



The Alzheimer's Disease Genetics Consortium 10-Year Symposium

Last November, the Alzheimer's Disease Genetics Consortium (ADGC), Penn Neurodegeneration Genomics Center (PNGC) and the National Institute on Aging Genetics of Alzheimer's Disease Data Storage Site (NIAGADS) hosted a two-day symposium celebrating the 10-year anniversary of the ADGC.

The agenda was packed with a number of sessions on topics such as diversity in Alzheimer's disease (AD) genetics, using AD research in drug discovery, and systems biology approaches to AD. Speakers included Penn Medicine researchers such as **Gerry D. Schellenberg, PhD**, Principal Investigator of the ADGC and Director of PNGC (pictured above), as well as **Virginia M.-Y. Lee, PhD**, Director of the Center for Neurodegenerative Disease Research (CNDR), as well as other experts in the field from beyond Penn; presentations were led by Eliezer Masliah, MD, Director of the Division of Neuroscience at the National Institute on Aging (NIA), Richard P. Mayeux, MD, MSc, Chair, Department of Neurology at Columbia University, and Jonathan Haines, PhD, Professor of Genomic Sciences and Chair, Case Western Reserve University, among others.

Photo credit: Zivadin Katanic



Left to right: Li San Wang, PhD, David B. Roth, MD, PhD, Gerry Schellenberg, PhD, Dean J. Larry Jameson, MD, PhD, John Q. Trojanowski, MD, PhD, Eliezer Masliah, MD, and Virginia M.-Y. Lee, PhD



Opening remarks by PSOM Dean, J. Larry Jameson, MD, PhD.

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Inferring Cognition vs. Testing Cognition

Accelerating Innovation and Discovery through a Precision Brain Health Approach

Last November, Boston University's Rhoda Au, PhD, professor of Anatomy and Neurobiology in Boston University's Schools of Medicine and Public Health, joined us as an IOA Visiting Scholar to present a lecture titled "The Path to Zero is One: Accelerating Innovation and Discovery through a Precision Brain Health Approach."

While Dr. Au's research does not focus specifically on dementia and Alzheimer's per se, she is interested in the full spectrum of cognitive aging from normal cognition all the way through cognitive impairment. The driving force behind her interest in this area is her fear that the cognitive assessments and tools that are currently in use are not actually depicting an accurate portrayal of a person's cognitive ability.

She believes that under the circumstances of the current "testing" methods, there are too many outside factors — stress, nerves, etc. — interfering to paint a true picture of someone's cognitive capabilities.

With this in mind, Dr. Au's overarching goal is to find a better way to assess what each individual is actually capable of and not just how well they were able to perform at that given time. Her first step in doing this is to figure out, "how can we do cognitive assessments without giving a test?" she explained.

"Everything we do, we do through our brain, so, you're always reflecting your cognitive capabilities," said Dr. Au. She would like to figure out if there is a way to use technology to track your normal, everyday behaviors — eating, sleeping, socializing, taking medications, etc. — to "infer" cognition rather than test cognition.

Dr. Au is currently building a Brain Health Monitoring Platform which is looking at a combination of different technologies for a more comprehensive assessment in tracking people's natural behavior.

She believes that the technologies that we have today may not be sufficient for her goals long term. Most of the technology that is used for health and lifestyle tracking today is considered "active engagement technology" — things like smartphone Apps requiring data input, FitBits and wearable devices that require effort to put on, turn on, recharge, etc. — but Dr. Au believes we will need to develop technologies that collect the data in the background with little to no effort from the subject.

Tau Co-factor Complexes as Building Blocks of Tau Fibrils

The 2019 Mary and Joseph A. Pignolo, Sr. Award and Lectureship in Aging Research

The IOA recently honored Songi Han, PhD Professor of Chemistry and Biochemistry and Chemical Engineering at the University of California, Santa Barbara, as the 2019 recipient of the Mary and Joseph A. Pignolo, Sr. Award in Aging Research for her 2019 publication, "Narrow equilibrium window for complex coacervation of tau and RNA under cellular conditions," published in *Computational and Systems Biology, Neuroscience*.

Dr. Han presented a lecture on "Tau-cofactor complexes as building blocks of tau fibrils," highlighting her research studying in-vivo aggregation and shape changes of tau from its soluble form to fibrillar forms.

Dr. Han explains that while the current in-vivo studies using brain derived material to replicate behavior in animal models and more recently cell models — a method pioneered by many including researchers here at Penn — are important, in order to really "get at" the shape changes, structures, and mechanisms, we need biophysical tools. Essentially, this means you need to be able to replicate the diseases properties of propagation in the test tube — a difficult task, according to Dr. Han.

"We have discovered what we call a three-player-game where you need 1.) the seeding material that is brain-derived or cell derived, 2.) Tau, and 3.) a cofactor," said Dr. Han.

