

What are some of the best foods, nutrients or herbs to help improve your brain function?

By Kim Balas

Once upon a time it was believed that the brain doesn't grow as people get older. New research, however, has shown that the brain cells continue to branch out and make connections throughout a person's life. Eating the right diet can help the brain make the right connections - at all ages.

Studies have repeatedly shown that there is a relationship between how we think, act and learn and what we eat. The brain needs fuel to function optimally and if we are putting in junk then we get "junk" thoughts. The brain uses 20-25% of the total energy a person consumes so the better fuel you put in the better it works. The right foods can help you concentrate, stay motivated, and improve your memory. The brain is the most vital of organs and gets the first priority of nutrients in the blood. Memory depends on all of the connections between cells or cellular communication. These nerve cells have tiny feelers called axons and dendrites and they connect with other cells. These are like interstates that get you from one place to another with exits and stops along the way. The chemicals that act as bridges that would go over water and gaps are neurotransmitters. Feeding the neurotransmitters with the right substances and preventing chemicals from blocking how they work achieves optimal brain function. Good nutrients especially essential fatty acids are needed in order not to have delays in nerve-impulse transmission. *The neurotransmitters*, such as serotonin, dopamine, and norepinephrine, carry messages from one cell to the other and affect mood as well as thoughts and actions. Some of the nutrients in the food we eat become part of the neurotransmitters that help us think. Neurotransmitters act as the food-mood connection. Each one of these three parts needs specific nutrients to enable the whole circuit to function properly. If any of these areas are deficient in nutrients, the circuit, like a defective electrical wire, misfires.

Using fiber to help with carbohydrate absorption for fuel will help maintain blood sugar levels and keep the brain working optimally. Stress hormones necessary to mobilize these energy reserves may create feelings of irritability, fatigue and hyperactivity or inability to focus.

There are two types of proteins that affect neurotransmitters: 1) neurostimulants, such as proteins containing tyrosine, affecting the alertness transmitters dopamine and norepinephrine, and 2) calming proteins that contain tryptophan, which relaxes the brain. Balancing both of these help with brain function, mood and behavior. Eating complex and low glycemic carbohydrates along with proteins helps to usher the amino acids from these proteins into the brain, so that the neurotransmitters can work better.

Complex carbohydrates and proteins act like biochemical partners for enhancing learning and behavior. Some studies show:

Nutritionally balanced plans are likely to help with brain function in many ways. Breakfast eaters achieve higher grades, pay closer attention, participate more in class discussions, and manage more complex academic problems than breakfast skippers.

Foods poor in nutrients are more likely to create inattentive, sluggish behavior. Not starting out with nutrient dense foods or sugary foods are more likely to show erratic eating patterns throughout the day, eat less nutritious foods, and give into junk-food cravings. They may crave a mid- morning sugar fix because they can't make it all the way to lunchtime on an empty fuel tank.

Children eating high calcium foods for breakfast (e.g., dairy products) showed enhanced behavior and learning.

Morning stress increases the levels of stress hormones in the bloodstream. This can affect behavior and learning in two ways. First, stress hormones themselves can bother the brain. Secondly, stress hormones such as cortisol increase carbohydrate craving throughout the day. The food choices that result may affect behavior and learning in children who are sensitive to the ups and downs of blood sugar levels.

How you think, act, and learn is affected not only by the types of food you eat, but also by how the food is prepared, how and when you eat it, and what foods you eat together.

The right carbohydrates are not the enemy. The brain needs carbohydrates, utilizing 20 percent of the body's carbohydrate supply. It is however selective about the type of sugars it craves and how it processes them. The brain works better with a steady supply. When the brain receives a steady supply of sugar for fuel, it does what it is supposed to do at a steady pace and without altering moods or creating stress on other parts of the body. But when levels of sugar in the blood fluctuate, the brain doesn't get its steady fuel supply and behavior and learning become more erratic.

Refined sugar does affect behavior and brain function. Most scientists discount the relationship between sugar and behavior, especially when Attention Deficit Hyperactive Disorder (ADHD) is present.

Different sugars affect the brain in different ways. Refined sugar enters the bloodstream quickly, reaching high levels in a short time. This triggers the release of large amounts of insulin, the hormone needed to escort the sugars into the body's cells. These sugars are used rapidly, and when they're all used up, the blood sugar level plunges to a sugar low, or hypoglycemia. The low blood sugar triggers the release of adrenal hormones (called a "sugar high") that squeezes stored sugar from the liver, sending blood sugar levels back up. This blood sugar roller-coaster affects moods and concentration in some children and

adults, leading to "sugar highs "and "sugar blues." The ups and downs of blood sugar and adrenal hormones can also stimulate neurotransmitter imbalance, causing you to feel fidgety, irritable, inattentive, and even sleepy.

