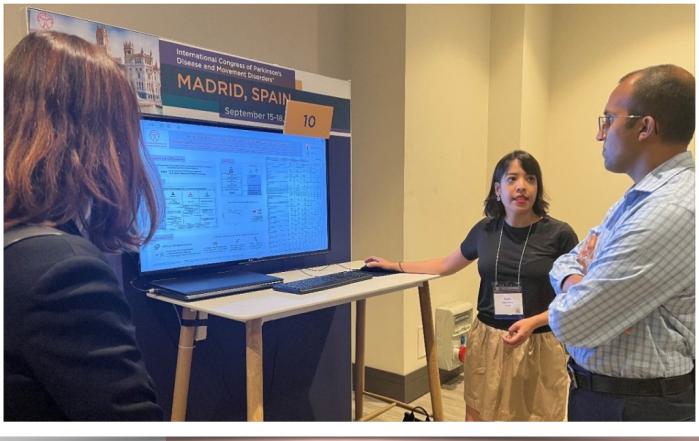
Outside of work, Viktorija enjoys exploring the outdoors and going hiking with her husband and dog, Alfie. She's always up for trying creative hobbies from painting to learning the piano.

Presentations

This past year, the Poston Lab traveled near and far to share knowledge and present our research findings. Here are some highlights!

1 MADRID, SPAIN

Carla (left) and Marian (right) traveled to present at the 2022 International Congress of Parkinson's Disease and Movement Disorders in Madrid, Spain.



2 SAN DIEGO, CALIFORNIA

Christina (left) and Marian (right) presented at the 2022 Alzheimer's Association International Conference (AAIC) in San Diego, CA.

3 SAN FRANCISCO, CALIFORNIA

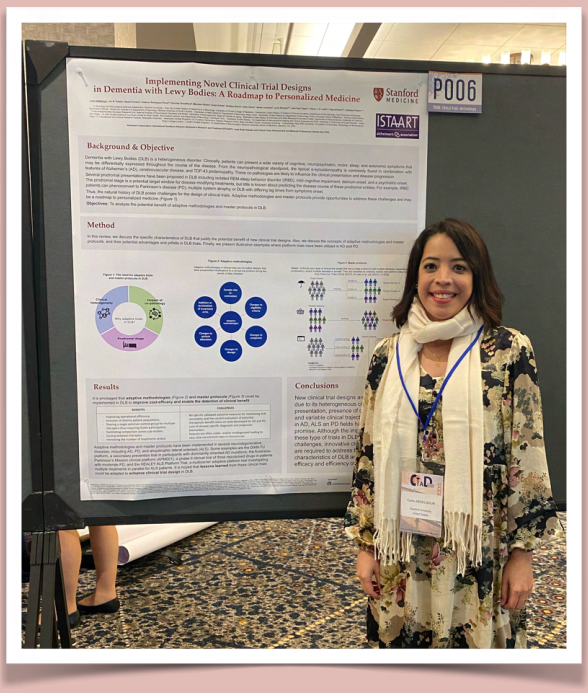
Christina (left) and Leila (right) presented at the 2022 San Francisco Neurological Society (SFSN) in San Francisco, CA.

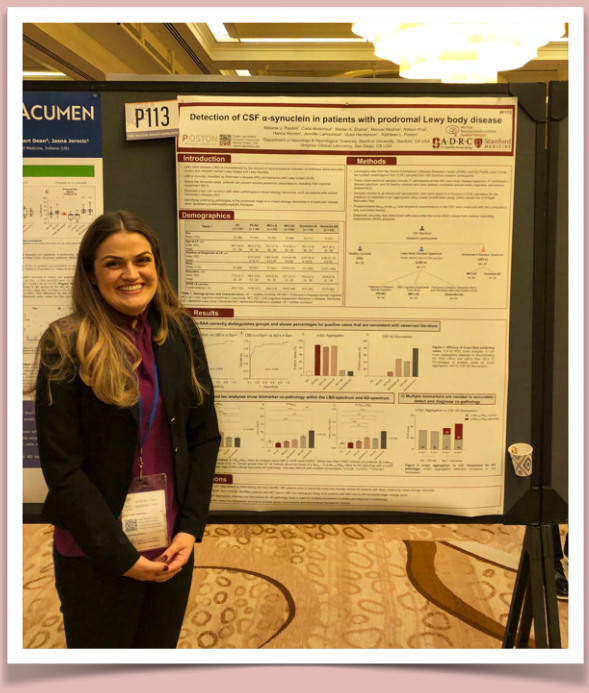
4 SAN FRANCISCO, CALIFORNIA

Carla, Melanie (left) and Hillary (right) from the Mormino Lab attended the 2022 Clinical Trials on Alzheimer's Disease (CTAD) Conference in San Francisco, CA.

4 SAN FRANCISCO, CALIFORNIA

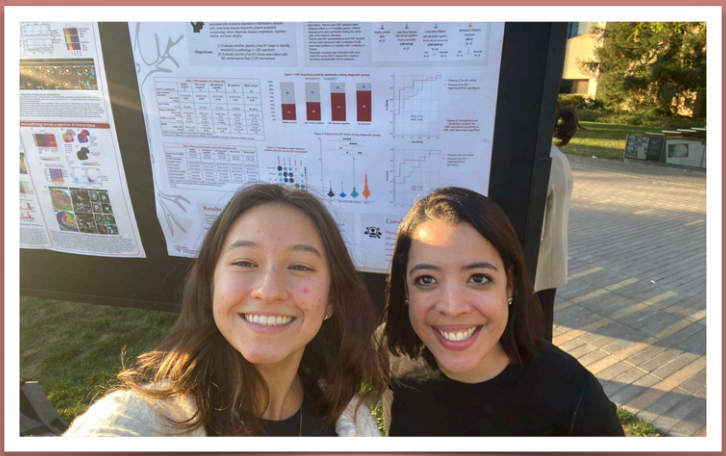
Carla (left) and Melanie (right) also presented at the 2022 Clinical Trials on Alzheimer's Disease (CTAD) Conference in San Francisco, CA.





5 STANFORD, CALIFORNIA

Carla (right) presented at the Wu Tsai Neuroscience Symposium, here on Stanford's campus.



Faculty Spotlight

Meet **Gaurav Chattree**, an Instructor in the movement disorders division.

Dr. Gaurav Chattree is originally from Fort Worth, Texas and received his BS in Biomedical Engineering from the University of Texas at Austin. He then received his MD from The University of Texas Southwestern where he was inducted into the Alpha Omega Alpha honor medical society. In medical school, he performed neuroscience research in the lab of Dr. Todd Roberts studying the neural circuit basis of how zebra finch birds learn to sing their song (a process that has many similarities with how humans learn to speak).

He then came to Stanford for his internal medicine internship and neurology residency and served as chief resident in his final year. As a neurology resident, he was drawn to the field of movement disorders because it is a field where clinical skills and understanding of neural circuitry amazingly come together to develop treatment plans. He therefore continued on at Stanford as a movement disorders fellow and is currently an Instructor in the movement disorders division.

