



In the coming decades, millions of men will be diagnosed with Alzheimer's and other brain disorders. Tap the latest science to avoid becoming one of them.

BY JOHN BRILEY | PHOTOGRAPH BY THE VOORHES | P.114

14 SMART WAYS TO MAINTAIN YOUR BRAIN

► IN JULY 2015, JEFF BORGHOFF, a high-level IT professional and father, noticed his memory slipping. He was 51. "I used to have no problem recalling entire conversations," says the New Jersey resident, "but that became so hard I started recording some of them."

He asked for a less demanding job—no small step for a high achiever. But before the transfer was set, Borghoff was hospitalized with a stomach virus and facial twitching. Doctors were stumped by his trouble with memory, speech, language, and cognition.

After months of frustration, Borghoff went to Columbia University Medical Center. His doctor looked at his family history, questioned his wife, and did spinal fluid and neuropsychological testing. The diagnosis: early-onset Alzheimer's, a disease that had struck his father, grandfather, and uncle.

Borghoff is no longer employed, but he belongs to the Alzheimer's Association Early-Stage Advisory Group and follows its recommendations. He walks, jogs, and cycles. He's watching his diet and is learning to play a musical instrument. He and his doctor are optimistic that a cure will be found soon.

Something needs to happen, because Alzheimer's cases could nearly triple by 2050. Fortunately, the past few years have brought new discoveries, tests, and treatments, plus more effective strategies for brain health. Read on for 14 exciting new developments.

1 Healthy Heart = Healthy Brain

Some people think the brain operates outside the rules that govern the rest of the body. "Nothing could be further from the truth," says neurologist David Perlmutter, M.D., the author of *Grain Brain*. Many factors that raise your risk of heart disease (unhealthy cholesterol levels, high blood pressure, smoking, diabetes, obesity, sedentary lifestyle) threaten brain health. These factors can lead to restricted bloodflow, inflammation, and clots. **DON'T FORGET** Think of your next blood test as a report card on your brain as well as your heart. Likewise, view your cardiologist as an early-warning neurologist, says MH advisor Murali Doraiswamy, M.D., a professor of translational neuroscience at Duke School of Medicine.



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BACTERIA COULD HELP ANXIETY AND DEPRESSION
Gut bacteria produce mood-influencing chemicals, such as serotonin and dopamine, which reach the brain via the bloodstream. Scientists are developing bacterial treatments in the hope of rebalancing brain chemicals to treat conditions like depression and anxiety. Until then, eat more fermented foods packed with good bacteria. Flip back to page 86 for some examples.

3 Antibiotics Could Compromise Memory

The damage antibiotics can do to the beneficial microbes in your gut is well established. And now it appears that antibiotics can also negatively affect your brain. A recent animal study in the journal *Cell Reports* suggests that they may inhibit new cell growth in the brain region associated with recall. **DON'T FORGET** Take antibiotics only when necessary at the direction of your doctor. You may want to pair them with a probiotic supplement, which might help restore the good gut bugs killed by the medicine.

4 This Simple Sniff Test Is an Early-Warning Sign for Alzheimer's

Mayo Clinic researchers gave a standardized smell test to 1,430 people with an average age of 80. The sniff test was designed to assess how accurately the elders could identify a dozen scents, including cherry, lemon, soap, and roses. Those who scored lowest had the highest risk of developing memory problems and/or Alzheimer's disease. Experts speculate that the brain's smell and memory centers may be linked. **DON'T FORGET** Take a whiff of Jif if you're older or have Alzheimer's in your family. Peanut butter is one of the scents scientists have used to test for developing brain disorders. In a University of Florida study, people in the early stages of Alzheimer's were less able to detect PB with their left nostril than with their right nostril. If you failed the test, don't panic, but say something to your doctor.

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EXERCISE IS LIKE MIRACLE-GRO FOR THE BRAIN

Physical activity can spur growth of new neurons in parts of the brain that control memory. In a study of seniors published in the *Journal of Alzheimer's Disease*, researchers found that even moderate exercise, such as gardening and dancing, promoted the formation of neurons in these brain areas and reduced Alzheimer's risk by half. Aim for 150 minutes a week of cardio, spread over three to five days. Ronald Petersen, M.D., Ph.D., director of the Mayo Clinic Alzheimer's Disease Research Center, advises using some of that time for interval training—sprints of intense effort alternating with active recovery periods. "Exercise may turn out to be one of the best things we can do to protect ourselves from Alzheimer's disease," he says.



6 Marijuana Might Someday Clear Foggy Brains

If you looked through a microscope at Alzheimer's patients' brains, you'd see clumps of protein, called beta-amyloid plaques, gumming up the works. While scientists suspect that beta-amyloid is a major player, its precise role is unknown. New studies suggest that it may be helpful initially, arriving in the brain to surround and subdue viruses, bacteria, or other invaders, like a pearl forming around a sand grain. But eventually it turns destructive. "Are plaques the tombstones of the disease, or an early warning?" asks Dr. Petersen. "We just don't know yet." **DON'T FORGET** Compounds in marijuana, including THC, might promote the removal of beta-amyloid, suggests research from the Salk Institute. Don't try it just yet, though; the results are preliminary.

7 Alzheimer's Screenings Will Soon Be Routine

Part of the diagnostic challenge with Alzheimer's is that doctors can't easily see what's going on. That's changing. "We can now successfully image Alzheimer's proteins in the brain," says Dr. Petersen. That's a major advance. The research is helping neurologists develop therapies to stall the progression, just as cardiologists do with arteriosclerosis. "We're trying to detect the 'cholesterol of Alzheimer's,'" he says. Imaging technology can also show brain shrinkage, reduced cell activity, and amyloid plaque buildup. **DON'T FORGET** Until these tests go mainstream, take periodic standardized tests to evaluate memory, problem-solving, and thinking skills. Ask your doctor about these.

