

You think it's fate. But pioneering scientists now say you can sidestep memory loss, if you play your cards right.



How to Beat Alzheimer's at Its Own Game

The new
science of
prevention

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I feel stupid. Worse, I feel overmatched. A simple short-term memory test shouldn't be this hard. But of the 10 random words just spoken to me, I can repeat back only two. I listened. I concentrated. I focused on the words as I heard them. But for some reason, they didn't stick. It's the kind of performance that makes you wonder if your brain is OK.

You, as in me.

I've been having memory blips recently. I tried to ID a singer on the radio the other day and couldn't come up with *Jackson Browne*. I'm not a fan, but it still bothered me. And a guy I've known for years named Rick, I somehow always accidentally call Dave. Things like that make me welcome this visit to the NeurExpand Brain Center in suburban Washington, DC. I'm here to have a brain fitness evaluation and talk with the founder, Majid Fotuhi, a Harvard-trained neurologist. He's getting some remarkable results helping people grow their brains—82% of his patients see measurable advances in cognitive function, and most experience an expansion in brain size, he says. There's good reason to believe that this is something we all should want to do.

Within 15 minutes of my initial test, not only do I perfectly recall 10 words

in order, but my 45-year-old brain tacks on 20 more words and masters 30 for 30. A miracle? Nope—a simple memory technique, one of the tools that are supposed to help protect me against dementia and Alzheimer's disease later in life. In fact, Fotuhi believes that if everyone could learn what I learned at NeurExpand that day last November, the high rates of dementia after age 65 could become a distant memory. At a time when some estimates indicate that Alzheimer's has become the United States' third-biggest killer—a time when the words *dementia* and *hopelessness* seem like synonyms—that just sounds crazy. But don't you want to believe it? I do.

If you remember just one word from this story, says Fotuhi, it should be *hippocampus*. Or *hippocampi*, since you have two of them, one on the underside

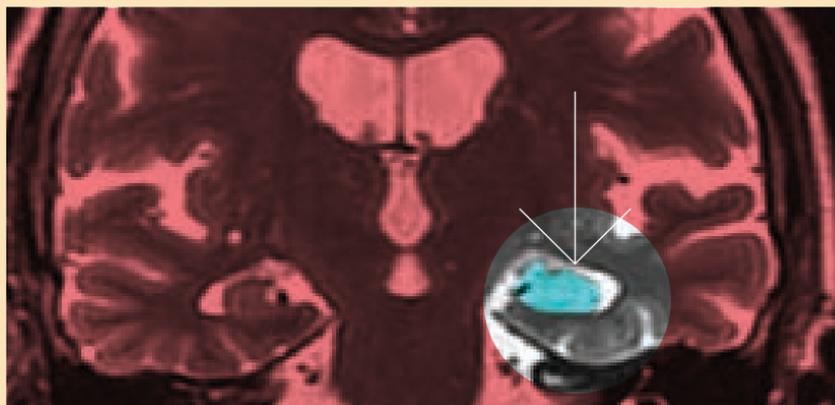
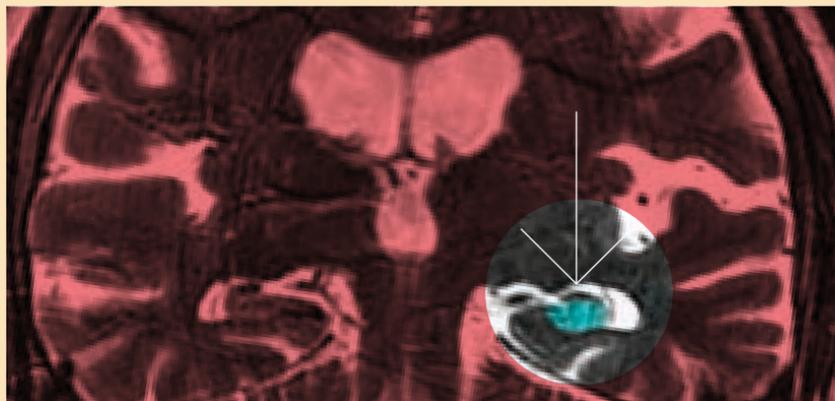
“If you remember just one word from this story, it's *hippocampi*—ground zero for your memory now and your dementia risk in the future.”