As a movement disorders clinician, Dr. Chattree recognizes there is still much work to be done in the field for improving the lives of our patients.

This drives his research in the lab of Dr. Mark Schnitzer, Stanford Professor in Biology and Applied Physics, where Dr. Chattree is applying cutting edge neuroscience tools to develop new treatments for Parkinson's disease.

STANFORD BRAIN DONATION PROGRAM

Science has taught us that aging, dementia, and neurodegenerative disorders happen at the cellular level. While our research in diagnosing living participants is becoming more promising every day, Stanford investigators aim to use microscopic brain tissue analysis to learn more about brain disorders and improve our diagnostic ability. Autopsy and postmortem brain donation will help doctors move from a "best-guess" approach to one of concrete evidence-based diagnosis. Using this valuable information, we will be able to refine our approach to clinical diagnoses for future patients and families.

If you or a family member are interested in brain donation, please contact Gabriel Hergenroeder at (650) 721-5274 or ghergenroeder@stanford.edu

Pareidolias: Seeing Objects That Aren't There

Written by Marian Shahid

Have you ever seen what looks like an animal in the clouds? Or a face in a rock or tree? These visual illusions are known as pareidolias. Pareidolias are complex visual illusions involving ambiguous forms that are perceived as meaningful objects, such as faces or animals. Researchers have found that patients with Dementia with Lewy bodies report more pareidolias than patients with Alzheimer's disease, and number of pareidolia responses on a test correlates with severity of visual hallucinations. However, pareidolias have not been examined across the Lewy body disease spectrum, including Parkinson's disease with and without cognitive impairment or dementia and Dementia with Lewy bodies.

To address this gap, we examined pareidolia responses in patients across the Lewy body disease spectrum, including those without reported hallucinations or delusions. Participants in our Stanford Alzheimer's Disease Research Center (ADRC) and Pacific Udall Center (PUC) completed the Noise Pareidolia Task.

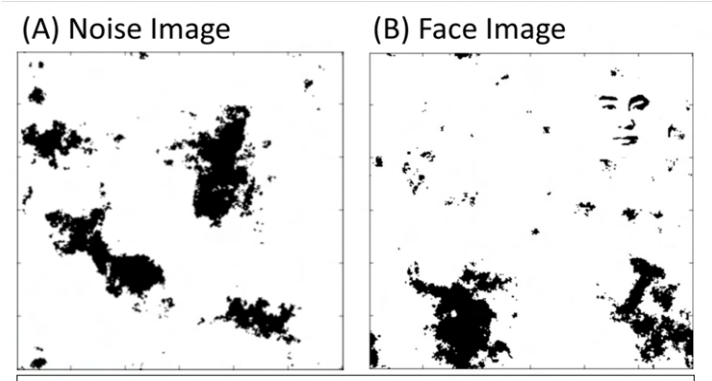


Figure 1: Noise Pareidolia Task

The Noise Pareidolia Task consists of 20 black and white noise stimuli images; 13 contained only the noise stimuli (Noise Image, Figure 1A) and 7 contained the noise stimuli with one human face embedded (Face Image, Figure 1B). An illusory response was when a participant saw a face in the Noise Image (where there is no face).

We found that Lewy body disease patients without reported hallucinations or delusions, and in particular those without dementia, endorse illusory responses on the Noise Pareidolia Task.

Our data shows that this test can possibly be used as a screening test in all Lewy body disease patients at risk of hallucinations, regardless of their level of cognitive impairment.

Thus, the Noise Pareidolia Task has great potential to be integrated into clinical care as a brief bedside test to identify patients at higher risk of hallucinations. This has extraordinary value to clinicians in medical decision-making.

Image credits: Google Images (left). Hallucinators find meaning in noises: pareidolic illusions in dementia with Lewy bodies, Neuopsychologia (right)

Plasma Ptau: Biomarkers Found in Blood

Written by Dr. Carla Abdelnour

Currently, neurodegenerative dementias are classified based on proteins deposited in the brain. When people with dementia die and researchers study their brains under the microscope, they frequently see more than one these proteins deposited. Lewy body disease is characterized by deposits of a protein called alpha-synuclein. Frequently, in addition to alpha-synuclein, people with Lewy body disease can have deposits of other proteins related to Alzheimer's disease. These proteins are called amyloid and tau. When people with Lewy body diseases have deposits of amyloid and tau, in addition to deposits of alpha synuclein, they experience worse performance on cognitive tests, may present different clinical characteristics, and sometimes even shorter survival. Additionally, these patients could have different responses to treatments, or they might benefit from therapies targeting amyloid or tau proteins.

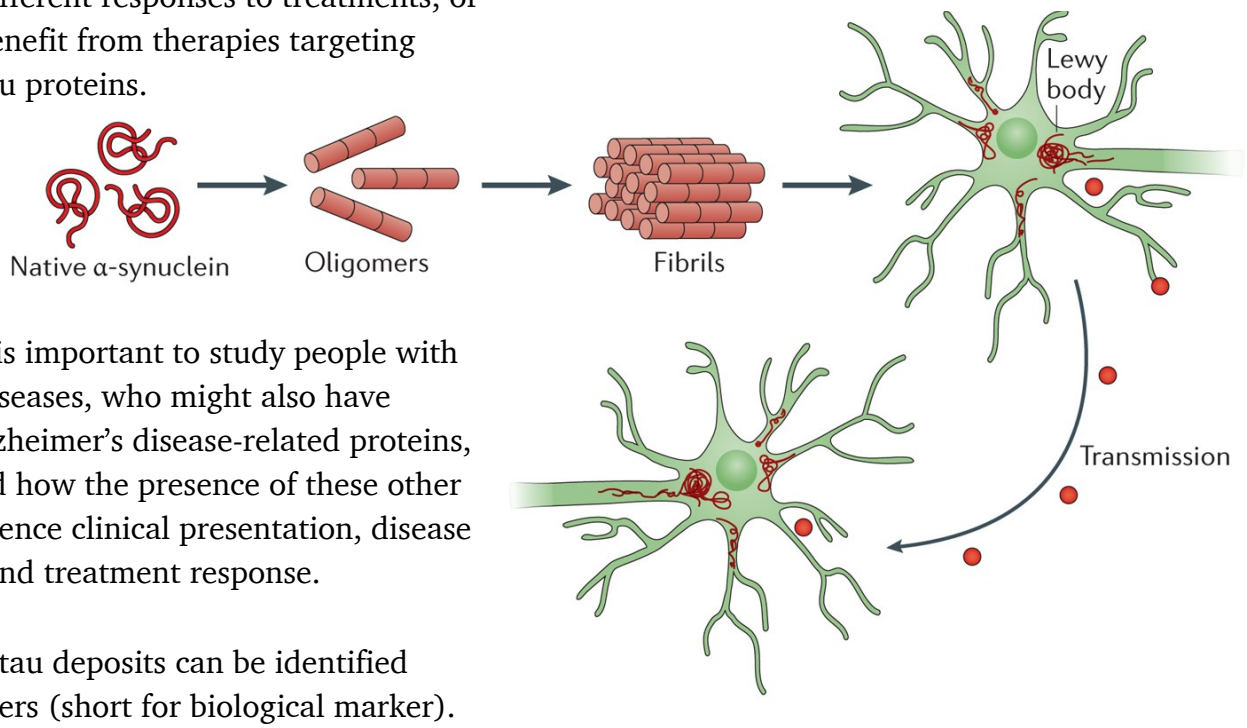


Image credit: Zeroing in on neurodegenerative α-synuclein, Nature Reviews Drug Discovery