The best sugars for the brain are complex carbohydrates. Starches and fruit sugars (fructose) do not cause the roller-coaster mood swings that the junk sugars do. The molecules in complex carbs are long, so it takes longer for the intestines to break them down into the simple sugars the body can use. Thus, they provide a time-release source of steady energy rather than a sudden surge followed by a sudden drop. Foods with a low glycemic index do not push the pancreas to secrete so much insulin, so the blood sugar tends to be steadier.

The company a food keeps and how it is prepared also affects the G.I., or how fast and steady the sugar enters the brain.

Snacking is good. When blood-sugar levels go down, stress hormones kick in to raise it up again, but this can cause behavioral problems and diminished concentration. To smooth out the blood-sugar mood swings, protein or essential fatty acid snacks are beneficial.

The right kinds of high proteins are beneficial. Proteins in the diet affect brain performance because they provide the amino acids from which neurotransmitters are made. Think of neurotransmitters as biochemical messengers that carry signals from one brain cell to another. The better you feed these messengers, the more efficiently they deliver the goods. Some neurotransmitters are neuron turn-ons that perk up the brain. Others have a calming or sedative effect.

The two important amino acids, tryptophan and tyrosine, are *precursors* of neurotransmitters, the substances from which neurotransmitters are made. Tryptophan is an essential amino acid, meaning the body does not make tryptophan; it must be gotten from the diet.

Tyrosine, on the other hand, is not an essential amino acid because the body can make it if there is not enough in the diet. So, it seems that dietary deficiency is more likely to affect tryptophan than tyrosine. These two amino acids influence the four top neurotransmitters - *serotonin*, which is made from the amino acid tryptophan, and *dopamine*, *epinephrine*, and *norepinephrine*, which are made from the amino acid tyrosine. Serotonin is the neurotransmitter that relaxes the brain, the other three, collectively known as catecholamines, are neurotransmitters that rev up the brain. Anti-depressant drugs like Prozac work by increasing the amounts of serotonin in the brain. Since carbohydrates favor serotonin production, perhaps carbo-cravers self-medicate to increase their own serotonin.

Two factors influence whether the brain perks up or slows down following a meal: the ratio of protein to carbohydrate, and the ratio of the amino acids tryptophan and tyrosine. Following the blood type diet and using 25% protein and 75% low

glycemic green foods along with the good fats create the perfect biochemical balance not only for brain function but for total health.

A low fat diet is not the best choice. Good fats are essential for memory, concentration and all brain activities. Fats are major components of the brain cell membrane and the myelin sheath around each nerve. It's not only the amount of fat that's important for growing brains, it's the type of fat - such as DHA. DHA is the primary structural component of brain tissue. A deficiency of DHA in the diet could translate into a deficiency in brain function. In fact, research is increasingly recognizing the possibility that DHA has a crucial influence on neurotransmitters in the brain, helping brain cells better communicate with each other. Asian cultures have long appreciated the brain-building effects of DHA. In Japan, DHA is considered such an important "health food" that it is used as a nutritional supplement to enrich some foods, and students frequently take DHA pills before examinations.

DHA is the primary structural component of brain tissue, so it stands to reason that a deficiency of DHA in the diet could translate into a deficiency in brain function. In fact, research is increasingly recognizing the possibility that DHA has a crucial influence on neurotransmitters in the brain, helping brain cells better communicate with each other. Asian cultures have long appreciated the brain-building effects of DHA. In Japan, DHA is considered such an important "health food" that it is used as a nutritional supplement to enrich some foods, and students frequently take DHA pills before examinations.

Research findings on DHA:

Infants who have low amounts of DHA in their diet have reduced brain development and diminished visual acuity.

The increased intelligence and academic performance of breastfed compared with formula-fed infants has been attributed in part to the increased DHA content of human milk.

Cultures whose diet is high in omega 3 fatty acids (such as the Eskimos who eat a lot of fish) have a lower incidence of degenerative diseases of the central nervous system, such as multiple sclerosis.

Experimental animals whose diets are low in DHA have been found to have smaller brains and delayed central-nervous-system development.

Some children with poor school performance because of ADD, have been shown to have insufficient essential fatty acids in their diet.

