Section 1: COVID-19 Biomarkers and Clinical Outcomes in Older Adults

By: Ashley Clayton, MA

While the Alzheimer’s Disease Research Center (ADRC) continues to carry on with study visits, either in-person or remotely, some very exciting, additional research is happening just a few blocks away over at the basic science labs! Our Alzheimer’s Disease Research Center Director, Dr. Thomas Wisniewski, has recently been awarded a prestigious National Institutes of Health (NIH) grant as a supplement to our larger ADRC award. Dr. Wisniewski along with some other NYU Langone Health (NYULH) collaborators, including Dr. Jennifer Frontera from the Department of Neurology at NYULH Brooklyn and Dr. Laura Balcer, NYULH Department of Neurology Vice Chair, have teamed up to evaluate if cognitively impaired individuals are at a greater risk of developing more severe neurological complications following a COVID-19 diagnosis.

Blood samples of patients collected during COVID-19 hospitalizations will be analyzed to test the hypothesis that the presence of plasma biomarkers associated with Alzheimer’s disease (AD) and/or blood-brain barrier dysfunction in older patients with or without a prior diagnosis of Mild Cognitive Impairment (MCI) or AD predisposes them to more severe pulmonary and systemic disease.

This NIH grant has also allowed our center to purchase a state-of-the-art Quanterix SIMOA system that is fully automated and will be used for running the blood sample immunoassays and comprehensive cytokine profiling. The SIMOA technology is novel due to its ultra-sensitive detection of biomarkers such as Tau, a protein in plasma that may be a marker of neuronal damage often found in those with Alzheimer’s disease. Stay tuned for our next ADRC newsletter, where we will hopefully have some fascinating results following this unprecedented research!
Research supported by brain banks is increasingly critical with today’s rising rate of neurodegenerative diseases. In the U.S. alone, 5.8M people currently live with Alzheimer’s disease (AD), making it the nation’s sixth leading cause of death. By 2050, the affected population is projected to increase to almost 14M, costing society more than $1.1 trillion as compared to $305M today. As ADRC participants, you probably often hear that one donated brain can provide resources for hundreds of research studies—and it is true! There simply is no substitute for human brain tissue. However, you may still wonder: why is brain donation so important to AD research, and what really happens in the lab once a brain is donated? This month, we will get down into the nitty gritty at the “research bench,” where we strive to gain critical knowledge in order to provide insight regarding improving treatments and medications, and ultimately, increasing the odds of finding a cure.

Why is brain donation so important? Let’s start with some important facts: animals do not get AD in the same way as humans, but they develop some of its markers. Most of the treatment advances made using animal and cellular models have been surprisingly limited until now. Brain donation is important as it is currently the only way to reach a definitive diagnosis of AD. Here, neuropathologists look for the main pathological hallmarks of AD: amyloid plaques, neurofibrillary tangles and vascular amyloid deposits. While amyloid plaques are toxic clumps that form in the spaces between the nerve cells by a protein called beta-amyloid, neurofibrillary tangles are formed by a protein called Tau inside the neuron itself. In cognitively normal patients, Tau is a regular protein that gives the neuron its shape and functional integrity. However, in AD, this same protein undergoes major changes and starts playing a completely different role. Just like beta-amyloid, Tau starts aggregating into intracellular clumps and prevents neurons from functioning and communicating properly. While the contribution of beta-amyloid and pathological Tau (pTau) to AD is undisputable, researchers recently started to understand that these two proteins are probably not doing their job alone. They need to physically associate with other proteins to go away and cause disease. Identifying these partners in crime could provide insights into how these proteins mediate their toxicity in AD. However, our knowledge of these partners has been surprisingly limited until now.

In the Wisniewski laboratory, postmortem samples from the NYU ADRC have already supported major breakthroughs. A recent study, led by Dr. Eleanor Drummond and myself, identified the reference map of pTau interactions, which we refer to as the “pTau interactome”. Using a cutting-edge technology called Affinity-Purification Mass Spectrometry (AP-MS), we were able to identify hundreds of pTau-interacting partners. Our findings suggest new potential drug targets for the treatment of AD. More extensive studies are underway to examine interacting proteins and unravel their role in AD and other dementias.

