



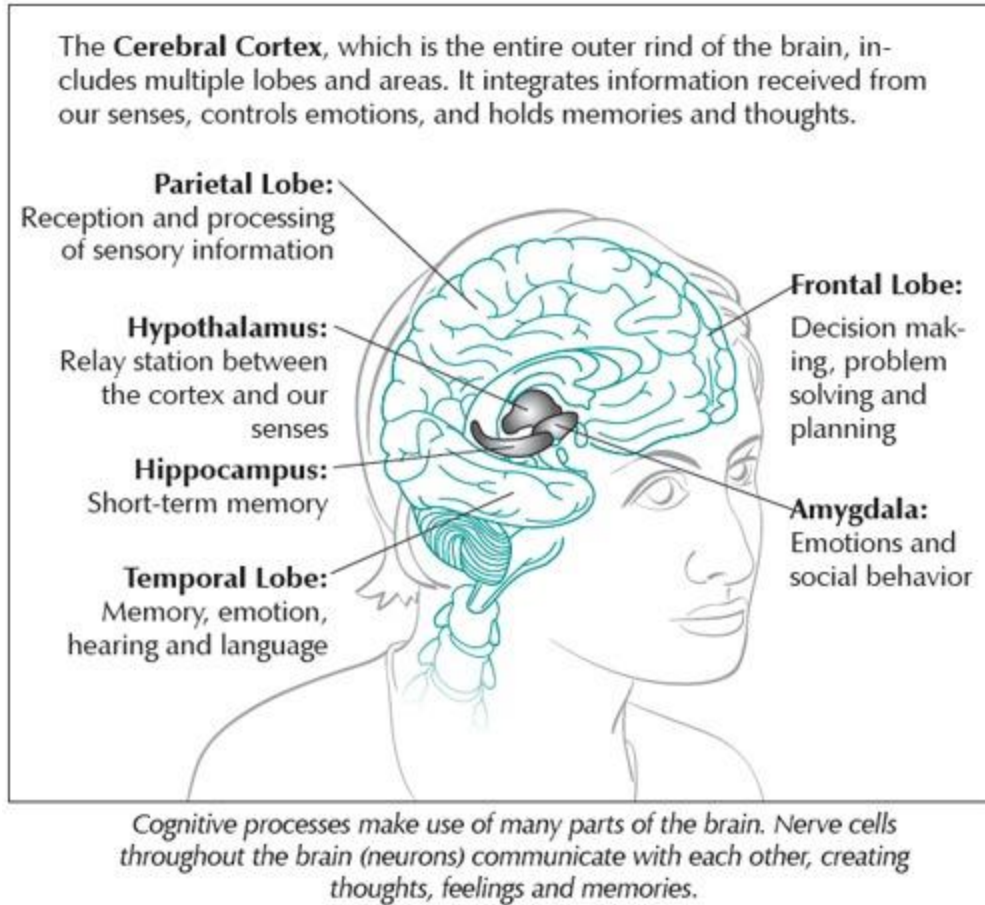
Thanks to advances in modern medicine, we are living longer than our predecessors. "We're also finding that living longer does not necessarily bring happiness because "quality of life" depends on being healthy--both in mind and body.

For many people, their greatest fear is losing their mind or memory as they age. The good news is that current research indicates that we can effectively improve brain health, even in our later years.

The Brain is Our Most Valuable Asset

The brain is the largest organ and, many people would argue, also the most important one. In *Your Miracle Brain*, Jean Carper states that "Unquestionably, the brain is our most precious physical possession, the seat of our entire being--our intelligence, personality, our humanity, our mind, our soul. Nothing is more central to a successful and fulfilling life than an optimally functioning brain." And yet, even with today's emphasis on health and fitness, the public has seen very little on how to improve or maintain brain health. It seems that the brain has been overlooked.

For decades we have been bombarded with information on heart health, especially on what to eat (or not to eat) to keep our hearts healthy and functioning well. But what about the brain? It is also significantly affected by what we eat. Carper explains that "brain cells are even more sensitive than other body cells to nutrients and dietary chemicals which determine at any moment how your brain functions or malfunctions."



How the Brain Works

Dr. Gayatri Devi states that "The brain is the most fascinating and least understood organ in the entire body." There is much we don't know about how the brain works, but a basic understanding of what we do know is necessary to discuss brain health.

The different components of the brain play various roles, and are illustrated at right,

The components that make up the brain consist of trillions of nerve cells called **neurons**. Each neuron has branch-like tentacles, called **dendrites**, for receiving information and a tail-like tentacle, called an **axon**, for sending information. The dendrites and axon of one neuron reach over to, but do not quite touch, other neurons. The gaps or spaces between the neurons are called **synapses**. Each neuron has many dendrites and synapses, providing a huge number of potential connections.

