Biohack Your Brain

What’s in it for me? Six simple steps toward better brain health

The French philosopher Descartes thought the human brain was like a hydraulic machine. Later, scientists likened it to a telephone. Later still, it was compared to a computer. American neuroscientist Kristen Willeumier, by contrast, says the brain is more like a high-powered sports car. If you want your brain to fire on all cylinders, you need to give it regular maintenance and top-quality fuel. The brain isn’t a machine, of course. It runs on blood and sugar; it thrives when it’s hydrated and shrivels when it’s deprived of water. But the metaphor is a useful one. To get the most out of this remarkable organ, she suggests, we need to look at what’s going on under the hood. That’s the best way to spot issues, make timely repairs, and prevent blow-outs further down the road. And that’s just what we’ll be showing you how to do in these blinks. Along the way, you’ll also learn

how walking can make you more creative; what blueberries and sardines have in common; and why taking a deep breath or five prevents brain damage.

The brain is as complex as it is essential to human life.

The human brain is a mind-bogglingly complex thing. Every second, billions of messages are sent between brain cells called neurons. This neuronal activity generates real electricity – enough, in fact, to power a low-wattage light bulb. Give it 70 hours and the brain could charge a smartphone. The brain also stores vast amounts of data. On average, it holds the equivalent of 2.5 million gigabytes of digital memory. If all that storage space were taken up by recordings of television shows, you could watch TV continuously for three centuries. The brain isn’t just a passive storage device, though. It regulates every part of your conscious and unconscious life, from the loftiest thought down to the tiniest twitch. The key message here is: The brain is as complex as it is essential to human life. The adult brain contains 100 billion neurons. Each one of these brain cells is connected to around 10,000 other cells. Neurons transmit, or send, messages to each other through this network using gaps known as synapses. All in all, there are about 100 trillion individual connections between neurons. To put that into perspective, that’s more than 1,000 times the number of stars in our galaxy. As physicist Michio Kaku puts it, the brain is the “most complicated object in the known universe.” Now, the brain’s neuronal activity regulates all the things you do – all of your physical, mental, and emotional operations. Some operations are intentional. What you say and how you say it, for example, are deliberate cognitive acts. Others are automatic. You don’t consciously regulate your heart rate, but it happens anyway. Both kinds of operation are possible because neurons are firing messages across synapses. The brain coordinates these operations by “translating” sensory stimuli. Eyes, ears, noses, and tongues pick up information from the external world, but the brain controls what you see, hear, smell, and taste. This data is relayed from the body to the brain through the spinal cord, which is the second component of the central nervous system (the first component is the brain itself). Once this information has been processed, new messages are generated that allow your body to perform conscious and unconscious operations.

The brain, in short, is a vital tool, which is why you need to look after it. Like a knife, it works best when you keep it clean, sharp, and well-honed. So how do you do that? That's just what we'll be exploring in these blinks.

Good blood circulation supports brain growth throughout life.

The brain isn't set in stone – it's constantly changing. Adults lose thousands of brain cells every day as part of the natural aging process. Some people lose more than others, though. Stress, drugs, alcohol, and disease all speed this process up. That's the bad news. Here's the silver lining. Scientists used to think that lost cells couldn't be replaced, but the latest neuroscientific research shows they were wrong. Adults, it turns out, generate new brain cells well into their sixties, seventies, and even eighties. That doesn't happen on its own, however – you have to help this process along. The key message here is: Good blood circulation supports brain growth throughout life. Our understanding of the brain has come on in leaps and bounds in recent decades. Take neuroplasticity. We now know that the brain's structure changes throughout life in response to our experiences. If you practice the violin every day, for example, new neuronal circuits form in the parts of the brain associated with fine hand movement. Then there's neurogenesis – the creation of new brain cells. This growth occurs in the hippocampus, a seahorse-shaped structure in the brain's inner regions that regulate memory and learning. Fascinatingly, simple changes to everyday habits can stimulate neuron growth. Before we get to that, though, we need to talk about blood circulation. The brain accounts for just 2 percent of total body weight, but it requires around 20 percent of the body's blood supply. Why is that? Well, blood carries oxygen and glucose, or sugar – the fuel needed to keep all those neurons firing. Blood circulation also rinses away harmful substances like amyloid-beta protein – a compound linked to the development of Alzheimer's disease. In short, good circulation is vital to cognitive performance and health. If you're suffering from brain fog or finding it hard to concentrate, there's a good chance poor circulation is to blame. Luckily, small hacks go a long way here. One option is to take a walk. Short bursts of movement boost the circulation of blood to the brain, which is why exercise has been linked with greater creativity and the generation of new ideas. Next time you hit a mental block, do your brain a favor and go for a brisk walk around the block or your office. When you get back to your desk, make sure you're sitting up straight with your shoulders back and your neck long. That's the simplest way of keeping blood flowing to your brain.