of each hemisphere of your brain. Each is about the size of your thumb and shaped like a sea horse (*hippocampus* comes from the Greek *hippos* for “horse” and *kampos* for “sea monster”), and their primary duties involve short-term memory and consolidating it for longer-term storage. That's different from, say, the cerebral cortex, your brain's outer layer, famously responsible for

THE MIRACLE OF Expanding Your Brain

After 12 weeks of training at Neur-Expand—including 12 total hours of meditation and 24 of memory exercises—this patient grew her hippocampus (in blue) 8.6%—the equivalent of reversing 17 years of brain aging. Five years ago, no one knew that such

a feat was even possible, says brain expert Majid Fotuhi—and certainly no one believed it could help your brain work around the tangles and plaques of Alzheimer's. But now some scientists are wondering: Is brain growth a dementia vaccine?



People who meditate
have larger hippocampi,
likely thanks to the
stress-soothing effects.



making decisions, navigating a city, moving your eyes around, and speaking. The hippocampi are ground zero for determining the strength of your memory now and your dementia risk in the future.

One reason I keep calling poor Rick Dave: The hippocampi shrink as we age—about 0.5% per year beginning sometime after 50. This forgetfulness is not only inconvenient and embarrassing but also a harbinger of bad things to come, research suggests. The smaller your hippocampi, the more vulnerable you are to the ravages of dementia. And as the movie *Still Alice* reminds us, Alzheimer's—the most common form of dementia—is horrifying. Bits of protein in the form of “plaques” and “tangles” destroy brain tissue, causing gradual memory loss that leads to behavioral deterioration and, in the end, an inability to perform basic tasks like swallowing food. The hippocampi get destroyed first, which explains why memory is the first casualty of Alzheimer's. The cortex goes down next, taking away everything else, including the very self. Everything that makes you you dwindles away.

Of course, there is no cure for this disease, which 1 in 9 Americans over 65 has. But Fotuhi, in his gently cheerful manner, reframes even that accepted wisdom. To him, hope is real for almost anyone with memory loss or cognitive decline, including most older people with initial signs of Alzheimer's disease. His

optimism doesn't include early-onset Alzheimer's, the relatively rare form that generally begins in one's 50s or 60s, since those dreaded plaques and tangles are like fast-moving brush fires that destroy the brain before anything can be done about them. But standard late-onset Alzheimer's, on the other hand, is in many cases preventable or at least postponable, he says. “If you do the right things today, you can even develop plaques and tangles in your 70s and never have symptoms of Alzheimer's.” You won't know the disease is there.



hat drives middle-aged people like me to clinics like Fotuhi's: those mild to major memory gaps

that make us fear we're slowly going crazy. Most of us turn out not to have dementia but, rather, to be stressed out, hormonally screwy, or even just paralyzed by fear of forgetting. We

“If you do the right things today, you can develop the plaques and tangles of Alzheimer's in your 70s and never show symptoms.”

do all have shrinking hippocampi, however, and Fotuhi will ferret out the main exacerbating reasons for this before recommending a plan to reverse or slow the problem. Cognitive decline is cognitive decline; it all leads

The Never-Get-Alzheimer's Rx

Exercise, a good diet, and mental challenges are great for your brain individually. Together? They'll make you unstoppable, at least according to animal studies. Here, ranked from most-research-backed to least, are the things to focus on.

#1 Exercise 3 hours a week. You've experienced it yourself on a mind-clearing walk: Moving your body is freaking great for your brain, both now and years from now. Majid Fotuhi of NeurExpand recommends keeping your heart rate up for at least 20 minutes at a time. In one study, people who increased their three weekly walks from 10 to 40 minutes expanded their hippocampi by 2% after a year—the equivalent of getting 2 to 4 years younger above the neck. Exercise increases levels of brain-derived neurotrophic factor (BDNF), a protein that's essentially fertilizer for the brain.

#2 Meditate 10 minutes a day. Too much cortisol is hippocampal poison. Basic mindfulness meditation is an effective weapon against it (as is exercise). Fotuhi trains his patients to start with a simple 5-5-5 routine: Sit up straight, close your eyes, and inhale slowly for a count of 5, then exhale for a count of 5. Do this for 5 minutes. Stay with the count and the movement of your breath, even if your mind wanders. Practice this twice a day—or, if you're stressed all the time, three or four times daily.



#3 Get 1,500 mg of omega-3s daily. People who have higher levels of DHA and EPA (found in fatty fish) also have (surprise!) larger hippocampi.

#4 Memorize something every day.