Brain cells communicate with each other by releasing chemicals, called **neurotransmitters**, which travel over the synapses to relay information between brain cells. Neurotransmitters relay every thought and feeling we experience. Dr. Edward Klaiber explains that neurotransmission is "the scientific name for the brain processes that determine how we think, feel, and behave, and how we function as sexual beings."

Researchers know that there are many different kinds of neurotransmitters, but have identified only about 50 of them so far. Some of the most common are acetylcholine, adrenaline (epinephrine), noradrenaline (norepinephrine), dopamine, serotonin, glutamate and GABA. Dr. Devi explains that these chemicals "either excite or depress the cells they reach" and that they exist in an intricate balance "in the ocean that is our brain, constantly being released and broken down."

The different parts of the brain produce different types of neurotransmitters and, in turn, also respond differently to the various neurotransmitters, depending on a variety of factors.

For example, neurotransmission can be weak or strong, depending on the quantity and quality of neurotransmitter molecules, how well those molecules bind to their receptors, and whether or not there are enough receptors present. Current research indicates that each of these factors is affected by diet, exercise, hydration, and hormone balance.

When brain cells do not get the nutrients they need, neurotransmitter production and processing is affected almost immediately -- activity level and thought processes begin to slow down. On the other hand, when brain cells get too much glucose (a primary brain nutrient), we experience an immediate "sugar high" in which both our body and brain go into overdrive, for a short time, usually followed by a commensurate "crash" or low period. Optimal conditions for neurotransmission provide the basis for healthy mental functioning.

Long-term or chronic imbalances, especially hormone imbalances, can lead to serious problems. Dr. Claire Warga identifies a broad array of brain-related symptoms associated with what she calls a "hormonal misconnection syndrome," including:

- **Changes in thinking** such as losing your train of thought and trouble prioritizing.
- **Speech changes** such as difficulty remembering the names of places or people you have known for a long time, and relying on "filler" words like "you know what I mean" when trying to express yourself.
- **Attention changes** such as being more distracted or listening but not really hearing.
- **Memory changes**, both short- and long-term, such as taking longer to retrieve memories, doing so with less accuracy, and forgetting something you just did.
- **Behavioral changes** such as briefly forgetting how to do something you once knew.
- **Altered sense of time**, including forgetting appointments or events of personal importance.
- **Spatial skill changes** such as briefly forgetting how to get to familiar places or known landmarks.