8 Germs Take the Blame for Some Brain Problems

No matter how clean we try to keep our thoughts, our brains contain tens of thousands of dormant microbes, says Dr. Doraiswamy. Scientists suspect that some bad bugs can be roused by triggers such as stress or certain drugs, after which they contribute to the development of Alzheimer's. **DON'T FORGET** Numerous microbes—like the ones associated with herpes, toxoplasmosis, HIV, Lyme disease, and the human form of mad cow disease—could infect your brain and hijack your cognitive processes. In fact, Alzheimer's and other dementias may turn out to be bug-induced in some way that's not yet fully understood. In other words, you could conceivably "catch" a brain disorder.

9 Make Sure Diabetes Doesn't Raise Your Risk

The diabetes link to cognitive problems is no secret, but the connection is growing stronger. One of the earliest brain deficits in people at risk for Alzheimer's is an inability of the nerve cells to use glucose, their main fuel. Dr. Doraiswamy calls this "diabetes of the brain." Scientists are testing exercise, low-glycemic index diets, and antidiabetic drugs as preventive approaches to Alzheimer's. **DON'T FORGET** Get tested for diabetes, and if you have it or are at risk, work with your physician on lifestyle changes.

10 Learn More Stuff to Offset Mental Decline

Continually challenging yourself with new and complex tasks—chess, a new sport, a second language, a musical instrument—can strengthen or open new lines of communication among neurons. With piano lessons, for example, neural networks will expand between your brain's hearing and movement centers. Becoming a serial learner creates a reserve of brainpower. "Even if disease knocks out part of the brain, you have kind of redundant cellphone towers as backup," says Dr. Doraiswamy. **DON'T FORGET** In July, a 10-year study showed that a brain game that shortens your response time may also reduce your dementia risk. "If these findings can be replicated, it will be a game changer," says Dr. Doraiswamy.



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YOUR BRAIN'S FAVORITE CUISINE IS MEDITERRANEAN

The brains of people who ate the Mediterranean way—fruits, vegetables, legumes, nonprocessed grains, fresh fish, olive oil, and red wine—were younger-looking in autopsy studies, says Dr. Doraiswamy. In one study, people on the so-called MIND diet, which focuses on plant-based nutrition, had up to a 53 percent lower risk of Alzheimer's.

12 Testosterone May Be a Brain Booster

Testosterone therapy is often touted as a fountain of youth. And in the brain of someone with low T, adding the hormone appears to help prevent damage from oxidative stress—the buildup of harmful byproducts produced by aging cells. But there's a catch: Once that stress reaches a certain threshold, adding T can actually accelerate brain damage, warns Rebecca Cunningham, Ph.D., who studies hormones at the University of North Texas Health Science Center. **DON'T FORGET** "The only way to know if androgen therapy is right for you is to see a doctor who knows your full health profile and history," says Cunningham. Low testosterone is one of many risk factors for brain disease, not a guarantee you'll develop it.

13 Researchers Now Recognize the Concept of "Mixed Dementia"

In the early stages of vascular dementia, patients show declines in judgment, decision making, planning, and reasoning. Symptoms of early-stage Alzheimer's are chiefly memory related. But as each disease progresses, the symptoms overlap. Doctors now recognize that many people have a blend of the two, known as mixed dementia. **DON'T FORGET** Knowing the relationship between the conditions could help doctors manage the disease, says Dr. Doraiswamy.

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TWO NEW DRUGS TO WATCH

Eli Lilly's solanezumab and Biogen's aducanumab are being studied for early Alzheimer's. Both attack amyloid plaques in the brain, usually considered the culprit behind reduced mental performance. In early studies, people on each of those drugs seemed to show less cognitive decline than the placebo groups did.



A BABY WHO WILL NEVER GET ALZHEIMER'S

That's the hope of his parents, who spent nearly \$40,000 on a new treatment to protect him.

When Jim's mother died of early-onset Alzheimer's at age 61, it was a wake-up call. "The disease has hit every generation of my family," says Jim, a software engineer. (He and his wife requested anonymity.) "I thought, 'If there's anything we can do to prevent this from happening to our kids, we should do that.'"

Turns out there is. Jim, 36, learned that he could be tested for gene mutations that cause early-onset Alzheimer's. Through in-vitro fertilization (IVF), he and his wife, Melissa, could then screen their embryos and implant one that lacked mutations.

The decision to do these "preimplantation genetic diagnostics"

was agonizing. "You realize that once you know the information, you can't unknow it," says Melissa. But they proceeded. Jim tested positive for the presenilin 1 mutation.

"It's pretty intense to be told you'll get Alzheimer's in 15 years," he says. "I've always planned life assuming it was going to happen, but there's something different about it being definitive."

Three of the couple's viable embryos lacked mutations. The first one doctors implanted in Melissa didn't take,

but the second one did, and the couple now has a healthy 14-month-old son.

Genetic analysis is available for a suite of diseases, says Svetlana Rechitsky, Ph.D., of Reproductive Genetic Innovations, the company that did Jim and Melissa's screening. Jim and Melissa know their son isn't immune to Alzheimer's, since lifestyle factors are involved, but they feel fortunate that they've been provided with the opportunity to reduce the odds in their family tree. —J.B.