Study Finds How Age Opens the Gate for Alzheimer’s

As adults age, highly evolved brain circuits become susceptible to molecular changes that can lead to neurofibrillary tangles, which are a hallmark of Alzheimer’s disease (AD), according to a study reported in the Proceedings of the National Academy of Sciences.

Researchers found that phosphorylated tau, which clumps together to form neurofibrillary tangles, collects in neurons in higher brain circuits of the aging primate brain. However, it does not accumulate in neurons of the sensory cortex. Researchers also found that phosphorylated tau collects in and near synapses and can spread between cells in higher brain circuits.

In addition, the study found clues about what causes tau to become phosphorylated with advancing age. Specifically, researchers uncovered age-related changes in the molecular signals that control the strength of higher cortical connections.

In young brains, an enzyme called phosphodiesterase PDE4A sits near the synapse, where it inhibits a chemical cycle that disconnects higher brain circuits when an individual is in danger, thus switching control of behavior to more primitive brain areas. Researchers found that PDE4A is lost in the aged prefrontal association cortex, which unleashes a chemical cascade of events that increase the phosphorylation of tau. This process may be amplified in humans whose

Health Staff Decompress in ‘Tranquility Room’

To combat mental and emotional fatigue, staff at a nonprofit health system took an ugly and underused utility room and transformed it into what they now call the “tranquility room.” The repurposed space serves as a safe haven for nurses, doctors, and staff to recenter and decompress when they have feelings of anxiety or stress.

The initiative was inspired after the health system enlisted a training program that combined the methods of HeartMath (http://www.heartmath.com) and Dr. Jean Watson, PhD, RN, AHN-BC, FAAN. HeartMath is a leader in heart rate variability (HRV) monitoring, as well as specialized training that has proven to increase HRV and reduce stress. Staff learned Heart-

Math’s techniques and incorporated the company’s technology products, such as the emWave® and Inner Balance™, into the tranquility room.

The program also incorporated Dr. Watson’s Caring Science theory, which posits that the core is creating an inner alignment of self-care so health care practitioners can be more authentically loving and kind to themselves, their patients, and their colleagues.

Dr. Watson’s theory and HeartMath’s approach have inspired the creation of tranquility rooms across the world. Based on HeartMath’s research and clinical studies, their programs have demonstrated significant improvements in performance, health, employee satisfaction, and staff retention. Individuals within their client organizations have gained renewed energy, greater mental health and emotional clarity, and reduced stress.

high order cortical neurons have even more excitatory connections, thus leading to tangle formation and ultimately cell death.


For Older Drivers, One Drink May Be One Too Many

One serving of alcohol may be enough to affect the driving abilities of drivers 55 and older, according to a study published in the journal Psychopharmacology.

Researchers tested how drinking legally non-intoxicating levels of alcohol affected the driving skills of individuals ages 25 to 35 and individuals ages 55 to 70. Thirty-six individuals from each age group were recruited for the study.

At the beginning of the study, both groups completed a driving task sober. Participants drove down a simulated, winding, 3-mile stretch of country road. They stared straight ahead at a large computer monitor, and two additional computer monitors flanked the large monitor to mimic the side windows of a car and what the drivers would see in their peripheral vision. A stereo system played driving sounds, and the console included a steering wheel and brake and gas pedals. Occasionally, the drivers encountered an oncoming car, but they did not encounter other distractions.

Researchers assessed the participants’ ability to stay in the center of their lane and maintain a constant speed. They also looked at how rapidly participants adjusted the steering wheel.

On a later day, the groups were separated into smaller groups. The first group imbibed a placebo—a diet lemon-lime soda misted with a negligible amount of alcohol to mimic the experience of drinking alcohol. The second group’s drink was strong enough to produce a 0.04% breath alcohol level, and the third group’s drink produced a breath alcohol level of 0.065%, both of which were still below the federal legal driving level of 0.08%.

Participants then completed the same driving task they performed when they were sober. Researchers timed the task so participants’ alcohol levels declined to mimic the situation in which individuals have a drink with dinner and then drive home.

In the young adult participants, researchers found that alcohol consumption did not affect their measured driving skills. However, for the older drivers, the small legal levels of intoxication did affect their driving.

Researchers are evaluating additional study results. During the study, participants also drove a course through a small-town setting and a course through a city setting, which included pedestrians, motorists who violated traffic signs, and other challenges. Researchers will examine brain electrophysiological data, which were collected through scalp electrodes embedded in caps that the participants wore during the drive, to study how the brain responds during the driving test when dosed with alcohol.


Alzheimer’s Association Awards Largest Ever Research Grant

The Alzheimer’s Association awarded its largest ever research grant—$8 million over 4 years—to support the Longitudinal Evaluation of Amyloid Risk and Neurodegeneration (LEARN) study as a companion study to the Anti-Amyloid Treatment in Asymptomatic Alzheimer’s Disease (A4) study.

The A4 study is an Alzheimer’s disease (AD) prevention trial that will start this year. It will investigate whether treatments that block amyloid beta protein build-up in the brain can slow or prevent AD in individuals who are cognitively normal, who have no known AD-related genetic mutations, but who are thought to be at risk of developing AD because of amyloid beta
protein buildup in their brains. The A4 study will screen 3,000 older individuals (ages 65 to 85) with positron emission tomography (PET) amyloid imaging to identify 1,000 people with elevated levels of amyloid-beta in their brains. This group will then be randomized into two treatment arms: active treatment ($n = 500$) and placebo ($n = 500$). Through the Alzheimer’s Association grant, 500 of these individuals will then be matched as closely as possible to the two treatment arms and followed in the LEARN observational cohort.

The LEARN study will follow participants for 36 months, with identical clinical and cognitive testing performed every 6 months to run parallel with the A4 treatment study. One objective of LEARN is to determine causes of cognitive decline, besides the buildup of amyloid proteins in the brain. A subset of study participants will have a PET scan of the brain to look for build-up of tau protein; tau protein clumps and creates neurofibrillary tangles.

One of the goals of the A4 and LEARN studies is to determine if anti-amyloid treatment can delay the progression of the neurodegeneration as measured by tau imaging and other biomarkers, including amyloid PET, volumetric magnetic resonance imaging, functional connectivity, and cerebrospinal fluid markers.

All data generated through LEARN will be publicly available and accessible through the Global Alzheimer’s Association Interactive Network™ (http://www.gain.org).

To complement these studies, the Alzheimer’s Association grant will also fund the use of a new tau imaging agent for PET scans in the A4 study and LEARN cohort to help researchers follow the development and progress of tau protein tangles. The PET tau imaging pilot substudy will include 150 individuals—100 participating in the A4 Study (50 active treatment, 50 placebo) and 50 in the LEARN study.

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