

Normal Brain vs. Brain With Dementia

Healthy older brains also work differently than younger brains.

By Lisa Esposito, Staff Writer Aug. 2, 2019

This article is based on reporting that features expert sources including [R. Scott Turner, MD, PhD](#); [Darlene Howard, PhD](#); [Peter Lichtenberg, PhD, ABPP](#)

YOU DON'T NEED TO BE A brain specialist to notice certain differences in images of a healthy older person's brain compared to that of someone with dementia. Narrowed, depleted folds on the brain's surface, the presence of blotchy plaques, twisted fibers and significant shrinkage are clearly visible. What you can't see is how brain changes like these affect how people's minds work.



 (GETTY IMAGES)

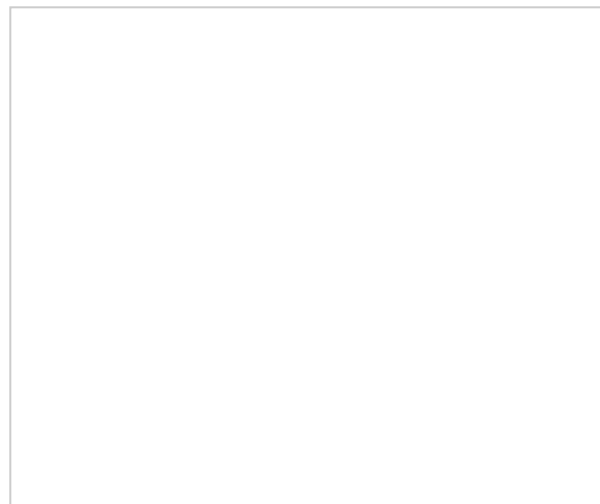
In a program from the National Press Foundation and funded by AARP, "Understanding the Latest on Dementia Issues," journalists heard from a spectrum of dementia experts, including researchers, gerontologists, family caregivers and a brilliant engineer who described her personal journey with [early-onset Alzheimer's](#). In addition, a leading neuroscientist detailed how normal brain aging is very different than changes arising from dementia and not something to be feared.

[[SEE: 9 Habits That May Reduce Your Risk for Developing Alzheimer's.](#)]

While some presentations were sobering, others were reassuring – and all highlighted just how complex dementia and [brain aging](#) are. Here are a few takeaways:

Dementia Brain Changes

Protein plaques and tangles infiltrate the brain in Alzheimer's. For more than a century, scientists have been staining brain sections with silver to visualize the amyloid plaques and tau tangles that are [Alzheimer's](#) hallmarks. Beta-amyloid, a product of protein breakdown, clumps together and disrupts brain cell function. Tau, another protein, forms tangled threads that interfere with communication between brain cells. "A nice, healthy young brain has none of these plaques and tangles," says Dr. R. Scott Turner, director of the memory disorders program and a professor of neurology at Georgetown University. "Whereas, as you get older, they accumulate in the brain." People with normal cognition may have a little amyloid and tau in their brains. However, he says, as you get more and more of these abnormal protein deposits, it causes loss of brain cells (or neurons), brain dysfunction and eventually progressive dementia that leads to death.



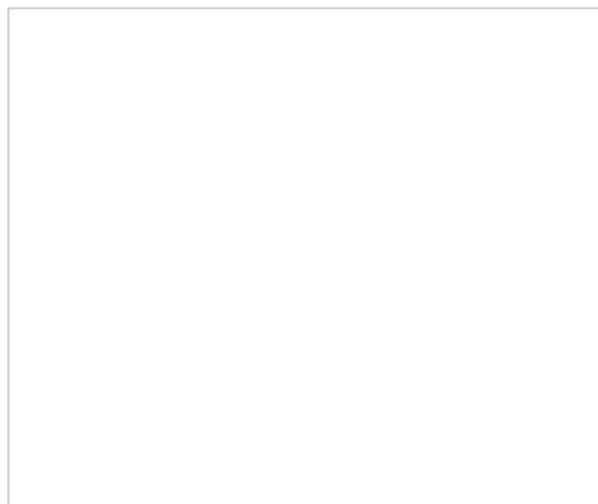
Hippocampus involvement affects memory. Alzheimer's typically first affects the hippocampus, a part of the brain that's highly involved in memory formation. That's why, he explains, "the first thing to go with Alzheimer's is making a new memory – old memories are fine." Then, as the disease continues to spread, it "affects more and more of the cortex." The cortex is the thin, outer layer of the brain.