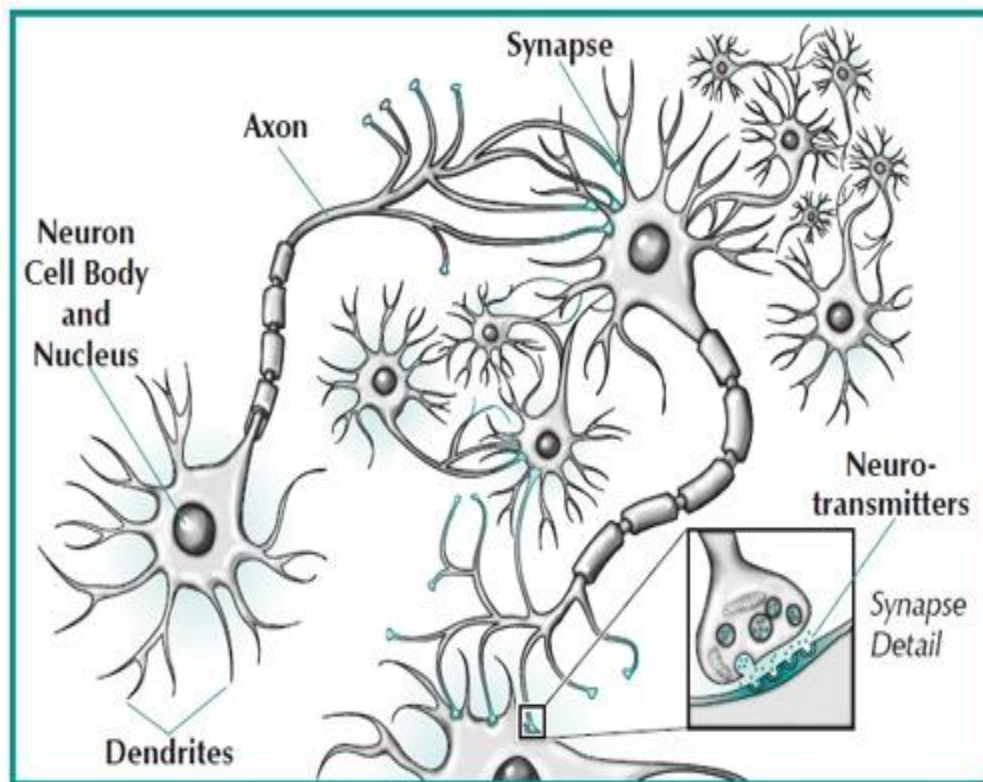
Cognition and Memory

Deteriorating brain health is usually diagnosed based on problems with cognition or memory. Elisa Lotter explains that cognition includes memory, and is "a general term that refers to the ability to know, which includes all types of perceiving, recognizing, thinking, learning, reasoning, problem solving, imagining, mental clarity, and the ability to concentrate and focus." Cognition also includes verbal memory, visual/spatial memory, speech and language skills, and higher-order intellectual thinking.

Dementia (sometimes referred to as senility) is the gradual deterioration of cognition such that it interferes with daily living. It is caused by diseases that affect the brain, and is not necessarily the outcome of aging. Dementia can influence all aspects of mind and behavior, including memory, judgement, language, concentration, visual perception, temperament, and social interactions.

Memory loss is one of the most common complaints and fears of aging. As we age, we typically need more time to remember things and our ability to concentrate tends to diminish. This is called Mild Cognitive Impairment (MCI), and can be exacerbated by poor nutrition, dehydration, and hormone imbalances, among other things. Even though MCI is "normal" and may not seriously affect daily living, there is some evidence that people with MCI over the age of 65 are likely to develop Alzheimer's disease within five years. However, most experts agree that Alzheimer's is a distinct disease and not necessarily the inevitable end result of the normal aging process.

So, how do you know if memory loss is age-related or a precursor to Alzheimer's disease? The Alzheimer's Association provides detailed information to help determine if you or someone you know should be evaluated. Visit www.alz.org for the most up-to-date information.



Nerve cells in the brain, called neurons, communicate with each other using a chemical process called neurotransmission. This process determines what we think, how we feel, what we remember, and how we behave—in essence, who we are.

Hormone Balance and Brain Health

Women going through menopause often exclaim "I feel like I'm losing my mind!" Ongoing research demonstrates that there is ample reason for their concern -- a hormone imbalance can wreak havoc on brain chemistry and communication between brain cells (i.e., neurotransmission). According to Dr. Klaiber, "Estrogen, progesterone, testosterone, and the thyroid hormones are as essential to our moods and cognitive abilities as food-based nutrients are to our basic cellular function."

In fact, concentrations of the estrogens, progesterone, pregnenolone, testosterone, DHEA and other hormones can be higher in the brain than in the bloodstream. Research indicates that nerve cells in the brain (and central nervous system) are actually producing their own supply of these hormones (i.e., "neuro-steroids"), independently of hormone production by the ovaries, testes and adrenal glands.

Because hormones are often more concentrated in the brain, any hormone imbalance can affect brain function dramatically. In *The Hormone Solution*, Dr. Thierry Hertoghe notes that deficiencies in cortisol, DHEA, estrogen hormones, melatonin, pregnenolone, testosterone, thyroid, and vasopressin exhibit the most common brain-related symptoms, including memory loss, poor concentration, and confusion."

Chronic medical conditions, especially those linked with a hormone imbalance, typically also have a profound impact on brain health and often lead to memory problems. Conditions commonly associated with memory loss are depression, arteriosclerosis, blood sugar problems, chronic fatigue syndrome, fibromyalgia, allergies, and infections such as candida. All of which are also often associated with a hormone imbalance."

Specific hormones and their effects on the brain, cognition and memory are further described below."

Estrogens

The estrogen hormones--primarily estrone, estradiol (the most abundant) and estriol--offer significant health benefits for women. Dr. Dominique Toran-Allerand states (in *Warga's* book) that "the brain is a major target organ of estrogen," so it is no surprise that the estrogens have such profound effects on brain health, in both men and women, including:

- Promoting networking between brain cells by increasing the number of dendritic branches, and keeping them strong and well-defined, which also increases the number of potential synapses.
- Increasing levels of the mood-regulating neurotransmitters, including acetylcholine, serotonin, and noradrenaline.
- Increasing the density of neurotransmitter receptors, thereby promoting better neurotransmission and mental well-being.
- Maintaining nerve cell health by encouraging nerve growth and preventing the accumulation of free radicals.
- Helping to prevent brain damage by reducing inflammation and promoting brain cell repair

when damage occurs.

