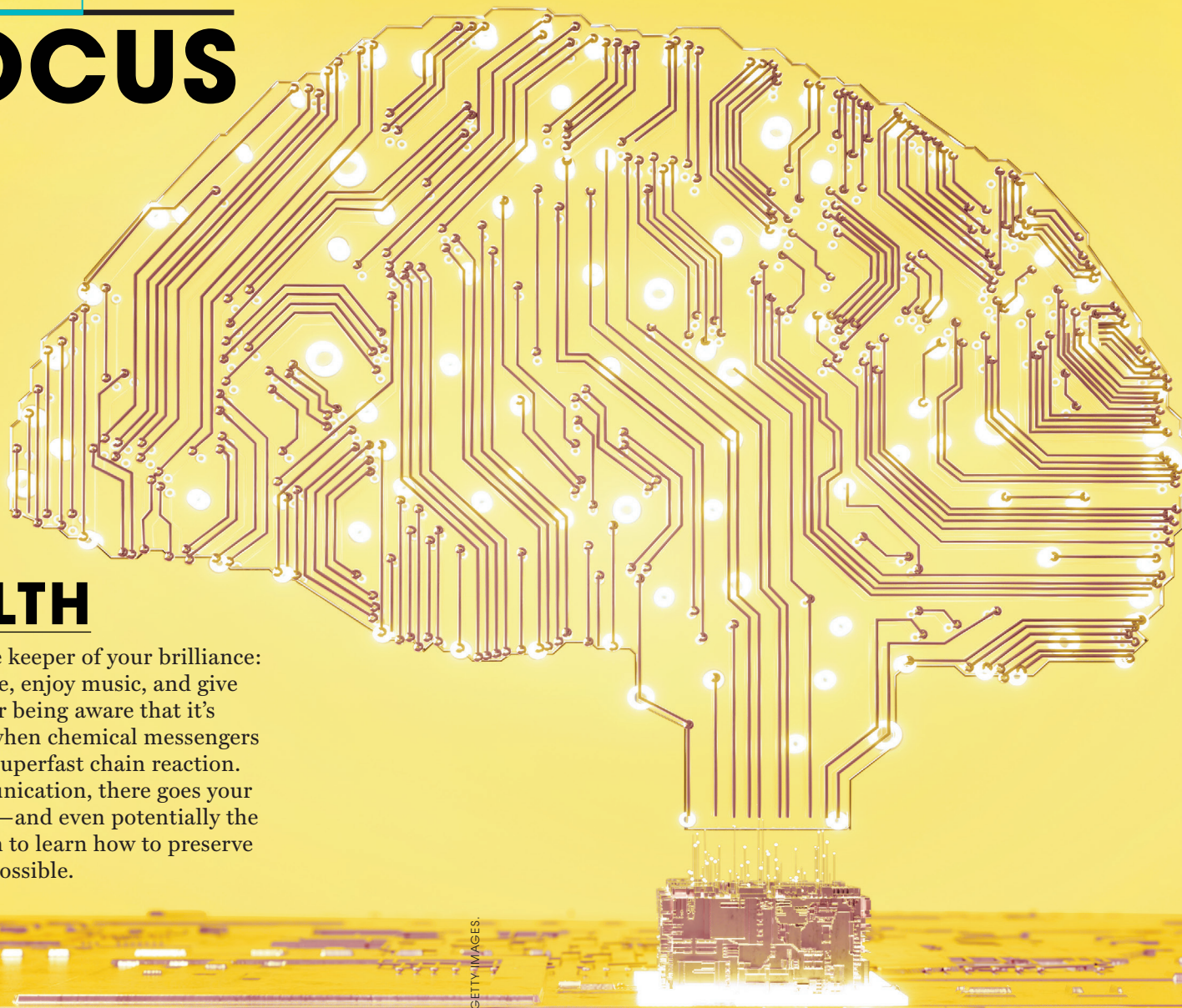


IN FOCUS

BRAIN HEALTH

Your brain is a lot more than the keeper of your brilliance: It controls your ability to breathe, enjoy music, and give someone a hug—all without your being aware that it's involved. These things happen when chemical messengers are passed from cell to cell in a superfast chain reaction. If anything disrupts that communication, there goes your ability to engage with the world—and even potentially the oxygen you need to live. Read on to learn how to preserve your brainpower for as long as possible.



GETTY IMAGES

MEET Your Brain

BY ARRICCA ELIN SANSONE

THINK OF THIS ORGAN AS YOUR OPERATING

SYSTEM, a miracle of efficiency with billions of nerve cells that coordinate everything from eye blinks to emotions. Whether you're making coffee or answering a text, your brain takes in information from multiple sources, then deciphers the data in an instant so you can act.