Inability to make new memories causes many problems. "You forget things, you lose things, you spend more time looking for things," Turner says. "You repeat questions. You

have more difficulty doing your job or doing your tasks at home. It takes a lot longer to do things." As the disease progresses, **other abilities worsen**. "It affects language and visuospatial skills, executive function, reasoning, insight – all the higher cognitive domains."

Alzheimer's disease shrinks the brain. An MRI **imaging** slide presented by Turner showed a stark contrast in brain size between normal and Alzheimer's brains. "We know that you lose one-third of your brain by the time you come to autopsy," Turner says. "One-third of your brain weight is gone from the atrophy, the neuronal loss, the white-matter loss with Alzheimer's." A cross-section view of the Alzheimer's brain revealed atrophy – shrinkage – in the areas affecting language, memory and judgment.

Dementia progresses in stages. Everyone experiences mild cognitive changes as they age, Turner notes. With **dementia**, people show increasing signs of decline over several phases that can last for many years. The preclinical stage is the silent phase during which brain changes occur without measurable symptoms or detectable test results. In this phase, Turner says, the patient knows something's wrong but the doctor doesn't. With **mild cognitive impairment**, the person and their family are concerned by these changes, and at least one cognitive domain, such as attention, executive function, memory or language, is significantly impaired. However, people can still go about their daily activities. As people pass through moderate to severe phases, dementia increasingly interferes with their everyday abilities.



Of course, many factors contribute to dementia development. Genetics play a major role. Alzheimer's risk rises, in part, depending on whether you have any copies of the

[ApoE4 gene](#), and how many. Another gene called TREM2 is being studied for its role in inflammatory action in the brain. Other genetic connections exist.

Recent disappointments in large clinical trials of Alzheimer's drugs have scientists looking at other potential pathways in dementia development. The goal is to find more effective treatments for the disease. Studies should target dementia much earlier in the process by including more participants who have mild cognitive impairment, Turner says. Ideally, long-term prevention trials would recruit normal participants who don't have dementia at all but face a higher risk.

[**SEE:** [Causes of Hearing Loss Beyond Loud Noise.](#)]

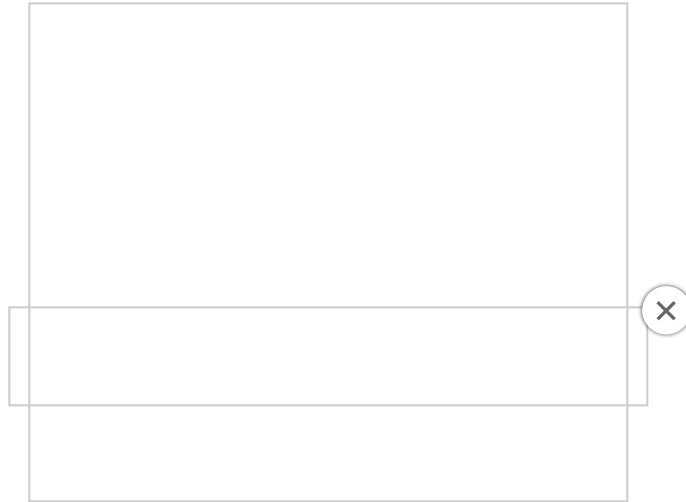


Normal Brain Aging

When it comes to comparing the normal, healthy brains of older and younger adults, younger brains do function differently in some ways – although not necessarily always better.

It's actually a "wonderful" time to be old, says Darlene Howard, a professor emerita at Georgetown University whose research focuses on changes in cognitive and neural

systems during aging. The "gray tsunami," with a larger proportion of people ages 65 and older in the population than ever before, is helping drive a host of changes.