Therefore, it is important to study people with Lewy body diseases, who might also have additional Alzheimer's disease-related proteins, to understand how the presence of these other proteins influence clinical presentation, disease progression and treatment response.

Amyloid and tau deposits can be identified with biomarkers (short for biological marker). A biomarker is a measurable indicator of a normal condition or a disease. Examples of biomarkers are blood pressure or blood glucose levels. Biomarkers for amyloid and tau proteins include a neuroimaging technique called positron emission tomography (PET) imaging, and analysis of cerebrospinal fluid (CSF) obtained with a lumbar puncture. These biomarkers are very useful, but there is a need to develop easier to obtain and less expense biomarkers that can be performed on larger numbers of people.

Recent technology advances have allowed researchers to obtain biomarker in formation from blood, which is far easier to obtain and less expensive than PET imaging or CSF.
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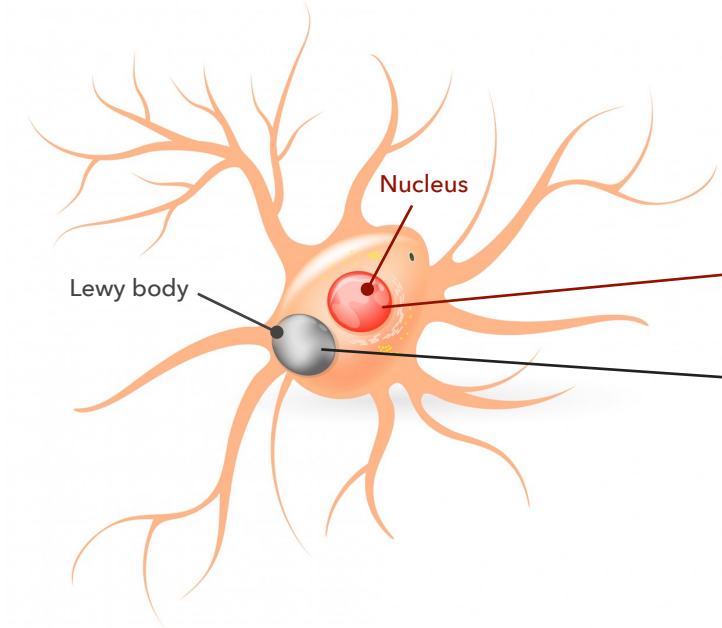
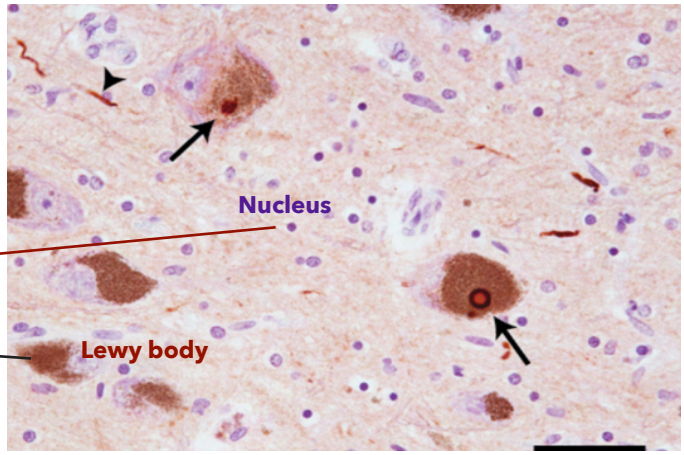




The right image shows Lewy bodies (in red) and Lewy neurites (arrows) in the substantia nigra from a brain tissue sample from a PD patient. The purple 'dots' in the image show the nucleus of neurons.

These so-called 'blood-based' biomarkers can now be used to study amyloid and tau proteins. In our center, we have analyzed one of these blood-based biomarkers called plasma p-tau181. We found that this biomarker can identify people with Alzheimer's disease, who have amyloid and tau proteins deposited when measured with CSF and PET imaging. Now we are studying plasma p-tau181 in people with Lewy body diseases.

In a recent study, we determined whether plasma p-tau181 was able to identify Alzheimer's disease-related proteins in people with Lewy body diseases who have cognitive impairment (for example, Parkinson's disease with mild cognitive impairment, Parkinson's disease with dementia, mild cognitive impairment due to Lewy bodies and dementia with Lewy bodies). We found that plasma p-tau181 was able to identify Alzheimer's disease-related proteins in some people with Lewy body diseases and cognitive impairment.

Our results indicate that plasma p-tau181 might be a useful screening tool for Alzheimer's disease-related proteins in people with Lewy body disease.

Our results have several potential implications. For instance, researchers can apply this biomarker in larger populations with less access to sophisticated tools to analyze CSF or PET imaging, or to patients with contraindications for these procedures. This blood-based biomarker is also easier to perform repeatedly several times during the course of the disease. It might also be able to identify subgroups of people, who might have different response to treatments. In the near future, we plan to analyze how plasma p-tau181 levels change over time in people with Lewy body diseases, and to study whether these changes can be related to worsening cognitive or motor performance longitudinally.