Let's say you spot an unfamiliar snake in your garden (*Eek!*). Your heart pounds, your breathing speeds up, and your blood pressure rises in a fight-or-flight response. That's the amygdala, the brain's emotional center, reacting to a perceived threat. "The amygdala responds to stimuli

in the environment," says Avram Holmes, Ph.D., an associate professor of psychiatry at Rutgers University. "It's a detection system, but it doesn't function in isolation."

Instead, there's a feedback loop. In milliseconds, "other parts of your brain come online to decide how

to respond," Holmes says. When you realize the "snake" is a stick (*Phew!*), the prefrontal cortex, in charge of decision-making, interprets the situation and sends "all is well" chemicals back to the amygdala

and your body calms down. All this happens without any conscious effort from you.

Mission control

Complex circuitry is involved in the way the

brain communicates with other body parts. "The brain serves as the body's control center by connecting an extensive network of neurons," specialized cells that carry impulses through the nervous system, says Prashant Natteru, M.D., a neurologist at Mayo Clinic Health System in La Crosse, WI. "Signals then get transmitted by the release of certain chemicals known as neurotransmitters."

These neurotransmitters move across the synapses, the small gaps between neurons, relaying their messages, explains Dr. Natteru. One, serotonin, helps regulate sleep and mood, among other functions; acetylcholine influences tasks such as the beating of the heart, blood pressure regulation, and gut motility; dopamine helps you focus and sleep.



TRUNK ARCHIVE.

So how does your brain know what to do when? It has the phenomenal ability to run in the background, monitoring internal and external environments all day, every day. The brain takes in information from sensory organs like the eyes, the ears, and the skin as well as from internal sensors measuring things like your blood pressure and body temperature, says Dr. Natteru. This data is then processed in different brain regions.

If you get hot, for instance, one of those regions, the hypothalamus, triggers responses such as sweating to cool you off, says Dr. Natteru. For more complex behaviors, such as when you're crossing the street and someone honks at you, more brain regions are involved: The sound is processed in the auditory cortex, and the prefrontal cortex

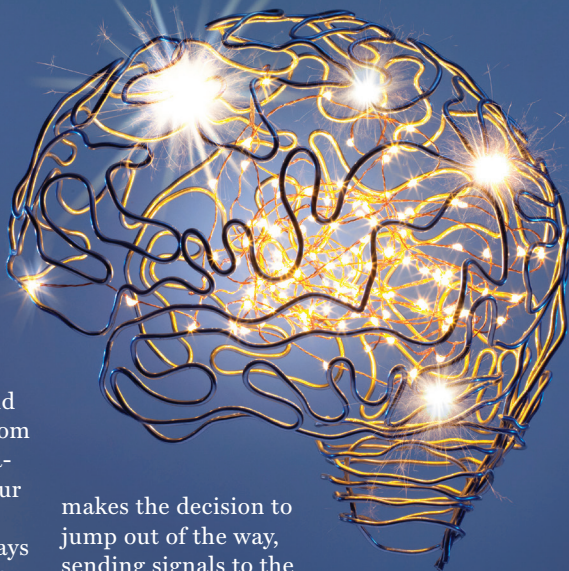
makes the decision to jump out of the way, sending signals to the motor cortex to initiate the proper movements. This integration of what your senses and your internal signals tell you, along with previous experience, lets your brain orchestrate the right actions at the right times, says Dr. Natteru.

Why healthy habits matter

■ Because your brain is so connected to other body parts, the

way you treat your body matters. "You may not realize how intertwined physical and mental health are," says Holmes. "But there's good evidence that healthy lifestyle habits are the most effective way to maintain good brain health too." To learn specific steps you can take to support your brain and help it perform its many jobs for years to come, turn to page 73.

TRUNK ARCHIVE.