Growing your brain might not be as simple as signing up for Lumosity—in fact, Fotuhi and a host of other neurologists find such arbitrary games to be ineffective—but making a habit of memorizing things will tone your hippocampi. Med students whose hippocampi were measured before and after they prepped for the boards substantially expanded their hippocampi after studying. People who learned to juggle (which is essentially memorization of physical movements) showed an increase in gray matter after 3 months. UCLA neurologist Gary Small recommends cross training, too. “Your brain loves variety,” he says, so challenge it whenever you can. Increased social interaction helps, as does learning a new skill or language.

somewhere bad if it can't be reversed, and everyone wins if it can.

Take Pascale Meraldi, a landscaper in Baltimore, who thought she was developing early-onset Alzheimer's at 51. “When I would try to speak, I couldn't recall words,” she says. “I thought I was losing my mind.” Fotuhi's read: She was distractingly busy and deeply stressed—and poisoning her hippocampi with cortisol overload.

A basic brain plan for a patient like Meraldi is to identify all the treatable causes of her memory loss and then tailor a set of interventions that involve exercise, diet, and mental stimulation. There are also calming treatments like meditation, neurofeedback, and counseling coupled with memory training. But one of the best ways to ease patients' anxiety is to show them that their memories are actually fine. “In five or six sessions, patients haven't changed their brains yet,” Fotuhi says, “but they have just learned how to use the capacity they already have. When they memorize 100 things, they're thrilled, and their fear of Alzheimer's has vanished. And they've started to add synapses to their hippocampi.” Meraldi finished her customized 12-week plan in January. “I feel like my brain had been torqued out of shape and they straightened it out,” she says. “I was very surprised—I never thought I'd get better to this extent.”

“We do have more control over this than we realize,” says Gary Small, director of the UCLA Longevity Center at the Semel Institute for



Neuroscience and Human Behavior. "It doesn't happen overnight, but with simple techniques, you can see rapid improvement in cognitive function."

Fotuhi puts it more bluntly: "At age 50, people should have a brain health exam just like they would have a colonoscopy. We're going to have a tsunami of people with Alzheimer's as the population gets older, and research suggests we can prevent more than a million new cases just by strengthening the hippocampi. We should be talking about this in the media every day."

During my trip to the NeurExpand center, they map my brain with an EEG, teach me how to meditate, and run me through test after test of mental agility and short-term memory. Shapes. Words. Cards. Colors. I do OK, but I also feel the limitations of my brain—as in, I should be quicker but can't be. Fotuhi's patients

“Neurologists are still saying, ‘I’m so sorry, you have Alzheimer’s. Here’s some Aricept,’” Fotuhi says. “It’s depressing and unfair.”

all run this gauntlet, including intense cardio on a stationary bike to test oxygen consumption (VO₂ max) and an ultrasound of vessels in the neck to check blood flow. He wants to get your baseline of mental and physical ability before he formulates a 3-month “brain fitness” program designed to turn

your mind around. There are currently three NeurExpand centers, located in Lutherville and Columbia, MD, as well as DC. It's Fotuhi's vision to have them dot the country.

The incredible decades-old discovery that underlies his program: While the hippocampi may shrink (and already have for most of Fotuhi's patients), they can also expand quite easily. By now, a raft of research has shown that in response to healthy behaviors, the brain can react like an exercised muscle, growing bigger and stronger, at any age. This is central to Fotuhi's work, since research has established that people with bigger hippocampi tend to have a lower risk of dementia.

The connection makes neurobiological sense: Enlarging certain brain regions means increasing brain cells (neurons), which have more branches (dendrites) and more contact points with other neurons (synapses). Our brains produce about 400 new neurons a day, but to be incorporated into our gray

matter, they have to develop attachments to other neurons there. That's what enlarges the hippocampi and adds to what scientists call your cognitive reserve—the surplus of neurons,

dendrites, and synapses that might one day compensate for those that become compromised, in much the same way active people with heart disease can grow blood vessels that provide a “natural bypass” around clogged arteries.

“Cognitive reserve may not really protect against the Alzheimer's disease

TO GROW YOUR HIPPOCAMPI, Do This Memory Trick for 20 Minutes Every Other Day

Pick up a regular deck of cards.

Deal yourself a card faceup and note it. Place another card faceup on top of it. Now name the first card aloud. Cover the second card with a third faceup. Name

the second card. Get it? Do the deck.

