Members of Our Research Community,
We at the Stanford Movement Disorders Center Poston Lab wanted to take the opportunity to express our sincere gratitude for your participation and interest in our research on Parkinson’s disease and other parkinsonian disorders. The dedicated participation from volunteers like you lies at the heart of our scientific research. As a show of thanks, here’s an update on our progress to-date.

**Treating Depression May Improve Memory!**
People with Parkinson’s disease can have problems with depression, problems with memory, or both. We analyzed depression and memory data from the over 80 generous participants in our study to find out if there is an interaction between these two common symptoms. We found that when trying to remember a long list of words people with both depression and Parkinson’s disease benefited from hints, or ‘cueing’, more than non-depressed people with Parkinson’s disease. Dr. Kathleen Poston and lab manager Taylor Hendershott recently presented this research in Portland, Oregon at the 4th World Parkinson Congress, which showcased promising research to over 4,000 healthcare professionals and people with Parkinson’s disease. This information is important for clinicians because when a person with Parkinson’s has memory improvement with cueing, we cannot assume this is entirely due to primary memory problems. Therefore it may be possible to improve this type of memory by treating depression. We are now preparing our research for publication.

**Hot off the Press**
We have been hard at work compiling and interpreting valuable information given to us by research participants. The fruits of our efforts will soon be available for shared access by the scientific community. Please see Page 4 for more information.

**Research Recruitment**
With the help of our research coordinators and scheduling team, headed by Taylor Hendershott and Jee Kim, we’ve considered over 352 individual cases for research.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parkinson’s disease (PD)</td>
<td>209</td>
</tr>
<tr>
<td>MSA</td>
<td>14</td>
</tr>
<tr>
<td>PSP/CBD</td>
<td>9</td>
</tr>
<tr>
<td>Healthy Control</td>
<td>120</td>
</tr>
<tr>
<td>Total Enrolled</td>
<td>352</td>
</tr>
</tbody>
</table>

We are actively recruiting participants with diagnoses of Parkinson’s disease. We are also actively recruiting healthy controls, over the age of 70.
Recruitment for new research studies!

(1) If you were part of our Michael J. Fox Foundation funded research study, you might be contacted to return for another visit! After the overwhelming success of our primary study, the Fox Foundation has asked us to continue to monitor the motor and memory functions of our participants.

(2) Last year, the NIH, with the National Institute for Aging (NIA) approved funding for the new Stanford Alzheimer's disease Research Center (ADRC) and we have had a very successful first year of recruitment and data collection! Our Center’s theme is understanding early memory problems in people with Parkinson’s disease and Alzheimer’s disease.

(3) In a collaborative study with SRI, we are recruiting people with Parkinson’s disease for an MRI study focused on understanding how dopamine might influence thinking and executive function.

(4) NEW STUDY! In July 2016 Stanford became the lead site for the Pacific Udall Center: A Morris K Udall Center of Excellence in Parkinson’s Research, which is one of eight Centers funded by the NIH and the National Institute for Neurological Disease and Stroke (NINDS). Pathology Chairman Dr. Tom Montine and Dr. Kathleen Poston will lead the Stanford team. Together with University of Washington and Oregon Health Sciences University (OHSU), the Pacific Udall Center’s mission is to understand the genetic contributions to Parkinson’s disease memory problems and balance problems. We will start recruiting people with Parkinson’s disease in early 2017!

If you would like to participate or want more information about research, contact Taylor Hendershott at trhend15@stanford.edu.

Do the interactions between motor and cognitive brain regions matter?

While all people with Parkinson’s disease experience problems with movement, many people also experience problems with memory or cognition. Using brain MRI, Dr. Poston and Dr. La investigated how cognition might be influenced by different brain regions working together in a ‘network’ or by those networks further interacting with each other. We found that these between-network interactions were more disrupted in people with Parkinson’s disease who were experiencing cognitive difficulty. More specifically, we found motor brain networks had decreased interactions with cognitive brain networks that include the insula (Figure 1, yellow). Interestingly, the insula is a brain region associated with gating of attention. This region is now the focus of our future studies.

Figure 1. The motor network (blue) and the executive network (green) have disrupted interactions with the insula network (yellow) in Parkinson’s disease patients who are experiencing cognitive difficulties.
How do we stop ourselves from reacting?

Ever wondered how baseball players can stop a swing just as they start it? It’s a brain process called ‘response inhibition’. The idea is that after a movement has been triggered (like seeing a pitcher throw a ball triggers the hitter to swing the bat) sometimes you can stop yourself from completing the movement, but sometimes you can’t. We tested a similar process in the MRI scanner in people with Parkinson’s disease. It’s not as fun as playing baseball, but it is quite challenging! We had people respond to an arrow stimulus that pointed right or left – but sometimes the participants were signaled to stop their response. Regardless of whether or not they were taking their dopamine medication, people with Parkinson’s disease used similar brain regions to perform this task as the people without Parkinson’s disease. However, the activation intensity of brain regions varied slightly among the groups. For example, people with Parkinson’s disease showed especially prominent activation in the anterior insular brain region, which is a region known to be activated when we switch our attention between different stimuli.

Present but often neglected: How do tiny strokes affect cognition in people with Parkinson’s disease?

People with Parkinson’s are at risk of developing cognitive impairments, but the exact causes for this risk are not really clear. We used MRI data that has been collected in the lab over the last 5 years to determine if tiny strokes might play a role. At the NIH/NINDS Udall Centers Director’s Meeting in November, Dr. Poston and Dr. Linortner showed that these tiny strokes increase the risk of having problems with attention, memory, and the ability to plan and multitask. People may not realize that they have had these tiny strokes, but we can see physical evidence of them on the MRI images. Treatment of high blood pressure, high cholesterol, diabetes, or other stroke risk factors may help slow down the progression of these cognitive difficulties resulting from tiny strokes, which will be the focus of future studies.
What are the similarities and differences between brain activation in healthy aging, Parkinson’s disease, and HIV?

In a collaborative study between the Stanford Movement Disorder Center and the SRI Neuroscience Program we are investigating how the effects of healthy aging compares to the effects of aging in people with Parkinson’s disease and in people with HIV. Dr. Schulte and Dr. Müller-Oehring from SRI presented our preliminary findings at the Society for Neuroscience meeting in San Diego. We found that people with healthy aging activate distributed brain regions associated with movement, and the cerebellum and premotor brain regions in particular. People with Parkinson’s disease show strong activation in both of these motor areas, but only when they are taking their typical dopamine medications. This activation was not seen in people with HIV infection, potentially rendering them vulnerable to decline in motor skills with aging. The findings from this study may help with the development of therapies to treat cognitive or motor dysfunction, as well as to help provide information about the similarities or differences in cognitive and motor changes associated with aging, Parkinson’s disease, and HIV.

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 brain donation will help doctors move from a “best-guess” approach to that 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 is interested in brain donation, please contact Christina Wyss-Conay at 650-721-2409.
**Scientific Papers**


York Williams S, **Poston KL**. “What light have resting state fMRI studies shed on cognitive impairment and depression in Parkinson’s disease?” *Journal of Clinical Movement Disorders*, 2014; Oct 29;1:4 [PMID: 26788330]