Berries and seafood protect your brain against cognitive decline.

According to the World Health Organization, one in ten people over 65 live with dementia. Globally, that adds up to around 50 million people. The problem is getting worse, too. By 2050, that number is set to triple as the world's population ages. Given the lack of effective treatments, prevention is key. That stands to reason – cognitive decline typically begins years or decades before the onset of conditions like Alzheimer's. In the long run, small changes stack up, protecting you against debilitating neurological diseases. What kind of changes, though? Well, it's time to talk about diet and what it can do for your brain. The key message here is: Berries and seafood protect your brain

against cognitive decline. When it comes to diet, the scientific evidence is clear. Eat healthily and you're likely to live a longer, more active life. Nutritionists' advice is pretty intuitive. Load up on vegetables and legumes, choose whole grains rather than processed carbohydrates, and limit your consumption of dairy, meat, and sugar. Throw nuts, seeds, and olive oil into the mix and you've got a dietary framework that will serve your overall health. So far, so simple. What about the brain specifically? Let's zoom in on two food groups that have been shown to boost cognitive health and performance, starting with berries. In 2012, researchers at Harvard Medical School published the results of a 20-year dietary study of 16,000 adults aged 70 and older. Participants who regularly ate berries, they found, had much slower rates of cognitive decline than peers who didn't. In some cases, the difference was as large as 2.5 years. The researchers attributed these results to the remarkable properties of berries, which are packed with antioxidants – compounds that reduce inflammation and cell damage in the central nervous system. To get a taste of these brain-boosting benefits, aim to eat at least two portions of strawberries, blackberries, blueberries, or blackcurrants every week. Next up: healthy fats. The brain is 60 percent fat, so it's no surprise dietary fat plays an important role in cognitive performance. Fat makes up the brain's myelin sheaths – a layer of insulation around nerve fibers that enables neurons to transmit messages quickly and effectively. The best way to protect this part of your brain is to stock up on marine omega-3 fatty acids. Aim for two servings a week of "oily fish" and seafood like salmon, tuna, trout, mussels, oysters, herring, mackerel, or sardines.

A well-hydrated brain is a happy brain.