Increased political clout and camaraderie, emerging technology like smart homes, better hearing aids, improved cataract surgery, universal access like ramps for everyone from parents pushing strollers to people with walkers and a society that's more accepting of diversity all represent advantages for elders, Howard says.

Fresh perspectives on the aging brain are also emerging. Decades of research from Howard and her peers offer encouragement. Their results counter traditional thinking about what's lost or preserved, what gets worse or improves and what's inevitable versus avoidable as you get older. As for normal brain aging compared to dementia effects, she says, "They're very different beasts."

[**SEE:** [11 Things Seniors Should Look for in a Health Provider.](#)]

These are some current findings on normal brain aging:

- There is very little loss of neurons, or brain cells, with aging, contrary to what was previously believed.
- Older brains operate differently than younger brains in some ways.
- Cognitive loss is selective. "It isn't that everything goes," Howard says. "Some components do decline, just in the course of getting older. But others don't – in fact, some even improve."

- Among people in the same age group, individuals differ a lot in how aging affects their brain performance. For instance, some people have better processing speed and memory function than their same-aged peers.
- Processing speed declines in normal aging. If dividing a group of adults into those over and under 40, Howard says, "We would find that if we asked you to hit a brake when a stop sign came up, the older group would probably be slower than the younger. We can also measure mental speed, which is typically slower in older groups than in younger."
- Most kinds of new learning and memorizing also decline. "New learning is learning things so you can remember them for later, like new names and faces," Howard says. "It gets harder – not impossible, just harder." Learning new languages or motor skills also becomes more difficult.
- Working memory can have glitches. "You walk into a room and you have a purpose," Howard says. "At least you had a purpose. And then you get into the room and you have no idea."
- Word finding and word retrieval take longer. "Typically, it isn't that you lost the word," Howard says. "You just wait for a while. But when you don't need it, there it will be." With Alzheimer's, by contrast, the issue is much starker, she adds: "You get to the point where the words aren't there at all."
- Vocabulary is spared, and in some ways, improved. In her own studies, similar to others around the country, Howard says, "When you give vocabulary tests where you give the definition, our older participants who came into our lab always did better, on average, than our Georgetown undergrads. You've had more chance to learn more words and you don't forget their meanings."
- Problem-solving and decision-making aspects stay constant or actually get better. Experience helps when nuanced situations arise. In studies, Howard says, "If you give people interpersonal problems, the kind of things that advice columnists write about, older people, on average, give better solutions to those."
- Financial decision-making abilities are mixed. It's harder for some older adults – such as a widowed person whose spouse handled all the household finances – to suddenly pick up these skills, says Peter Lichtenberg, a Wayne State University

psychology professor. On the other hand, he says, "crystallized intelligence," which calls upon previous learning and experience, helps many older people keep their financial houses in order.

- Certain components of financial decision-making improve. Younger adults are more likely to fall into the trap of "temporal discounting" when it comes to decisions like building savings for the future. "Temporal discounting is when you value an immediate reward higher than you do a delayed reward," Howard says. That kind of bias toward immediate gratification tends to decline in old age.
- The brain may adapt to its own aging. Howard described an MRI-based study showing that when given certain tasks, younger adults usually activate only one hemisphere of the brain. "Give the same task to older people and you see bilateral activation," Howard says. In many studies, she says, older people with this bilateral brain activation do better at tasks than older adults with one-sided activation. The theory: Perhaps older adults who perform well are those who adapt to changes in the brain.
- Growth continues to occur. "What we know is that throughout life, it turns out, we can grow new blood vessels (angiogenesis)," Howard says. "We can grow new connections among neurons (synaptogenesis). Indeed, something we didn't know until fairly recently – we can grow new neurons throughout life (neurogenesis)."