You need a cofactor that mildly interacts with the tau and lowers its barrier so now when you add the human-derived material or seed, the reaction takes off, says Dr. Han.

While this in and of itself isn't a breakthrough yet, it can lead to one. "The structure of this resulting fibril can now be studied in much greater detail than is possible in in-vivo systems," she explained.

ANNOUNCING OUR NEW WEBSITE...

The new Penn U19 Center: A Center on Alpha-Synuclein Strains in Alzheimer's Disease and Related Dementias (ADRD) website is now live! Visit us at:

www.med.upenn.edu/pennu19-asyn

Why where you live matters

The link between location and life expectancy

There are many factors that play a role in an individual's life expectancy — but is where they live one of them? In a recent report, NBC10 investigator, Mitch Blacher, shared data looking into six years' worth of records from the Center for Disease Control and Prevention to examine a potential link between age at death and geographical location.

According to the example presented by Blacher, the average life expectancy in Narberth, Pennsylvania, an area with a relatively low crime rate, tops 91 years of age. Just 5 miles away, individuals in Strawberry Mansion, a neighborhood in Philadelphia with a higher crime rate, are only reaching about 63 years on average.

To help explain this drastic difference in lifespan, **Irma T. Elo, PhD**, IOA Fellow and Chair of the Sociology Department at the University of Pennsylvania, was also featured in the report. Dr. Elo, whose research focuses on socioeconomic, demographic, and racial/ethnic disparities in health, cognition, and mortality across the life course, explained that stressful life situations, including financial stability or lack thereof, influence health and mortality.

The Cost of Aging

Long term care, aging in place, & alternative options

Penn Medicine's **Lisa M. Walke, MD**, chief of geriatric medicine at the Hospital of the University of Pennsylvania, and **Norma Coe, PhD**, Associate Professor of Medical Ethics and Health Policy, sat down with WHYY's Mary Cummings-Jordan for a Radio Times segment on aging and the cost of long term care, as well as alternative options for senior care.

One of the biggest issues that older Americans face is the struggle to afford long term care, but the cost is not the only important consideration. It can sometimes be difficult to determine when it is the right time to start looking for additional care. "The time when you need to start to consider potentially moving beyond where you're living is when you cannot get services within your house to keep you safe and do your daily activities of living," explained Dr. Walke.

Once you are over that hurdle, that is when cost comes into play. With an average cost of \$48,000 a year, over half of middle-income earning Americans are unable to afford assisted living, explained Dr. Coe. And it also is important to note, long term care is not covered by Medicare.

According to Dr. Coe, it would be great if there was some sort of program, within or outside of Medicare, to cover this cost for older Americans, but the challenge is finding a way to pay for

Social Mobility

Its impact on an income-based life expectancy gap

In similar research, Penn Medicine's **Atheendar Venkataramani, MD, PhD**, an assistant professor in the Department of Medical Ethics and Health Policy, and his colleagues found that the life expectancy gap between rich and poor individuals is increasing in the United States, according to an article on healio.com.

In general, areas with higher social mobility — the ability to change social class — have a smaller life expectancy gap. The article refers to evidence that suggests that living in areas with low social mobility negatively affects an individual's beliefs about their future well-being leading to stress and less of a chance to engage in healthy behaviors.

"While we cannot prove cause and effect, this study — along with others from our group — suggests that hope for a better future may translate into better health," said Venkataramani.

that program.

With that said, there are alternatives to assisted living for long term care of older adults. In addition to health service providers, there are also programs that offer "adult day care" outside of the home as well as home health aide programs that compensate family members who care for their loved ones. There is also a rise in the push for aging in place — finding ways to safely maintain your ability to live at home in your later years of life with the help of geriatric health care providers and more recently, several technological advances such as apps and devices to track behaviors and patterns to better assess any changes in an individual's capabilities.



UPCOMING IOA EVENTS

“Supported Decision-Making for Older Adults: What it is and Why it Matters to Pennsylvanians”

A Visiting Scholar Series Event ft. Nina Kohn, JD
March 5, 2020 | 11:30am - 5:00pm
Jordan Medical Education Center (JMEC)
Seminar Room 516 EW
3400 Civic Center Blvd., Phila., PA 19104

“Bringing the Microscope to Clinic: Crossing the Translational Divide in Neurodegenerative Disease Research” The 2020 Institute on Aging (IOA) and Center for Neurodegenerative Disease Research (CNDR) Annual Research Retreat

May 15, 2020 | 8:30am - 4:30pm
Smilow Center for Translational Research Auditorium & Lobby
3400 Civic Center Blvd., Phila., PA 19104

Learn more and register online at:
www.med.upenn.edu/aging

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The mission of the Institute on Aging (IOA) at the University of Pennsylvania is to improve the health of older adults by increasing the quality and quantity of clinical and basic research as well as educational programs focusing on normal aging and aging-related diseases across the entire Penn campus.

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