Good Fats/Bad Fats – Human breast milk, DHA, coldwater fish, sardines, salmon, tuna, flaxseed oil, fermented soy are all good brain building fats. Chemically altered fats, especially hydrogenated or partially hydrogenate produce trans fats which affect brain function negatively. They enter the cells of the central nervous system where they may compete with the action of natural fats, so that the nerves in the brain don't function as well as they were designed

to. Also, hydrogenation turns unsaturated fats into saturated fats, in which the fat molecules pack together tightly, like lard. The same type of packing could occur in blood vessels, compromising the blood flow to the brain.

Fats make up sixty percent of the brain and the nerves that run every system in the body. It is just necessary to have the right kinds of fats.

The brain is in control of sending chemical messengers throughout the body and telling them what to do. Prostaglandins initiate the body's self-repair system. The body needs two kinds of fat to manufacture healthy brain cells (the message senders) and prostaglandins (the messengers). These are omega 6 fatty acids (found in many oils, such as safflower, sunflower, corn, and sesame oils) and omega 3 fatty acids (found in flax, pumpkin seeds and walnuts, and coldwater fish, such as salmon and tuna). The foods from which oil can be extracted are generally the foods highest in essential fatty acids.

Most important to brain function are the two essential fatty acids, linoleic (or omega 6) and alpha linolenic (or omega 3). These are the prime structural components of brain cell membranes and are also an important part of the enzymes within cell membranes that allow the membranes to transport valuable nutrients in and out of the cells. When the cells of the human body - and the human brain - are deprived of the essential fatty acids they need to grow and function, the cells will try to build replacement fatty acids that are similar, but may actually be harmful. Higher blood levels of "replacement fatty acids" are associated with diets that are high in hydrogenated fats and diets that contain excessive amounts of omega 6 fatty acids. Levels of replacement fatty acids have been found to be elevated in persons suffering from depression or Attention Deficit Disorder. A diet rich in omega 3 fatty acids (such as the LNA from flax oil or the EPA and DHA from fish oils) not only provides the body with healthy fats, but it also lowers the blood level of potentially harmful ones, such as cholesterol and, possibly, even reversing the effects of excess trans fatty acids.

Using the lock and key analogy will help you understand how the brain communication system works. Neurotransmitters are biochemical messengers that carry information from one brain cell to another, sort of like sparks flying across the gap between nerve cells. Each cell membrane contains a series of locks. The various message carriers (prostaglandins and neurotransmitters) are like keys. The keys and the locks must match. When the cell membrane is unhealthy because it is made of the wrong kind of replacement fatty acids, the keys won't fit, and brain function suffers. Nutrients may also fail to fit in a mismatched lock.

ADD and Food

One theory about ADD is that it is caused by a neurotransmitter imbalance. Children with ADD use hyperactivity and undesirable behavior to stimulate production of neurotransmitters, but then they get overstressed and deplete

themselves of neurotransmitters and are soon out of control. It seems, that a child with a tendency toward ADD needs a diet rich in nutrients that build neurotransmitters, given the difficulties he may have regulating their production. Research supports this idea, specifically:

A 1996 study of 96 boys found that those with lower blood levels of omega 3 fatty acids were significantly more likely to have learning and behavior problems than those whose levels were normal.

DHA and A.D.D.

Another study showed that children with ADHD tended to have low blood levels of DHA and arachidonic acid, two key brain fats. Perhaps this is why studies have shown that children who have been breastfed are less likely to have ADHD, and the longer the period of breast feeding, the less the likelihood of having ADHD.

The reason seems to be that breast milk is high in important fatty acids, such as GLA, ALA, DHA, arachidonic acid, and others, but prior to 1997 most formulas contained none or little of these fatty acids. Studies at Purdue University in Indiana suggest that many boys with ADHD have low levels of the omega fatty acids DHA, GLA, and AA in their blood, and tended to have lower levels of ALA and LA precursors in their blood than boys without ADHD, suggesting that these children were unable to make the fatty acids their brain needs from the fats in their diet. The boys with ADHD who had the lowest levels of DHA, GLA, and AA, exhibited the most anxiety, impulsivity, hyperactivity and conduct disorders. The researchers suggested three possible explanations for their findings: the children's diets were deficient in essential fatty acids, the children had a metabolic problem that prevented the body from converting dietary nutrients to essential fatty acids for the brain, or various lifestyle and dietary factors reduced the level of essential fatty acids available to the brain.

While a deficiency of omega 3 fats can contribute to poor behavior and learning, the ratio of omega 6 to omega 3 fatty acids in the diet is also important. A study of fifteen children with motor coordination problems showed that motor skills improved after the children were given a diet rich in omega 3 and omega 6 fatty acids. Brain researchers believe that the ideal ratio in the diet is 1:1, but a study found that children with ADHD had a higher omega 6 to omega 3 ratio in their diet. When the omega 6 to omega 3 ratio gets too high, the important omega 3 fats may be less available to the brain.