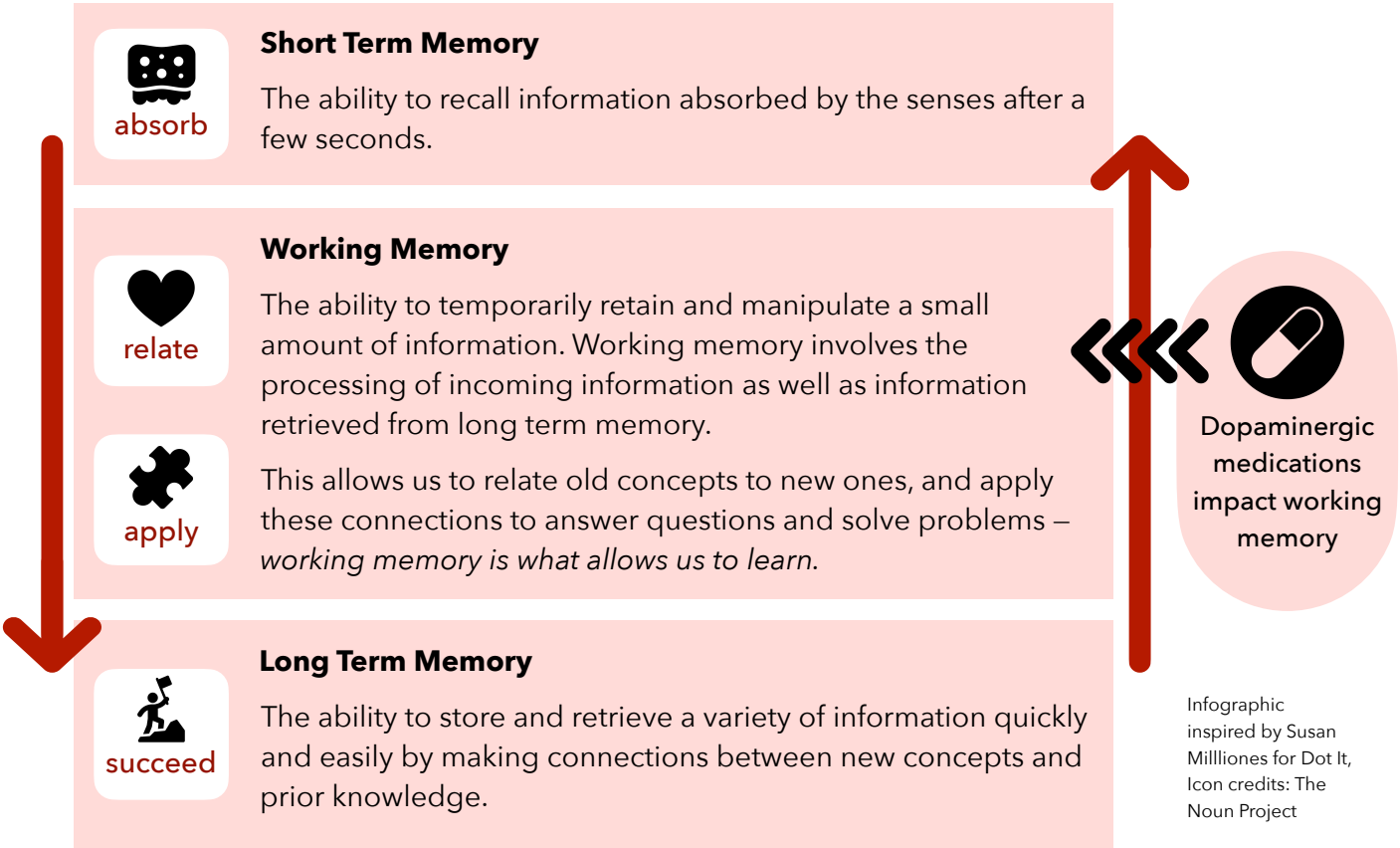
Our studies are possible thanks to patients and caregivers who participate in our research studies. We are grateful for their generosity as they are a key part of research. Science is a team work, and we will be able to understand these complex and devastating diseases working together to have a world free of dementia.

Image credits: Neuropathology of Lewy body disorders (right), Shutterstock (left)

What Does Dopaminergic Medication do to the Brain?

Written by Dr. Christina Young

In addition to improving motor symptoms of Parkinson's disease, dopaminergic medications have also been shown to influence thinking abilities. Specifically, past research has shown that dopaminergic medications impact working memory (i.e. the ability to temporarily hold and manipulate a small amount of information in your brain such as when you are remembering a phone number before you write it down) and executive functioning (i.e. mental processes that allow for complex behaviors such as problem-solving, multi-tasking, and inhibition). However, how dopaminergic medications impact brain systems that support these cognitive abilities was underexplored.



Infographic inspired by Susan Millliones for Dot It, Icon credits: The Noun Project

To address this question, we used functional magnetic resonance imaging (fMRI), a brain imaging technique that measures blood flow to infer brain activation. 36 participants with Parkinson's disease completed an fMRI scan both OFF and ON dopaminergic medication. An additional 44 healthy control participants were also scanned. During the fMRI scan, participants completed a working memory task so that we could look at brain activity while participants try to remember differing amounts of information in their heads. (cont. next page)

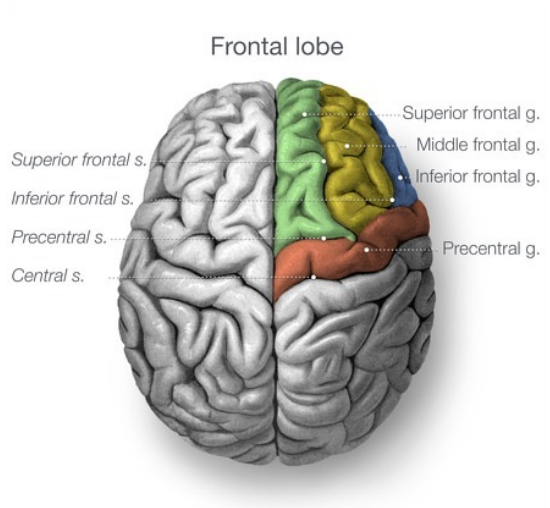
We then used computational modeling to understand the signaling between brain regions involved in working memory. Specifically, we quantified how similar the brain signaling was for each Parkinson's disease participant in comparison to healthy control participants. We found that Parkinson's disease participants were more similar to healthy controls when ON dopaminergic medication in comparison to when they were OFF medication. Furthermore, the degree of brain signaling change when ON vs. OFF medication predicted working memory and executive functioning ability.

Finally, we identified that signaling from the right medial frontal gyrus to the right posterior parietal cortex, specifically, was associated with faster working memory performance in health controls. Importantly, signaling between these two brain regions was impaired in Parkinson's disease participants when OFF medication, but this connection as well as its association with working memory speed were restored when ON medication.

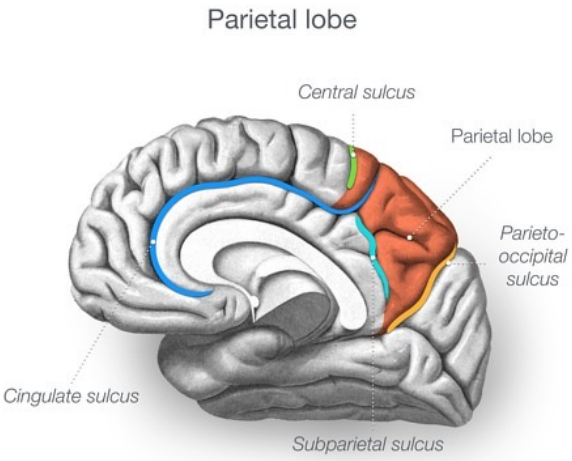
Our results highlight how dopaminergic medications can normalize brain functioning, which can then lead to improved thinking abilities.