When that's too easy, again deal a card faceup, note it, and cover it with another card faceup. But now deal a third faceup before naming the first card. Go from

there, naming the card two cards back after each new deal.

Every 4 weeks, increase the number of cards you cover. If you can get up to 10 covered, you're an ace, says brain expert Majid Fotuhi.



NEVER FORGET **Another Name**

When you meet someone new, what are you fixated on?

YOURSELF: What kind of impression you're making, your handshake, if you are making eye contact or have spinach in your teeth. That's why the new acquaintance's name never gets locked in. You

can change that. Pick out one or two things about the person—a trait, where they're from (e.g., "Steve with the big beard is from Boston"). To keep his brain firing, neurologist Majid Fotuhi plays this game with himself whenever he lectures in front of a large group. He interacts with the audience and tries to memorize up

to 50 names—and usually succeeds. "Now I can't not do this trick when I meet someone one-on-one—I don't even have to try anymore," he says. "My wife, who always used to say she was bad at names, never forgets anymore, either. It makes people feel good, and we're building synapses in the process."

changes in the brain—amyloid plaques and tangles," says Reisa Sperling, professor of neurology at Harvard Medical School and director of the Center for Alzheimer's Research and Treatment at Brigham and Women's Hospital. "Rather, it just may allow people to work around their symptoms for longer."

While there has yet to be a study proving that groups of people who expanded their hippocampi had fewer dementia cases as a result, all the other fragments of Fotuhi's logic are in scientific place. Research shows that those who exercise, eat well, and have stimulated brains lower their incidence of dementia and grow larger hippocampi (aka more cognitive reserve). More cognitive reserve drives down Alzheimer's risk. One memorable study followed people until death and measured the

plaques and tangles in their brains postmortem. Of the people who had significant amounts of Alzheimer's plaques and tangles, a third had normal cognitive function when they died. And this group had, on average, larger hippocampal volume than the others.

"The hippocampus research may not be entirely there yet," says Small, who writes about these issues in his new book, *2 Weeks to a Younger Brain*, "but, frankly, I don't want to wait 10 years for the studies. There's enough suggestive evidence to get started now."

Imagine the implications for treatment if having healthy sea horses could keep the Alzheimer's in our brains completely out of our lives. It would mean doctors and those who already have the disease would be able to reframe a diagnosis as a chance to slow their

decline. In unpublished research, Fotuhi found that the majority of patients who've taken part in NeurExpand's prescribed 3-month program saw measurable gains in hippocampus size and cognitive function. Many had come to him with symptoms of dementia.

"So often my patients have been told by other neurologists, 'I'm so sorry, it looks like you have Alzheimer's. Here's some Aricept,'" Fotuhi tells me. "That's depressing and unfair.

"I saw a patient whose sister wanted me to confirm that she was not competent and needed to be put in a nursing home," he says. "She was 69 and forgetful and confused, and was basically watching TV all day every day. After she spent 3 months working with the brain fitness program team, the scans showed that her hippocampi had grown about 8.6%, which amounts to having reversed the age of her brain by about 17 years. Now she has improved so much, she wants to go back to work."

According to Fotuhi, I have one of the healthiest brains he's seen in a while. I'm relieved, as if I got a passing grade on a monster midterm. Maybe that's why, months later, I still haven't proceeded with what he recommended for me—a sleep study, for one. I snore, and Fotuhi says sleep apnea might be sucking the youth out of my brain every night. (A

host of chronic conditions, including sleep trouble, strangle the hippocampi.) Given my mild forgetfulness, Fotuhi also recommends memory exercises using playing cards (like the one on p. 123). Directly challenging my short-term memory, he promises, will help those baby neurons that my brain

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produces take hold and mature.

For a number of patients who did the training, NeurExpand followed up a year later. All maintained some increase in hippocampal size. Many slipped 10 to 20% but are still better off than they were at the start. "After 3 months, if you totally go back to your old lifestyle, chances are the benefits you've gained are lost," he says. "But if you do half, like with physical exercise, you'll maintain some of the improvement."

Fotuhi laments that his personalized approach to diagnosing and treating the underlying causes of memory problems hasn't become universal yet. Until brain checkups are as ubiquitous as colonoscopies, most of us will have to rely on the same one-size-fits-all set of techniques.

Yet what an opportunity even that blunt approach represents. If every one of us keeps our hippocampi robust, we collectively lessen the threat of lost marbles down the line. My friend Rick is just one of the millions of us who will like that future. ■