Your brain is like a high-performance sports car: it needs high-octane fuel to run properly. Of course, it's not gasoline that keeps your neurons firing – it's water. That's down to the brain's composition, which is 75 percent water by weight. To function optimally, it needs to stay at that mark. Losing just 1 percent of your body weight to water loss is like putting sand in the wheels – it jams everything up. The result? Fatigue, loss of focus, and slower reaction times. According to a Medical Daily report from 2013, however, three-quarters of all Americans are chronically dehydrated at any time. In other words, most people's brains aren't operating anywhere near as efficiently as they could be. Luckily, that problem is easy to fix. The key message here is: A well-hydrated brain is a happy brain. The human brain is 75 percent water – not milk, juice, iced tea, beer, or soda. Put differently, if you want to keep your brain well-hydrated, you have to drink plain old H2O. How much, though? Let's start by putting an old myth to bed: you need to consume plenty of water even if you don't live in a hot and humid climate. That's because your body expends large amounts of water even when it's at rest in a climate-controlled room. You lose one cup of water every day just by breathing. Another six cups are excreted in urine and feces. Perspiration adds another two cups to the tally. All in all, you lose close to five pints, or just over two liters, of water every 24 hours simply by being alive. When you fail to replace lost water, your brain suffers. Mild dehydration causes brain fog and tiredness. Chronic dehydration can result in more extreme symptoms like dizziness, short-term memory loss, irritability, splitting headaches, and impaired vision. Which brings us back to the all-important question: how much water is enough to keep your brain at peak performance? In short, it depends. If you spend the day cycling in the mid-summer heat you'll need to drink more than you would if you were working in a cool office. A good rule of thumb, though, is that men should consume between seven and eight pints a day while women should aim for five to six pints. That's 3.7 and 2.7 liters respectively. Hit those targets and your brain will thank you.

Give your mind a mental workout and it’ll be healthier and stronger.

Muscles respond to training. Lifting weights causes the biceps to grow; swimming strengthens abdominal muscles; running adds bulk to the quadriceps. The brain isn’t a muscle, but it can be exercised. Give your gray matter a workout and it will become more powerful. This happens in a couple of different ways. Frequent training rewires the brain, establishing new connections between different regions of the neuronal network. That’s neuroplasticity. Exercise also supports neurogenesis, or the growth of cells. There isn’t a one-size-fits-all cognitive fitness regimen, however. Different neurological “muscles” require different kinds of workouts. The key message here is: Give your mind a mental workout and it’ll be healthier and stronger. What kind of mental exercises give your brain a boost? Well, it depends on your goal. Let’s start with a workout that trains your intelligence. Intelligence isn’t a single thing – we all have three different kinds of intelligence. There’s crystalized intelligence, for example – the accumulation of knowledge, facts, and know-how. Fluid intelligence is your ability to solve unfamiliar problems using reason. And, finally, there’s emotional intelligence, which is your capacity to navigate social life and interpersonal relationships. According to a landmark study published in the journal Science in 2013, reading long-form narrative fiction boosts all three forms of intelligence. That’s because it trains different “muscles” simultaneously. It adds to your stock of knowledge, invites you to solve puzzles, and trains you to see the world empathetically through other people’s eyes. More interested in improving your memory? Your best bet is picking up a new word every day. A large vocabulary is linked with greater cognitive efficiency and learning words gives the parts of your brain associated with visual, auditory, and memory processing a workout. If you want to grow new brain cells, try getting creative. When you write stories, poems, songs, love letters, or diary entries, your hippocampus grows new neurons. That’s down to the fact that creative tasks challenge your brain to come up with new words and ideas. Like lifting weights, the strain tells you that your brain is working hard. How about boosting your attention span? According to a 2019 study published in the International Journal of Geriatric Psychology, people who regularly solve jigsaw and sudoku puzzles have cognitive capabilities similar to people ten years younger. Why is that? Simple: unlike computerized brain games, which usually have a specified time limit, you can easily spend hours immersed in a difficult puzzle or numbers game.

Breathing exercises can help you beat stress.

Stress is a normal psychological and physical response to pressure and danger. When you feel stressed, your brain produces biochemicals essential to survival – literal and metaphorical. Adrenaline, for example, allows you to outrun predators and fight off assailants. It’s also what keeps you working through the night to meet tight deadlines. Too much stress, however, is a danger to your health. It wears down your brain, robbing you of the cognitive tools you need to master challenges. The key message here is: Breathing exercises can help you beat stress. Stress takes different forms. Regular stress, like that adrenaline-fueled night of work to meet a deadline, takes its toll on the brain, but it doesn’t make the wheels come off. Chronic stress, by contrast, is like