Future research examining the effects of dopaminergic medication on brain functioning will be critical to those experiencing cognitive decline in the context of Parkinson's disease.

Image credits: Radiopaedia



Medial frontal gyrus highlighted in **yellow**



Parietal cortex highlighted in **orange**

Special congratulations to **Dr. Christina Young**, the author of this article, for her recent promotion to Instructor!

An example of your Working Memory in action:

Susan Millliones for Dot It

Here's how working memory processes reading the word "**cat**". Working memory says,

1. This is the letter **c**. It makes the sound **/k/** when it comes before an a. **Hold that.**
2. Next is the letter **a**. It makes the sound **/a/** in the middle of a CVC word. **Hold that.**
3. This is the letter **t**. It makes the sound **/t/**. **Hold that.**
4. Now go back and **recall** all three sounds in sequence **/k/ /a/ /t/**.
5. **String** them together. **/kat/**
6. **Say cat**.

If "**cat**" is a familiar word, long term memory retrieves an association with the word cat in the form of an image or experience with cats. It gleans the correct meaning of the word cat and helps to solidify the symbols and sounds for "cat" in long term memory.

Sleep and Activity Patterns in Aging and Disease

Written by Dr. Joe Winer

In Fall 2021, Dr. Joe Winer began using movement-sensing watches, also known as actigraphy watches, to record patterns of physical activity and sleep in participants in the Stanford Healthy Brain Aging Study.

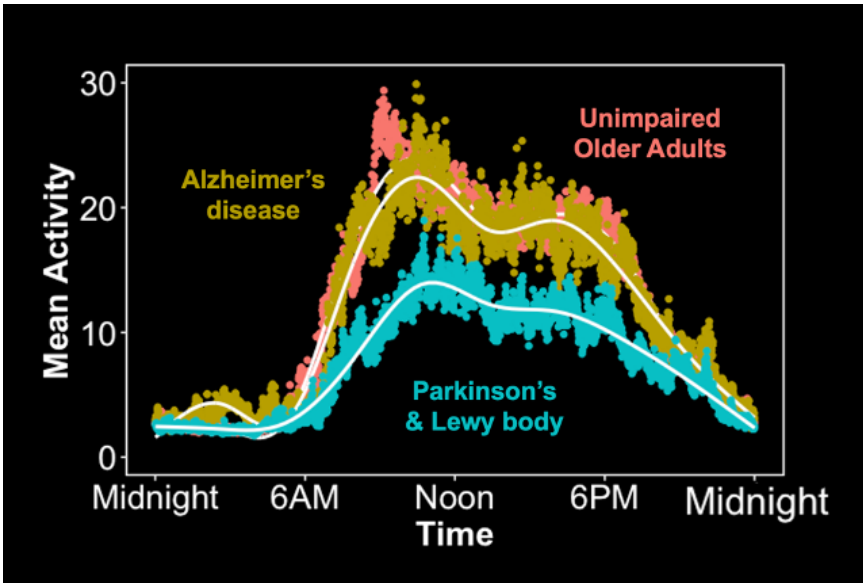
Image credits: The Sleep Foundation

So far researchers have collected actigraphy data from over 150 individuals, including people with Parkinson's disease and Lewy body dementias. From the actigraphy watches the research team can measure levels of real-world activity, sleep duration, and sleep quality, and then they investigate how these factors are affected across neurodegenerative diseases. Because the Stanford Healthy Brain Aging Study collects data from research participants annually, the research team will be able to determine whether better sleep health and increased physical activity are associated with Parkinson's disease and Lewy body dementia symptoms progressing more slowly over time.
(cont. next page)

The graph below shows activity levels across an average 24-hour day for people with Parkinson's disease or Lewy body dementia, as well as in people with Alzheimer's disease, and unimpaired older adults.

There is a clear difference in daytime activity levels (between 6am and midnight) in individuals with Parkinson's disease or Lewy body dementias.

Researchers are working to understand what causes these changes in daytime activity level and to determine if these changes can be used a disease-specific biomarker.



The Value of Identifying Alpha-Synuclein in the Cerebrospinal Fluid

Written by Dr. Melanie Plastini

Image credits: Amprion

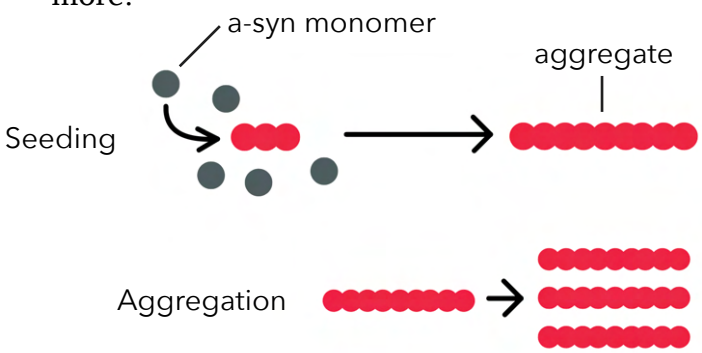
The buildup of misfolded alpha-synuclein protein that clumps together to form what we call aggregates, can indicate the presence of active alpha-synuclein-related diseases like Parkinson's disease (PD), Parkinson's disease with dementia (PDD), or Lewy body dementia (LBD). We can collectively term these diseases as alpha-synucleinopathies.

By detecting misfolded alpha-synuclein in the cerebrospinal fluid (CSF), we can provide a more accurate diagnosis early on. With early detection, we can potentially catch the disease process years before the start of clinical symptoms and treat patients sooner with more specific and personalized treatments to delay the progression of the disease. Identifying these proteins early or in dementias can also help to develop more precise and effective therapeutics. Alpha-synuclein can also be present as an underlying pathology that complicates the management of other diseases, such as Alzheimer's Disease, and can affect treatments. Therefore, determining if alpha-synucleinopathy is occurring with patients is important for the best treatment options.

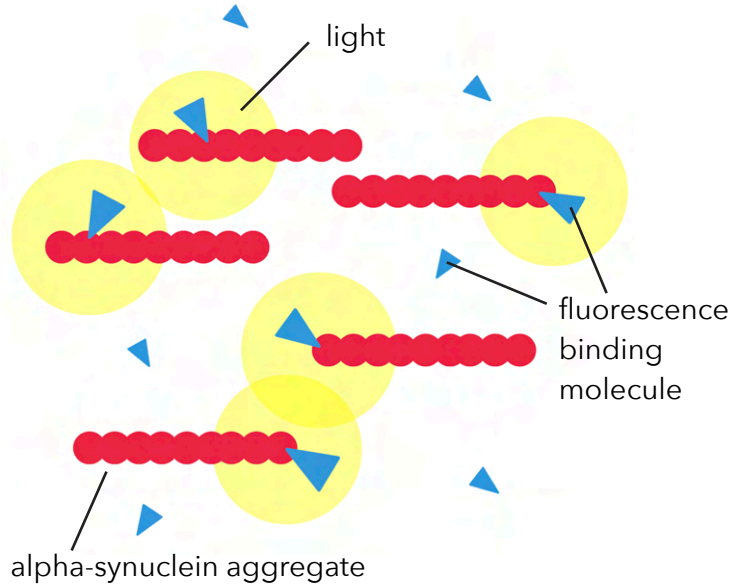
Misdiagnosis of PD and LBD occur over 20% of the time. Protein-specific biomarkers are needed for the diagnosis of underlying alpha-synucleinopathy, which is why we are working with a company called Amprion to find the best test for this.