How Your Brain GROWS UP

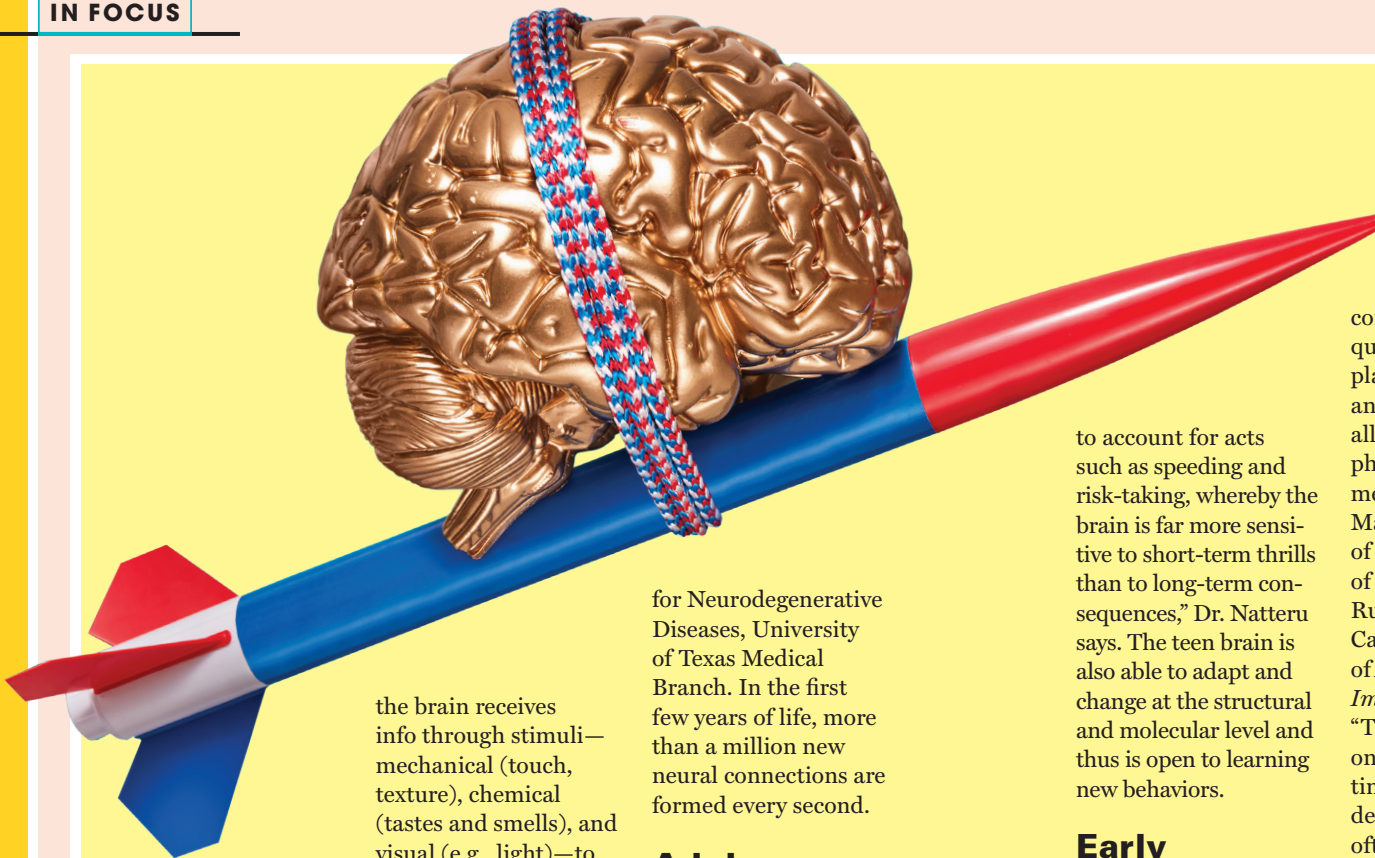
BY ARRICCA ELIN SANSONE

YOUR BRAIN ISN'T STAGNANT; THROUGHOUT YOUR LIFETIME, MANY CHANGES

occur as a result of genetic, hormonal, and environmental factors that accompany emotional, intellectual, and physical milestones, says Dr. Natteru. Use this overview of common milestones to prep for what may be ahead for you or your kids.



TRUNK ARCHIVE.



Childhood

■ You can't miss the fact that babies stick everything in their mouths and toddlers are eager to explore. As their brains develop, they are forming new connections to help them make sense of the world. After birth,

the brain receives info through stimuli—mechanical (touch, texture), chemical (tastes and smells), and visual (e.g., light)—to help sensory pathways, including vision and hearing, develop. Our sensory receptors are constantly activated, “and the brain learns how to interpret all this information from the environment,” says Agenor Limon, Ph.D., an associate professor at the Mitchell Center

for Neurodegenerative Diseases, University of Texas Medical Branch. In the first few years of life, more than a million new neural connections are formed every second.

Adolescence

■ The limbic system, which controls emotions and reward-seeking, is highly active during these years, which is why teens might elect to do things they know are dangerous if their friends are doing them. “This [system] is said

to account for acts such as speeding and risk-taking, whereby the brain is far more sensitive to short-term thrills than to long-term consequences,” Dr. Natteru says. The teen brain is also able to adapt and change at the structural and molecular level and thus is open to learning new behaviors.