driving a car cross-country with a frayed timing belt, leaking pipes, and a shot alternator: it's only a matter of time before the engine blows. From a neurological point of view, stress is a killer. It halts the growth of new cells, decimates existing neurons, and shrinks gray matter. In the short term, it destroys your ability to think clearly. In the long run, it increases your risk of degenerative conditions like dementia. Unfortunately, stress is a vicious circle. Cortisol, the "stress hormone," increases the size of the amygdala, an almond-shaped group of neurons in the inner brain that attaches emotions to memories and ideas. The larger the amygdala, the more anxious you become, which in turn makes you more susceptible to stress. That triggers even more cortisol production. You can escape this trap, though. Let's take a look at one of the most effective stress-busting tools out there – deep breathing. It rapidly lowers cortisol levels and brings down your heart rate and blood pressure, taking you from crisis to calm within seconds. Best of all, it's easy to learn. Start by closing your eyes, placing one hand on your stomach and the other over your heart. Now take a deep breath through your nose and bring the air down toward your stomach while counting to six. Hold this breath for a count of three before slowly exhaling as you count to six again. Repeat this exercise five to ten times, open your eyes, and enjoy your new and calmer perspective on the world!

Negative thoughts rewire the brain – for the worse.

We have over 60,000 thoughts a day, and most of them are negative. Take it from a 2013 study conducted at Harvard University. When researchers asked participants if they experienced more positive or negative thoughts, most said they experienced more of the former – the positive kind. When they were asked to keep track of their thoughts, however, it turned out that between 60 and 70 percent were negative. Follow-up studies put that number as high as 90 percent. What's going on here – are humans just hardwired to be pessimistic? Not really. In fact, emerging neuroscientific research suggests that negativity is bad for both our mental and neurological health. The key message here is: Negative thoughts rewire the brain – for the worse. Every thought creates new neural pathways, and negative thoughts create negative neural pathways. This rewiring process enlarges the amygdala – the brain's fear center. As a result, we store more experiences as bad memories, which causes us to become fearful and stressed in more situations. Negative thinking has also been linked with the shortening of protective caps at the end of chromosomes called telomeres. The shorter this cap is, the faster cells age. The psychological effects of negative thinking are just as profound. Thoughts shape our emotions, and emotions drive decision-making. If we "train" our brain to be negative, we're likely to make bad situations worse. Pessimism, after all, often means overlooking opportunities to improve things. So how can you avoid the pitfalls of negative thinking? A good place to start is to record your mental chatter. Keep a journal and record as many thoughts as possible, especially those that trigger a change in mood. After a week, reread your journal and look for patterns. Are you telling yourself you'll always be alone, for example, or that you'll never find a new job? Do they occur in particular contexts, like work, or with particular people, like certain friends? Once you've identified a common negative thought, write down all the reasons it might be true. Now list all the evidence you can find that it might be wrong. Say you're scared of always being alone. Well, you might meet someone tomorrow, or develop a new life-defining friendship, or decide to live with your family during this particular stage of your life. When you approach negative thoughts in this rational manner, they lose their

sting. Oftentimes, it’s not reality that’s getting you down – it’s an emotional overreaction. Remind yourself of that next time one of those niggling thoughts floats into your mind and you’ll start feeling a lot more positive about things!

Final summary

The key message in these blinks is that: The brain is one of the most complicated objects in existence. It’s also our most essential asset, controlling everything from our heartbeat to conscious thoughts and actions. It might be able to do a lot on its own, but we can’t take it for granted – we have to look after it. How? Adopt a brain-forward diet, drink lots of water, give your gray cells a regular workout, and practice stress-busting breathing techniques, and you’ll be well on your way to neurological health. And here’s some more actionable advice: Keep an eye on your own hydration levels. Hydration is key to cognitive performance. Without water, your brain just can’t function properly. As we’ve seen, everyone needs different amounts of water to achieve that goal. How, though, do you know if you’re getting enough H2O? Simple: take a peek in the toilet. If your urine is a light straw color or clear, you’re properly hydrated. If it’s darker than a light honey, you’re dehydrated and need to drink water.