Amprion has created a Seed Amplification Assay (SAA) called the SYNTap® Biomarker Test using CSF samples to detect misfolded alpha-synuclein in living patients. This test can confirm patients with alpha-synucleinopathy and rule out those without underlying pathology to provide a more accurate diagnosis.

The SAA test mimics the biological process by which proteins misfold and aggregate in patients. The test amplifies, or builds up, misfolded alpha-synuclein protein aggregates and can detect even the smallest amounts of protein in the CSF. These tests make even small amounts of protein amplify by a billion times or more!



A specific molecule that lights up when attached to alpha-synuclein (a process called fluorescence) is used in the test to detect whether or not aggregates are in a sample. If aggregates are in the sample, the light will shine and we can detect it. If there are no aggregates in the sample, the light will remain too dim to be seen.



In our research and others, we have shown that this test can detect aggregates of misfolded a-synuclein years before symptoms of alpha-synucleinopathy appear.

We were also able to detect aggregates in patients diagnosed with other neurodegenerative diseases, such as Alzheimer's Disease, that had not been previously diagnosed with an alpha-synculeinopathy.

By detecting alpha-synuclein early, we are one step closer to treating Lewy body diseases sooner and eradicating all of these debilitating diseases.

We are incredibly grateful to our participants and their loved ones and caretakers for their time, dedication, and contributions to our research – thank you very much!

Helpful Resources

If you or a loved one has Parkinson's Disease, the following resources may be useful.

STANFORD PARKINSON'S COMMUNITY OUTREACH

The Stanford Parkinson's Community Outreach team provides education, assistance, and resources to improve the quality of life for those with Parkinson's disease, caregivers, and the community. Materials are available in English, Spanish, and Chinese.

MEDICAL LOAN CLOSETS

Loan closets provide medical equipment such as walkers, canes, wheelchairs, and bathroom equipment free of charge.
Here is a list of a few loan closets available in the Bay Area:

- https://www.recares.org
- https://www.avenidas.org/medical-equipment-loan-closet-now-open/
- https://norcalsci.org/equipment-list

SUPPORT GROUPS

Being part of a support group can be one of the best ways to reduce stress and connect with others who can relate to your experience. Care partners and family members also benefit from sharing questions and concerns with like-minded others. Here are some resources available to help you find a support group in the Bay Area.

- https://med.stanford.edu/parkinsons/northern-california-resources/support-groups.html
- http://parkinsonssupport.weebly.com

Some sources of **online** support:

- The Parkinson's Buddy Network is an online community of people impacted by Parkinson's, helping you build meaningful connections and relationships.
- NeuroTalk has a robust Parkinson's disease community.
- HealthUnlocked has Parkinson's community pages.

Poston Lab Pets

This Halloween, the pets of members from the Poston Lab competed in a Neurology department-wide costume contest. Alfie won second place!

"The Little Old Alfie that wasn't afraid of anything"

Sam the BatCat

Rocco the Poston Lab Security Dog

Tut the Teddy Bear

Addie the Birthday Queen

Cleo the Witch

Clark in a cool hat

Bucky the SpiderCat

Publications

We're proud to share 12 scientific publications from our lab this year. Your involvement in our research has allowed us to share findings to an international audience, contributing to important understandings in neurology and neuroscience.

- **Performance of a fully-automated Lumipulse plasma phospho-tau181 assay for Alzheimer's disease.** Wilson EN, Young CB, Ramos Benitez J, Swarovski MS, Feinstein I, Vandijck M, Le Guen Y, Kasireddy NM, Shahid M, Corso NK, Wang Q, Kennedy G, Trelle AN, Lind B, Channappa D, Belnap M, Ramirez V, Skylar-Scott I, Younes K, Yutsis MV, Le Bastard N, Quinn JF, van Dyck CH, Nairn A, Fredericks CA, Tian L, Kerchner GA, Montine TJ, Sha SJ, Davidzon G, Henderson VW, Longo FM, Greicius MD, Wagner AD, Wyss-Coray T, Poston KL, Mormino EC, Andreasson KI. Performance of a fully-automated Lumipulse plasma phospho-tau181 assay for Alzheimer's disease. Alzheimers Res Ther. 2022 Nov 12;14(1):172. PMID: 36371232.

- **Parkinson's Progression Markers Initiative brain autopsy program.** Bukhari SA, Nudelman KNH, Rumbaugh M, Richeson P, Fox EJ, Montine KS, Aldecoa I, Garrido A, Franz J, Stadelmann C, Vonsattel JPG, Poston KL, Foroud TM, Montine TJ; Parkinson's Progression Markers Initiative. Parkinson's Progression Markers Initiative brain autopsy program. *Parkinsonism Relat Disord*. 2022 Jul 1;101:62-65.

- **Cognition as a mediator for gait and balance impairments in GBA-related Parkinson's disease.** Morris R, Martini DN, Ramsey K, Kelly VE, Smulders K, Hiller A, Chung KA, Hu SC, Zabetian CP, Poston KL, Mata IF, Edwards KL, Lapidus J, Cholerton B, Montine TJ, Quinn JF, Horak F. Cognition as a mediator for gait and balance impairments in GBA-related Parkinson's disease. *NPJ Parkinsons Dis*. 2022 Jun 20;8(1):78.

- **Multimodal deep learning for Alzheimer's disease dementia assessment.** Qiu, S., Miller MI, Joshi PS, Lee JC, Xue C, Ni Y, Wang Y, De Anda-Duran I, Hwang PH, Cramer JA, Dwyer BC, Hao H, Kaku MC, Kedar S, Lee PH, Mian AZ, Murman DL, O'Shea S, Paul AP, Saint-Hilaire MH, Alton Sartor E, Saxena AR, Shih LC, Small JE, Smith MJ, Swaminathan A, Takahashi CE,Taraschenko O, You H, Yuan J, Zhou Y, Zhu S, Alosco ML, Mez J, Stein TD, Poston KL, Au R and Kolachalama VB "Multimodal deep learning for Alzheimer's disease dementia assessment." Nature Communications. 2022 13(1): 3404.