Section 2: Identifying Molecular Targets in Alzheimer’s Disease

By: Geoffrey Pires, PhD candidate in Thomas Wisniewski’s laboratory

• The Metropolitan Opera: https://metopera.org/user-information/nightly-met-opera-streams/
• Improv Comedy: https://magneticsheater.com/calendar/?date=2020-03-28&archive-holder

Medications and Podcasts:

• Mindful App: https://www.mindful.org/free-mindfulness-resources-for-calm-during-covid-outbreak/
• Headspace provides free meditations: https://www.headspace.com/covid19
• Lovingkindness Meditation from OnBerg: https://onberghq.com/blog/sylvia-baerstern-a-lovingkindness-meditation/
• Calm: free meditations, music and calm body exercise routines: https://www.calm.com

Virtual Book Clubs:

• Toddler Together: head War and Peace only a few pages a day; #ToddlerTogether; https://publicspace.org/news/detail/toddler-together
• TweetSpeakLive: A virtual poetry and storytelling reading. Events are held on Zoom: https://twitter.com/hashtag/TweetSpeakLive?src=hashtag_click

Section 3: At Home Activities for Seniors

By: Gabriella Tedesco

• Improv Comedy: https://www.headspace.com/covid-19

As researchers continue to work towards effective treatments for Alzheimer’s disease (AD), there is an urgent need to identify strategies that can prevent or delay disease onset. In light of growing evidence of the benefits of meditation and mindfulness for both psychological and physical health, the impact of these approaches on cognitive function is being actively explored. Mindfulness-based interventions have been shown to improve attention, memory, executive function, processing speed and general cognition in older adults with subjective cognitive decline and mild cognitive impairment.

Mindfulness is defined as a non-judgmental awareness of present-moment experiences, including thoughts, emotions and bodily sensations. One way to develop mindfulness is through meditation. Formal practices such as guided body scans and sitting meditations are used to train the mind to attend to the present moment. The breath is often used as an anchor, and when the mind wanders, attention is redirected back to the breath. Meditation fosters awareness and acceptance of thoughts and emotions, including negative ones, as non-threatening, temporary experiences. This leads to an enhanced ability to recognize and disengage from escalating patterns of negative thinking (i.e., rumination) and reduces emotional reactivity. Mindfulness can also be practiced informally by bringing focused attention to activities in routine daily life, which helps disrupt the tendency to be on automatic pilot.

Mindfulness-based interventions improve attention control and emotion regulation, and reduce depression, anxiety and stress. These psychological factors are associated with cognitive decline as well as AD risk factors such as physical inactivity, poor sleep, high blood pressure. In addition, there is emerging evidence of direct effects of mindfulness and meditation on the brain. For example, observational studies have found larger hippocampal volume and reduced age-related hippocampal atrophy in experienced meditators compared with controls. Several small trials have also shown positive changes in brain structure and function in regions that are sensitive to aging and AD after mindfulness-based interventions.

Though still preliminary, current evidence suggests that meditation and mindfulness may hold promise for slowing age-related cognitive decline and preventing AD. Studies to date have been limited by small sample sizes, inadequate controls and brief follow-up periods. Additional research is needed to address these limitations, identify the best ways to teach mindfulness to older adults, and understand the mechanisms by which mindfulness and meditation can preserve cognitive function. In the meantime, improving psychological well-being is reason alone to promote these strategies to support successful aging.
Music therapy is not a cure for Alzheimer's disease or related dementias, but it can alleviate some of the behavioral symptoms. Results of a recent study conducted by Drs. Ray and Mittelman at NYU suggest that widespread use of music therapy in long-term care settings may be effective in reducing symptoms of depression and agitation. To explore this hypothesis, we conducted a pilot study to determine the feasibility of implementing a group music therapy program in a long-term care facility. The study design and results are described in detail in a recent publication. 

Section 5: Music and Our Memories
By: Mary Mittelman, DrPH, and Christina Madera

Music is an important part of our everyday lives. Music helps us express our feelings and emotions. Music can be a powerful tool in helping improve overall mood and listening to music from our past can help bring back memories. One immediate benefit of music is that it can improve our emotional wellbeing. Have you ever noticed that you can’t be sad listening to Pharrell Williams’ “Happy”? The song’s infectious beat and catchy lyrics make you want to smile. Problems can happen even if it’s just a moment. Music-related activities and music therapy can improve the well-being of people with dementia—and caregivers. For those caring for someone with dementia, it can be especially challenging to communicate with them. One way you can bridge the gap and feel closer to the person with dementia is through music.