- Promoting brain vibrancy by increasing blood flow to the brain, which increases the oxygen and glucose available.

Dr. Barbara Sherwin has conducted numerous studies of the effects of hormones on cognitive function, especially in older women. She reports that "several studies have shown that estrogen replacement therapy reduces the incidence of Alzheimer's disease in older women." She also states that "What estrogen seems to do is to prevent some of the decline in the ability to learn and remember new material after menopause." Dr. Phyllis Bronson observes that estradiol, specifically, seems to exhibit the greatest influence on retaining brain health

Testosterone

Certain hormones, such as testosterone, may also influence our ability to perform different types of thinking tasks. According to Dr. Hertoghe, studies show that men and women "who have better spatial memory (which allows precise movements in space, such as handling tools or dancing) have higher levels of testosterone than their peers. Women who excel in mathematics have also been found to have high testosterone levels.

In both men and women, testosterone fortifies muscles, arteries, and nerves, including those in the brain (although it has a more profound effect in men, whereas estrogen has a more profound effect in women). Without enough testosterone, Dr. Hertoghe explains that "the arteries in the brain weaken, growing too soft in some places (increasing the risk of blood clots and stroke) and too stiff in others (increasing the risk of high blood pressure and cerebral hemorrhage)--none of which is good for the memory! When the arteries of the brain wear out, blood can no longer properly circulate there or to any organ. When the resulting lack of oxygen and nutrients to the brain is chronic, memory weakens."

Thyroid

Thyroid hormones also have significant effects on thought processes and memory. Dr. Hertoghe explains how: "In the brain's gray matter, where thinking takes place, the blood begins to flow more slowly as thyroid levels decline. As a result, less oxygen and fewer nutrients reach the brain cells, the brain becomes malnourished, and the brain's owner thinks and moves less. Without enough thyroid hormones, the number of connections (dendrites and synapses) between the brain cells decreases, weakening the brain cells."

Fortunately, this process can be reversed with proper treatment. Taking thyroid hormones typically accelerates blood flow to and throughout the brain. Correcting the imbalance provides the neurons with sufficient oxygen and nourishment, which gradually improves neurotransmission, typically leading to clearer thinking and better memory."

Pregnenolone

Dr. Hertoghe calls pregnenolone "the memory hormone" because of its astounding ability to improve memory. Research has shown that pregnenolone works as a neurotransmitter to clarify thinking, promote concentration, and prevent memory loss. One of its more unusual effects,

according to some patients, is that it seems to intensify color perception.

Pregnenolone is the most abundant hormone in the brain, and is concentrated about 75 times greater in the brain than in the blood. It serves as a precursor to many of the other hormones, so even a slight deficiency can have a domino effect on other hormones.

How to Improve or Maintain Brain Health

We used to think that brain cells grew as we developed, leveling off at some point in our adulthood, and then declining as we aged. That notion was recently replaced with the realization that brain cells are continually changing, growing new dendrites and receptors, and creating new synapses. Carper states that "even adult brains can grow brand new cells! ... For the first time in human history, scientists are beginning to understand how profoundly a person can influence the factors that control brain functioning Ñ through food, supplements, and simple lifestyle changes, including mental and physical exercise."

Dr. Dharma Singh Khalsa also uses a multifaceted approach and believes that an "optimal brain" is the result of a series of personal choices. While he has been able to restore memory and cognition, and even enhance mental functioning in dedicated patients looking for "super learning capabilities," he believes that most memory problems are not really "memory loss Ó but rather a result of the brain's inability to create a strong memory in the first place."

Most experts agree that it is never too late to start improving your brain health. To help keep your brain sharp:

- Become a lifelong learner. Exercising your mind is the most important thing you can do to build and maintain brain health.
- Partake in regular physical exercise at least three to five times per week. The increased oxygen and blood flow help improve memory, even in those who already show signs of dementia.
- Maximize nourishing foods and minimize anti-nutrients, including:
 - Eating a healthy diet that is rich in antioxidants to reduce the amount of free radical damage to your brain tissue. If necessary, take a multivitamin or supplement to avoid deficiencies.
 - Getting enough omega-3 essential fatty acids, which are found in cold water fish such as salmon and have beneficial effects on brain cell structure.
- Avoid smoking and excessive alcohol consumption, which are toxic to the brain and other body cells.
- Maintain optimal hormone balance to keep neurotransmitters nourished and functioning well.
- Recognize that you are an ever-changing but integrated whole, not just a collection of body parts that can be treated or maintained separately.

As Dr. Dharma promotes, when you take care of your "whole" selfÑmind and bodyÑyou are more likely to live a longer life, and a richer, more productive one as well.