- **Divergent Cortical Tau Positron Emission Tomography Patterns Among Patients With Preclinical Alzheimer Disease.** Young CB, Winer JR, Younes K, Cody KA, Betthauser TJ, Johnson SC, Schultz A, Sperling RA, Greicius MD, Cobos I, Poston KL, Mormino EC; Alzheimer's Disease Neuroimaging Initiative and the Harvard Aging Brain Study. "Divergent Cortical Tau Positron Emission Tomography Patterns Among Patients With Preclinical Alzheimer Disease." *JAMA Neurol.* 2022 Jun 1;79(6):592-603.

- **Neurofunctional characteristics of executive control in older people with HIV infection: a comparison with Parkinson's disease.** Müller-Oehring EM, Hong JY, Poston KL, Brontë-Stewart HM, Sullivan EV, McGlynn L, Schulte T. "Neurofunctional characteristics of executive control in older people with HIV infection: a comparison with Parkinson's disease." *Brain Imaging Behav*. 2022 Aug;16(4):1776-1793

- **Fluid and Tissue Biomarkers of Lewy Body Dementia: Report of an LBDA Symposium.** Scott GD, Arnold MR, Beach TG, Biggons CH, Kanthasamy AG, Lebovitz RM, Lemstra AW, Shaw LM, Teunissen CE, Zetterberg H, Taylor AS, Graham TC, Boeve BF, Gomperts SN, Graff-Radford NR, Moussa C, Poston KL, Rosenthal LS, Sabbagh MN, Walsh RR, Weber MT, Armstrong MJ, Bang JA, Bozoki AC, Domoto-Reilly K, Duda JE, Fleisher JE, Galasko DR, Galvin JE, Goldman JG, Holden SK, Honig LS, Huddleston DE, Leverenz JB, Litvan I, Manning CA, Marder KS, Pantelyat AY, Pelak VS, Scharre DW, Sha SJ, Shill HA, Mari Z, Quinn JF, Irwin DJ. "Fluid and Tissue Biomarkers of Lewy Body Dementia: Report of an LBDA Symposium" *Frontiers in Neurology* 2022 Jan 31;12:805135

- **Dopaminergic medication normalizes aberrant cognitive control circuit signaling in Parkinson's disease.** Cai W, Young CB, Yuan R, Lee B, Ryman S, Kim J, Yang L, Henderson VW, Poston KL, Menon V "Dopaminergic medication normalizes aberrant cognitive control circuit signaling in Parkinson's disease" 2022 Brain Mar 31:awac007. doi: 10.1093/brain/awac007. Epub ahead of print. PMID: 35357463.

- **Neuroimaging approaches to cognition in Parkinson's disease.** Montaser-Kouhsari L, Young CB, Poston KL. Neuroimaging approaches to cognition in Parkinson's disease. Prog Brain Res. 2022;269(1):257-286.

- **Clinical Efficacy and Dosing of Vibrotactile Coordinated Reset Stimulation in Motor and Non-motor Symptoms of Parkinson's Disease: A Study Protocol.** Pfeifer KJ, Cook AJ, Yankulova JK, Mortimer BJP, Erickson-DiRenzo E, Dhall R, Montaser-Kouhsari L, Tass PA. Clinical Efficacy and Dosing of Vibrotactile Coordinated Reset Stimulation in Motor and Non-motor Symptoms of Parkinson's Disease: A Study Protocol. Front Neurol. 2021 Nov 18;12:758481.

- **GaitForeMer: Self-Supervised Pre-Training of Transformers via Human Motion Forecasting for Few-Shot Gait Impairment Severity Estimation.** Endo M, Poston KL, Sullivan EV, Fei-Fei L, Pohl KM, Adeli E. Med Image Comput Comput Assist Interv. 2022 Sep;13438:130-139. doi: 10.1007/978-3-031-16452-1_13. Epub 2022 Sep 16. PMID: 36342887.

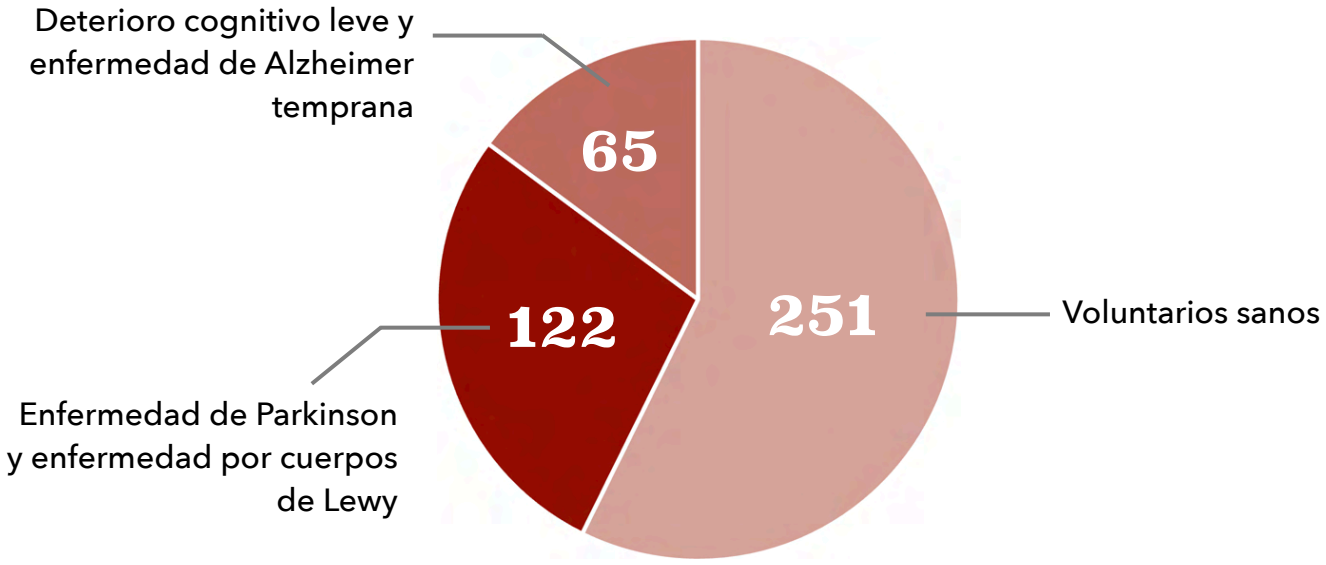
- **Illusory responses across the Lewy body disease spectrum.** Shahid M, Rawls A, Ramirez V, Ryman S, Santini VE, Yang L, Sha SJ, Hall JN, Montine TJ, Lin A, Tian L, Henderson VW, Cholerton B, Yutsis M, Poston KL. Ann of Neurol. 2022 Dec 13:ana.26574. doi: 10.1002/ana.26574. Epub ahead of print. PMID: 36511519.

RECURSOS EN ESPAÑOL

Traducción cortesía de Dr. Carla Abdelnour

Reclutamiento para Estudios de Investigación

Nuestros estudios de investigación son posibles gracias a la participación de pacientes y cuidadores. Agracedemos su generosidad ya que son una parte fundamental de la investigación.