Early adulthood

■ Luckily, the prefrontal cortex finally kicks in when we're in our mid- to late 20s. This final part of the brain to mature is responsible for executive functions such as decision-making, impulse control, reasoning, and

considering consequences. “The ability to plan, abstract thought, and emotion regulation all benefit from this physiological development,” says Charlotte Markey, Ph.D., chair of the department of health sciences at Rutgers University at Camden and author of *Adultish: The Body Image Book for Life*. “These skills come online at a critical time in most people's development, as they're often navigating serious relationships, starting professional lives, and having kids.”

Pregnancy and postpartum

■ Pregnancy brain is a thing! Women may experience symptoms like forgetfulness and an inability to focus.

Changes in the levels of estrogen and progesterone are drastic, and these two hormones influence the neurotransmitters that affect brain functions, says Dr. Natteru. Sleep deprivation also can contribute to reduced clarity, but it should improve as hormones stabilize (and babies sleep longer at night!).

Menopause

■ Women in perimenopause may have brain fog or memory lapses related to a decrease in their estrogen levels. Estrogen modulates the activity of neurotransmitters, including serotonin and dopamine, which are involved in mood modulation, memory, and learning processes, Dr. Natteru says. Fortunately, these changes are usually temporary, and hormone therapy may help reverse them.

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Is **ALZHEIMER'S DISEASE** Hereditary?

BY MARISA COHEN

IT'S HEARTBREAKING TO WATCH A PARENT WITH ALZHEIMER'S LOSE THEIR MEMORY, speech, and ability to take care of themselves. The degenerative brain disease has no cure, and it's only natural to think, *If Mom has it, does that mean I will get it too?*

The answer depends on many factors, including genetic ones: "There are around five dozen different genes that, alone or in combination, pose a slightly higher, or slightly lower, risk in terms of people developing Alzheimer's," says James Noble, M.D., an associate professor of neurology at Columbia University Irving Medical Center. But even if you have a



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TRUNK ARCHIVE.

Mature adulthood

As we grow older, mild cognitive changes—which are a normal part of aging—may affect areas such as memory and reasoning for some people. "Changes in the prefrontal cortex are especially relevant in terms of slower thought processes and decision-making," says Markey. "For example, inhibitory control, which allows us to think before we act, may decline. That's why older adults may be

apt to make comments we may find inappropriate at times." Some people also may lose a little flexibility, meaning they may be slower to find words or recall names. But you've also crystallized your intelligence and the knowledge you've accumulated at this point. "Essentially, you can focus on what matters and not what doesn't," says Holmes.

The good news: While some brain regions may decline as we age, the

healthy brain is very plastic, and other regions may compensate. "We may not learn as easily as we did when we were kids, but we can still learn," says Limon. In fact, studies have found that in areas such as vocabulary, verbal reasoning, and math we stay the same (or improve!) as we age. What's more, by practicing healthy lifestyle behaviors you can support good health for your brain throughout your life.

gene that raises your risk a bit, it doesn't mean you're destined to develop the disease, he adds.

With late-onset Alzheimer's, which generally appears at age 65 or older and is by far the most common type, the biggest risk factor is age. In fact, your risk of developing Alzheimer's increases exponentially with each decade: By 85, the average person has around a one in three chance of developing it. When symptoms appear before 65, it's known as early-onset Alzheimer's disease, which accounts for less than 10% of cases. Early-onset Alzheimer's can happen to those with no family history, but in very rare cases it can be due to an inherited genetic mutation. Inheriting this "deterministic gene" means an individual almost certainly will get Alzheimer's. Such circumstances account for 1% or less

of all cases and are known to affect just a few hundred families across the world.

Which genes increase risk?

■ The most well-known gene that can affect the risk of Alzheimer's is the APOE gene. There are three versions (e2, e3, and e4), but it's estimated that 40% to 65% of people with Alzheimer's have APOE-e4. If you inherit one copy of APOE-e4, you have a threefold increased risk for developing Alzheimer's—inheriting two (one from each parent) and the risk is multiplied eight to 10 times.

But don't freak out: Only 2% of Americans have this genetic double whammy. And remember, even if you have e4, your risk increases proportionally. For example, it's estimated that 5% of Americans ages 65 to 74 have Alzheimer's disease.

So if your risk increases threefold, you still have only a 15% chance of developing it at that age.

Should you get tested?

■ You can, but it may not be that useful. Genetic testing can detect whether someone has APOE-e4, but having one or two copies of e4 cannot predict the development of Alzheimer's, and plenty of people who don't have e4 get the disease. It's important to consider testing carefully. "What are you going to do with the information?" asks Dr. Noble. "What are the possible positive and negative implications? How will this affect other people in your family?" Your genes are only a part of your story, he adds. "Only in rare circumstances do they wind up being the answer for why any particular individual gets Alzheimer's," he says.

