



The Healthy Brain

Learn to take charge of your brain's chemistry

“If the human brain were so simple that we could understand it,” a brilliant physicist once quipped, “we would be so simple that we couldn’t.”

The full workings of the human brain will probably always defy comprehension. But scientists have come to understand a great deal about the chemicals that make this extraordinary engine run. Knowing what these chemicals are and how diet, exercise, and other lifestyle factors can affect them enables you to make changes to help your brain be at its best.

I hear a symphony

Your brain is composed of 100 billion neurons that interact through a constantly evolving series of connections called synapses. It sends instructions to neurons by releasing two different types of chemicals: neurotransmitters and neuromodulators. The former relay signals back and forth between synapses, while the latter convey more general communications to regions that control specific physical and mental functions. Among the most significant of your approximately 200 neurochemicals are serotonin, glutamate, dopamine, acetylcholine, noradrenalin, and endorphins.

Scientists describe these chemicals as working separately yet harmoniously, like instruments in an orchestra. Each one plays a different tune, directing different elements of your physical and mental being. In concert, they enable mind and body to operate as one fluid, functioning whole.

A delicate balance

Any good orchestra needs a conductor. The mind’s maestro is serotonin, a powerful molecule that regulates all other neurochemicals. Its role is to maintain the delicate homeostatic balance that ultimately means the difference between health and illness. For example, a deficiency in dopamine is associated with Parkinson’s disease and addiction; loss of acetylcholine has been linked to Alzheimer’s disease; and a lack of serotonin itself can cause depression and other mood disorders.

Having healthy brain chemistry starts with tryptophan, the essential amino acid required to manufacture serotonin. Along with sufficient sleep and proper stress management, consuming high-quality protein and foods high in B vitamins is the best way to ensure effective tryptophan metabolism.

Having healthy brain chemistry starts with tryptophan, the essential amino acid required to manufacture serotonin. Along with sufficient sleep and proper stress management, consuming high-quality protein and foods high in B vitamins is the best way to ensure effective tryptophan metabolism. But that isn’t always how people get their tryptophan.

Many find themselves craving sweet and starchy carbohydrates that increase production of insulin, a hormone that helps stimulate higher serotonin levels by eliminating other amino acids that compete with tryptophan to enter the brain. Giving into such cravings isn’t healthy in the long run, however, since it can

lead to obesity and related health issues. Try to eat five or six small meals -- always including protein and fiber -- at regular intervals during the day. This will help stabilize blood sugar levels while also delivering much-needed tryptophan to your brain.

A glut of glutamates

Glutamate is the most common neurochemical. The brain releases it in minute quantities and then promptly re-absorbs it to transport signals from neuron to neuron. You might recognize the name from its synthesized chemical form, monosodium glutamate, MSG for short. Some health experts believe MSG also spells trouble for human health. Whereas natural glutamates found in whole foods are bound with protein and digested slowly, this additive is completely unattached to any other protein. As a result, the body swiftly absorbs it, causing a rapid rise in glutamate levels.

An unusually high level of glutamates in the bloodstream can make neurons misfire, sparking a host of physical and mental health problems. So the safest course of action may be to avoid MSG -- which is ubiquitous in canned, fast, and takeout foods -- altogether. You can find many MSG-free soups, sauces, and seasonings in health-food and organic-food stores.

Let's get physical

Exercise, like diet, also alters brain chemistry by stimulating production and secretion of noradrenalin (norepinephrine) and endorphins, along with serotonin. Noradrenalin elevates heart rate and blood pressure to boost oxygen to the brain and tissues, helping you think and function better. Endorphins strengthen the immune system, reduce stress, relieve pain, and slow down the aging process. Their effect is similar to morphine, evoking feelings of euphoria. That's why the sensation associated with an exercise-induced surge of endorphins is known as a "runner's high."

It takes moderate- to high-intensity physical exertion to increase production of noradrenalin, endorphins, and serotonin. This activation process may be related to helping the lungs when breathing becomes difficult or refuelling the muscles once their stored energy has been used up. Workouts most likely to raise your levels of noradrenalin, endorphins, and serotonin include running, brisk walking, aerobics, bicycling, swimming, and sports such as soccer and rugby.

The dope on dopamine

From the perspective of evolutionary biology, dopamine may be the most important neurotransmitter of all. It compels you to eat, have sex, and pursue other patterns of behavior critical to survival by giving you your sense of motivation and reward. But the release of dopamine can also be triggered by negative behaviors such as drug-taking and aggression -- especially in those with a dopamine imbalance (a recent study showed psychopaths actually experience four times the normal level of dopamine arousal when they get what they want).

For most people, the simplest and healthiest way to regulate dopamine levels is through social connection. Feelings of acceptance and belonging provide more motivation, pleasure, and reward than anything else.

For most people, the simplest and healthiest way to regulate dopamine levels is through social connection. Feelings of acceptance and belonging provide more motivation, pleasure, and reward than anything else. As evidence, consider how children, pets, and even adults can often be trained through positive reinforcement alone, without resorting to incentives like food or money. The right measure of dopamine will help increase your capacity to learn and mental alertness, as well as motivate you to work hard to accomplish your goals.

Your brain forms and stores your every thought, emotion, and memory, on top of controlling all your other organs. So be good to your brain: do your part to keep its chemistry balanced. It is, after all, the only one you'll ever have.