Con la ayuda de nuestras asistentes de investigación, este año hemos conseguido reclutar 438 personas en investigación. Actualmente estamos reclutando participantes en los estudios que aparecen a continuación. **Únase hoy!**

Estudio de imágenes PET Tau

Estamos reclutando voluntarios para participar en un estudio de imágenes PET del cerebro para determinar el impacto de los depósitos de la proteína tau en la cognición. A los participantes del estudio se les pedirá que asistan a una visita de investigación de 2 horas, que incluye una exploración PET-RMN de 40 minutos.

Para más información contactar a: Alena Smith (alenaa@stanford.edu) o Hillary Vossler (hvossler@stanford.edu).

(continuación)

Estudio de biomarcadores de Expresión Facial

Estamos buscando voluntarios para participar en un estudio que analiza los movimientos faciales en enfermedades neurodegenerativas. Esperamos validar una herramienta de diagnóstico desarrollada por Erin Smith, estudiante de Stanford, para la detección temprana de la enfermedad de Parkinson. A los participantes del estudio se les pedirá que asistan a una visita de investigación de 30 minutos.

Para más información contactar a: Alena Smith (alenaa@stanford.edu) o Kristen Wheeler (kjwheele@stanford.edu)

Estudio del Microbioma Intestinal y la enfermedad de Parkinson

El microbioma intestinal es el conjunto de microorganismos (virus, bacterias, hongos) que viven dentro del tracto digestivo. Algunos estudios de investigación han demostrado que el microbioma intestinal de las personas con enfermedad de Parkinson es diferente al de las personas sin enfermedad de Parkinson, y que estas diferencias pueden contribuir a la inflamación, el estreñimiento y los síntomas de la enfermedad de Parkinson. Estamos reclutando activamente a personas con la enfermedad de Parkinson y a su cónyuge (u otro miembro de la familia que viva en el mismo domicilio), para que se participen en este estudio. A los participantes se les pide una muestra sangre y una muestra de materia fecal (¡tomada desde la comodidad de su casa!).

Para más información contactar a: Gabriella Green (gzmg1@stanford.edu) o Erin Brooks (efbrooks@stanford.edu)

Biomarcador para el diagnóstico de la Degeneración Corticobasal

El propósito de este estudio es identificar potenciales biomarcadores moleculares en el plasma de pacientes con degeneración corticobasal (DCB). Actualmente, el diagnóstico clínico DCB sigue siendo un desafío, y no se sabe mucho acerca de la patología específica de DCB a nivel molecular. Nuestro objetivo es descubrir posibles biomarcadores en la sangre de los pacientes con DCB, para conocer mejor la patología molecular de esta enfermedad. Estamos reclutando pacientes con síndrome corticobasal y voluntaries sanos de 30 años o más. A los participantes del estudio se les pedirá que asistan a una visita de investigación de 30 minutos y una extracción de sangre.

Para más información contactar a: Ze Yang (yangze@stanford.edu)

Toma de decisiones en la enfermedad de Parkinson

El deterioro de la toma de decisiones se asocia especialmente con las primeras etapas de la enfermedad de Parkinson. Los pacientes presentan una capacidad disminuida para integrar información sensorial con información aprendida previamente, lo cual es necesario para tomar decisiones perceptivas. Este estudio quiere investigar hasta qué punto el deterioro de la toma de decisiones en pacientes con enfermedad de Parkinson se debe a problemas de memoria, atención o procesamiento visual.

Además, evaluará cómo estos procesos cognitivos afectan la forma de caminar. Los resultados pueden ayudar a la detección temprana de la enfermedad de Parkinson mediante el análisis de la toma de decisiones, y mostrar el efecto de la dopamina en este proceso.

Los pacientes con enfermedad de Parkinson elegibles para este proyecto deben ser cognitivamente sanos, y el reclutamiento se realizará solo en la Universidad de Stanford.

Para participar, deberá poder asistir a SNHC (213 Quarry Rd, Palo Alto) dos viernes consecutivos, durante aproximadamente 2,5 horas cada día. En uno de esos días se le pedirá que tome la medicación para la enfermedad de Parkinson, y el otro día se le pedirá que no tome la medicación para la enfermedad de Parkinson durante 12 a 24 horas antes de la visita. Si decide participar en este estudio, la Dra. Montaser Kouhsari o un representante designado, le explicará con detalle el procedimiento. Su participación en este estudio es totalmente voluntaria. También recibirá un Apple Watch como parte del estudio.

Para más información contactar a: Stephanie Tran (trans@stanford.edu)

Proyecto de Envejecimiento Cerebral Saludable de Stanford patrocinado por el Centro de Investigación de la Enfermedad de Alzheimer del NIH (Alzheimer's Disease Research Center: ADRC)

Seguimos reclutando activamente a personas con enfermedad de Parkinson, demencia con cuerpos de Lewy, y adultos mayores sanos para nuestros estudios de investigación longitudinales.

Para más información contactar a: Veronica Ramirez (vramirez1@stanford.edu) o Isabelle Yi (isabelleyi@stanfordhealthcare.org)

Recursos útiles

Si usted o un ser querido tiene la enfermedad de Parkinson, los siguientes recursos pueden ser útiles.

SERVICIO COMUNITARIO DE STANFORD PARA LA ENFERMEDAD DE PARKINSON

El equipo del Servicio Comunidario de Stanford para la enfermedad de Parkinson proporciona educación, asistencia y recursos para mejorar la calidad de vida de las personas con enfermedad de Parkinson, los cuidadores y la comunidad. Los materiales están disponibles en inglés, español y chino.

PRÉSTAMO DE EQUIPOS MÉDICOS (MEDICAL LOAN CLOSETS)

Los *Medical loan closets* proporcionan equipo médico como andadores, bastones, sillas de ruedas y equipo de baño sin cargo. Aquí hay una lista de algunos *Medical loan closets* disponibles en el Área de la Bahía:

- https://www.recares.org
- https://www.avenidas.org/medical-equipment-loan-closet-now-open/
- https://norcalsci.org/equipment-list

GRUPOS DE APOYO

Ser parte de un grupo de apoyo puede ser una de las mejores maneras de reducir el estrés y conectar con otras personas que puedan comprender su experiencia. Los cuidadores y miembros de la familia también se benefician al compartir preguntas e inquietudes con otras personas con ideas afines. Aquí hay algunos recursos disponibles para ayudarle a encontrar un grupo de apoyo en el Área de la Bahía.

- https://med.stanford.edu/parkinsons/northern-california-resources/support-groups.html
- http://parkinsonssupport.weebly.com

Algunas fuentes de soporte **virtual**:

- El Parkinson's Buddy Network es una comunidad virtual de personas afectadas por la enfermedad de Parkinson, que lo ayudará a construir conexiones y relaciones significativas.
- NeuroTalk tiene una comunidad importante de personas con enfermedad de Parkinson.
- HealthUnlocked tiene páginas web de la comunidad de Parkinson.