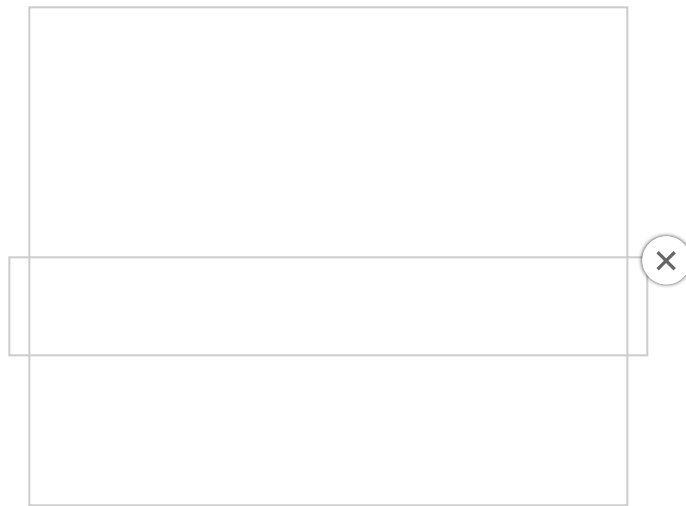
[**SEE:** [Exercise Equipment for Seniors.](#)]

How to Preserve Brain Function

Everyone wants to know what they can do to preserve their lifelong brain function. Howard points to research on "the various and sundry techniques that have been looked at for promoting healthy cognitive and brain aging." Computer-based brain games, social engagement, diet, physical exercise, lifelong bilingualism, meditation, yoga, taking on new learning like photography or quilting, teaching and practicing reasoning skills, and addressing [attitudes toward aging](#) have all been studied.

Physical [exercise](#), it turns out, "is the best-documented, by far, if you look at the literature," Howard says. "We know it works. It's not that others don't – we just don't

have the evidence." [Aerobic exercise appears to improve cognitive areas](#) such as working memory and executive function more than anaerobic exercise such as stretching and toning.



Brain-training games, however, aren't backed by much evidence. Perhaps, Howard suggests, that's because when people are doing online brain exercises, they aren't moving their bodies and they aren't interacting with other people.

Best Foods for Brain Health



Lisa Esposito, Staff Writer

Lisa Esposito has been a patient advice reporter for U.S. News since 2014, writing about ... [READ MORE »](#)

Tags: health, patients, patient advice, mental health, aging, senior health, dementia, brain health, neurology

HEALTH DISCLAIMER »

RECOMMENDED

3 Bladder Cancer Prevention Tips

How to Help Someone With PTSD

Brain Aneurysms: What to Know



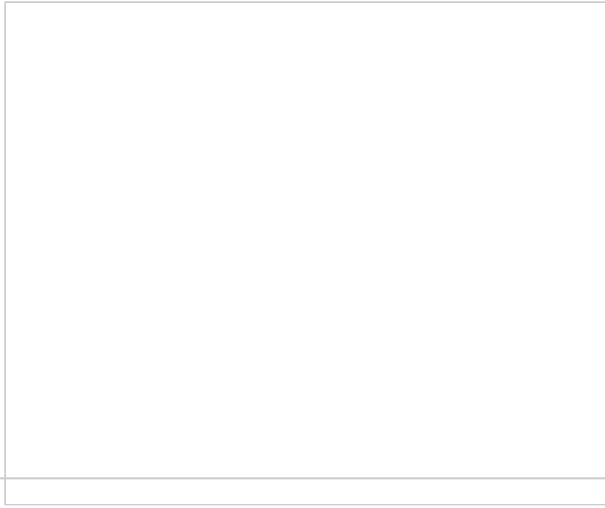
Retail-Based Health Care: What to Know

'Referred' Knee Pain: What to Know

Should You Try CBD for Arthritis?

Spinal Tumors: What to Know

Dry and Wet Macular Degeneration



Ensuring Kids Get the Right Treatment

The Health Effects of Low Testosterone

Load More

CIVIC

RANKINGS

EDUCATION

HEALTH

MONEY

REAL ESTATE

TRAVEL

360 REVIEWS

CARS

LAW FIRMS



[About](#) [Contact](#) [Press](#) [Advertise](#) [Newsletters](#) [Jobs](#) [Site Map](#)

[Store](#) ✕

Copyright 2019 © U.S. News & World Report L.P. [Terms & Conditions/Privacy Policy](#)