5 Ways to STAY SHARPER Longer

BY JIHAN MYERS

SOME ADVICE FOR BRAIN STRENGTH, LIKE EATING A HEALTHY DIET, is pretty straightforward. Other recommendations, however, have become so broad—*Do crossword puzzles! Get more sleep!*—that you may feel stuck as to how to reap the brain benefits. Here, experts share what to focus on.

Cross-train your brain.

■ If you're on your 500th Wordle, you may want to put the phone down—at least for a bit. When it comes to the

benefits of puzzles for brain function, Zaldy S. Tan, M.D., M.P.H., director of the Memory & Healthy Aging

Program at Cedars-Sinai, recommends doing other brain-boosting activities, not just repeating the same types of exercises. “Brain games, crossword puzzles, and Sudoku are meant to challenge

specific areas of the brain, but our minds are complex, and different areas serve different functions,” he says.

► **WHAT TO DO:**

Try puzzles one day, read a book the next; take a Spanish class, go to lunch with friends. In fact, socializing may be particularly beneficial. “Social interaction is quite demanding in that you have different types of stimulation, including planning the outing as well as interacting with others, which fulfills the reward pathways of the brain,” Limon says. Whatever you choose, engaging in a mix of activities may strengthen brain circuits and stimulate

new brain connections, which can help you function if typical brain networks are disrupted due to disease. “Think of it like cross-training for the brain, because different activities give you a better chance of having the totality of your mind stimulated and engaged,” says Dr. Tan.

Move your body.

■ “Exercise undoubtedly reduces the risk for heart disease, stroke, and other vascular phenomena,” says Dr. Tan. This may be a boon for your brain: Preventing vascular disease (which can cause small strokes and lesions on the brain) through exercise may help stave off a type of cognitive decline known as vascular dementia as well as Alzheimer’s disease. Researchers don’t know exactly why, but exercise increases

blood supply to the brain and stimulates the production of chemicals that promote neuron growth.

► **WHAT TO DO:**

You know the drill. Aim for at least 150 weekly minutes of moderate-intensity exercise. You want an exercise routine that includes cardio and strength training along with balance and flexibility exercises.

Skip the “brain health” supplements.

■ Do you really need to pop OTC pills to support your memory? “The short answer is no, unless you have a vitamin deficiency,” says Dr. Tan. “Most of the over-the-counter supplements do not have sufficient research that would support their effectiveness,” explains Douglas

Scharre, M.D., director of Ohio State’s Center for Cognitive and Memory Disorders.

► **WHAT TO DO:**

If you’ve noticed increased forgetfulness or other memory stumbles, ask your doctor to check you for vitamin deficiencies and follow their recommendations. “If your vitamin B₁₂ is low, it needs to be supplemented, because brain cells need B₁₂ to function,” says Dr. Tan. “And there is a link between lack of vitamin D and dementia, so it can be good to take a supplement.”

Find stress relief.

■ While a little stress can help motivate you to achieve your goals, chronic stress tells the brain there’s ongoing danger, and that can impair memory, increase risk of mental health disorders, and impact physical health.



PETER CROWTHER.

► **WHAT TO DO:**

Try to keep stress under control with an array of strategies such as deep breathing or mindfulness techniques, meditation, and spending time outdoors in nature, says Limon.

Address sleep apnea.

■ Established research on sleep has shown that getting deep, restorative sleep supports cognition in a variety of ways, from consolidating memories to “actively removing toxins from the brain,” Dr. Scharre says. But one sleep disruptor people often miss, says Dr. Tan, is sleep apnea, which affects roughly 39 million American adults. Sleep apnea occurs when your airway gets temporarily obstructed while you’re asleep, resulting in reduced airflow. This means not enough oxygen is

getting to your brain, causing you to gasp for air. “We know that sleep apnea interrupts deep REM sleep and wakes you up, which can lead to sleep deprivation,” says Dr. Scharre.

► **WHAT TO DO:**

Talk to your doctor if you show signs of sleep apnea. One study found that older adults who received treatment were less likely to develop dementia and Alzheimer’s. If you have a partner,

they’ll be able to spot signs like loud snoring and stop-start breathing, gasping, or choking in the middle of the night. If you sleep alone, take note of increased daytime sleepiness, frequent night wakings, and morning headaches, and consider wearing a sleep tracker; a new Apple Watch feature, for example, can detect signs of apnea. The sooner the condition is diagnosed, the better off you’ll be.