Memory for music is relatively preserved among people with dementia because key brain areas linked to musical memory are relatively unaffected by the disease. Even in the late stages of Alzheimer’s disease, a person may be able to tap a beat or sing lyrics to a song from childhood, even when they can no longer speak. Creating playlists for your loved one with dementia can help with managing stress levels, promoting relaxation and improving their quality of life. Each person’s playlist should be personalized, based on individual preferences, culture, and social and behavioral needs, avoiding songs that will cause more agitation to a person with dementia who may be struggling with this already.

Music activities in groups have many benefits. In 2011, our ADRC’s Music Activity Program offered a variety of music-related activities, including group singing, music therapy, and individual music programs. The program was evaluated to determine its impact on objective and subjective outcomes, such as behavior and quality of life. The study was designed to evaluate the effectiveness of music therapy in reducing symptoms of depression and agitation in older adults with dementia. The results of this study were presented at the Alzheimer’s Association Conference in 2012. In addition, a follow-up study was conducted to evaluate the long-term effects of music therapy on subjective and objective outcomes. The results of this study were presented at the Alzheimer’s Association Conference in 2013.

Music therapy is an effective therapeutic intervention for individuals with dementia. The program can be a valuable tool for caregivers and family members in managing the symptoms of dementia. The benefits of music therapy include improved mood, reduced stress, and enhanced communication and social interaction. In addition, music therapy can help individuals with dementia to reconnect with their past and reconnect with their family and friends.

Music therapy is a powerful tool for individuals with dementia. It can help improve their quality of life and enhance their connection with the world around them. The benefits of music therapy are numerous, and it should be considered as an important component of the overall care plan for individuals with dementia. 

Which activities invigorate me? Which make me feel drained?
Consider how aspects of your daily schedule and functioning are affecting your mood. How does exercise and maintaining healthy eating habits impact your body's mood? Is increased sugar intake or use of substances making you feel suggish? How is the media that you are consuming connected with some of the stress and anxiety you feel? Consider limiting media intake to one hour per day.

How can you effectively communicate your needs to those around you?
Recognizing that each individual has their own unique personal needs. Try not to expect those around you to be aware of your set of personal needs in absence of communication. If you let your family, friends, coworkers, and managers know about these needs, they will be better able to understand how to interact with you during this difficult time.

As per CDC guidelines, if you or someone you care about are feeling overwhelmed with emotions like sadness, depression, anxiety, or feel like you want to harm yourself or others: Call 911, the New York State COVID-19 Emotional Support Helpline at 1-844-863-9314, or the Disaster Distress Helpline, 1-800-985-5990, or text TalkWithUs to 66746.

Psychometric Cognitive Decline
Duration Unknown
GDS Stage 1

Subjective Cognitive Decline
15 Years Duration, Before Mild Dementia
GDS Stage 2

Mild Cognitive Impairment
7 Years Duration, Before Mild Dementia
GDS Stage 3

Are you feeling stressed or anxious about the current coronavirus pandemic? You are certainly not alone…
As society attempts to adjust to a new normal, most of us are uncertain of just how to feel or respond to the global pandemic that we are currently facing.

You may find yourself preoccupied with worries about your health or the health of your friends and family. You may be spending hours consuming media filled with upsetting images and statistics. Or, you may find that you are experiencing changes in sleep or appetite, worsening of chronic health conditions, or increased consumption of alcohol, tobacco, or other drugs. Though each individual responds to stressful situations differently, the examples listed above are all common manifestations of stress and anxiety.

It is important to be mindful of your personal needs during these difficult times. By answering the following questions, you may be able to better understand and meet your needs:

What might make me feel grounded during a time of chaos?
Explore what types of activities bring you a sense of peace. Some are comforted by social interaction, spending time with family, or keeping in touch with friends virtually. Others require more personal space and alone time to recharge. Could any of the following activities help you find a sense of purpose, or provide a therapeutic outlet: scheduling a daily walk outside, reading a book, doing an art project, cooking or baking, practicing meditation or yoga, watching a funny television show, listening to music, etc.

In comparison with prior abilities. In 1988, we showed that individuals in stage 3 performed significantly worse than those in stage 2, who had subjective complaints only, on 15 of the 16 test measures that we studied. We coined the term “Mild Cognitive Impairment”, or MCI, widely used today for describing this condition. We estimated in 1986, and we subsequently confirmed, that the MCI stage lasts about 7 years in otherwise healthy persons (see the figure). Our 1988 publication showed that Mild Cognitive Impairment was followed by the stages of dementia, defined as a generalized decrease in thinking capacities.

Last month, together with my colleagues at NYU and elsewhere, we published a scientific article demonstrating that decline in psychological test measures occurs even before the stage of Subjective Cognitive Decline. We followed 47 healthy, cognitively normal subjects over an average interval of 6.7 years. If the subjects showed worsening at following-up to the Stage of Cognitive Decline, or worse, we categorized them as “decliners.” If the subjects remained normal or showed a subjective cognitive decline, we categorized them as “non-decliners.” After compensating for differences between the groups in age, gender, educational background, and follow-up time, the combinatorial test measure score was significantly lower at baseline in the future decliners.

This appears to be the first study that directly links a decline in test measures scores to subsequent subjective loss in thinking abilities and, by extension, to MCI, and to the dementia of the Alzheimer’s type continuum. These findings provide new opportunities for the identification and application of current and future strategies for the prevention of Alzheimer’s related decline.
Section 8: Meet Our New Doctor

Dr. Joel Salinas

Joel (pronounced ‘joh-EHL’) Salinas has been appointed the Lulu P. and David J. Levidow Assistant Professor of Neurology at the Center for Cognitive Neurology. Dr. Salinas obtained his BA in Biology & Society from Cornell University. He earned his medical degree with research distinction at the University of Miami Miller School of Medicine as well as an MBA with a concentration in Health Sector Management & Policy at the Miami Herbert Business School. He completed his neurology residency at Massachusetts General Hospital and the Brigham and Women’s Hospital. He then subspecialized through a combined research and clinical fellowship in Behavioral Neurology & Neuropsychiatry at Massachusetts General Hospital and Neuroepidemiology at the Harvard TH Chan School of Public Health, earning a Master of Science degree in Epidemiology.

Most recently, he was Assistant Professor in Neurology at Harvard Medical School and the Massachusetts General Hospital Department of Neurology’s division of Cognitive-Behavioral Neurology and was the Clinical Director of the McCance Center for Brain Health. He now specializes in practical clinical approaches to brain health and conducts research in social and behavioral epidemiology to understand social determinants of brain health and harness these insights to preserve healthy cognitive function at the population level. He also chronicles his experiences as a neurodivergent neurologist and the powerful stories of patients experiencing neurological conditions in his book, Mirror Touch: A Memoir of Synesthesia and the Secret Life of the Brain.

Dr. Salinas’s administrative office will be located at 222 E 41st Street, 14th floor. He will practice out of the Pearl Barlow Center for Memory Evaluation and Treatment and join the Alzheimer’s Disease Research Center at 145 E 32nd Street.

Section 9: Upcoming and Past Events

Upcoming Events:
We have a number of events in the works for the fall and winter so be sure to keep an eye out for our ADRC email announcements.

Past Events:
- Dr. Thomas Wisniewski, our Center for Cognitive Neurology Director and Principal Investigator for the ADRC study, presented on “Will There Be a Vaccine for Alzheimer’s Disease” on July 31st. Over 80 people from both our ADRC and Barlow Clinic registered!
- Dr. Ricardo Osorio presented our very first Learn at Home series discussion “Sleep and Brain Health” on 5/29/20. It was a tremendous success with over 70 people in attendance!
- Winter Tea Dance: On February 12, 2020 some ADRC participants, Barlow Center patients, and research study staff visited the Intrepid Sea, Air & Space Museum for an afternoon of dancing with music from the Intrepid’s years of service (1943-1974). Dancing was led by Rhythm Break Cares, an organization designed to provide the restorative power of music, movement, and touch to as many older adults living with Alzheimer’s and dementia as possible, along with their families and caregivers. Everyone seemed to be having so much fun and could not stop dancing!

Our most recent Lunch and Learn with Dr. Arline Faustin on “What We Learn from Examining the Brain” took place on 1/31/2020.

Our most recent Learn at Home with Dr. Thomas Wisniewski.

Ludovic Debure, known affectionately as Ludo, is a Senior Research Technician at NYU’s Department of Neuropathology. Alongside his love of science and research, Ludo explores the idea that science is art through his drawings and sculptures.
Section 10:
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