Some children with ADHD have outward symptoms of essential fatty acid deficiency, such as excessive thirst, frequent urination, dry hair, and dry skin. These symptoms appear because the vital organs, such as the brain, seem to have claim on the essential fatty acids in the diet and rob these vital nutrients from less important organs, such as the skin.

The Hyperactive Children's Support Group in England, after researching the connection between ADD and essential fatty acid deficiency, concluded that since some children may have a problem with the normal metabolism of essential fatty acids, they should supplement their diets with essential fatty acids. The group even suggested that perhaps males require two to three times more essential fatty acids than females, since hyperactive male children seem to outnumber females by three to one.

In a study of DHA and behavior, a group of college students were given a daily supplement of DHA beginning in August and continuing until final exams. Students who took DHA supplements displayed far less external aggression than those not taking supplements.

Sugars can also affect the learning and behavior of children. Glucose tolerance tests on 261 hyperactive children showed that 74 percent had abnormal glucose tolerance tests, indicating that some children with ADHD are more prone to blood sugar swings and the poor behavior and school performance that may accompany them. In one study, seventeen children with ADD were shown to have a lower rise in plasma epinephrine and norepinephrine in response to glucose infusion, another indication that these children may have more difficulty with blood-sugar changes.

Some research suggests that vitamin and mineral supplements may help children with A.D.H.D. Studies have shown that A.D.H.D., along with their lower serum levels of free fatty acids, may contribute to their A.D.H.D. Studies have shown that schoolchildren receiving a daily multivitamin containing the recommended dietary allowance of essential vitamins and minerals showed better school performance. However, studies using megavitamin therapy (doses of vitamins well above the RDA) on children with A.D.D. showed no effects; researchers concluded that this type of treatment should be discouraged because of potential toxic effects from excess amounts of some vitamins.

Other studies show that children placed on vitamin and mineral supplements tend to exhibit less violent, antisocial behavior, and show higher gains in academic performance than children on placebos. One study found that children who took 100 percent of the RDAs did better on I.Q. tests than those receiving 200 percent or 50 percent of the RDA. The conclusion was that taking more or less than the RDA may not be helpful.

More protein.

Teen males need around 25% more protein, at least 15 more grams than a pre-teen. Most adolescent females, on the other hand, need less daily protein than males.

More iron.

When entering adolescence, males need around 20% more iron during the phase of rapid muscle growth. Females need around 33% more iron once they begin menstruation.

More zinc.

Adolescent males need about a 33% increase in their daily requirements for zinc; adolescent females need about 20% more zinc than pre-adolescent females.

More calcium.

Both adolescent males and females need around 33% more calcium than pre-adolescents (1,200 milligrams a day versus 800 milligrams).

More vitamins.

Both males and females show at least a 20 to 30% increase in daily requirements of nearly all the vitamins as they grow from pre-teens to adolescents.

Brain busters

Stress and certain medicines can interfere with optimal brain function. Several conditions that impede brain health.

Stress, Anger and Anxiety

There's an intricate connection between the brain and the body. They communicate with each other through hormones, neurotransmitters, and many other types of chemical messengers. For instance, the hypothalamus and pituitary, two regions in the brain that control various hormone systems, respond immediately to stress by releasing hormones that stimulate the adrenal glands to release cortisol. Excess cortisol can wreak havoc with brain cells, interfering with mental functioning and memory. In turn, the immune system and some of the organs in the body release chemicals that pass into the brain and influence the function of brain cells.

Whether physical (intense athletic competition, illness) or psychological (emotional difficulties, financial worries), stress has definite harmful biological effects. Our immune system responds quickly to our thoughts and emotions. On the surface of white blood cells, there are receptors to which hormones and neurotransmitters attach. When we are under stress, substances released by the brain attach to the cells of the immune system and disturb their proper functioning. Positive thoughts and emotions are believed to enhance the immune system. The immune system can in turn send substances back to the brain, altering the release of neurotransmitters, thus influencing mood and cognition. Exposure to heavy metals, house cleaning products, pesticides, paints, some art and cosmetic supplies can adversely affect the brain.

Brain Supplements:

B-Complex plays an essential role in brain function especially with folic acid, which can affect neurotransmitter function and a deficiency can result in symptoms of depression, B6, which if deficient can cause hyper-irritability and fatigue. B12 is vital to maintaining healthy myelin sheath. They also help manufacture and release neurotransmitters. This helps with mood regulation, hunger regulation and sleep.

Antioxidants like Vitamin C – which is required by the brain to make neurotransmitters. The brain actually draws extra Vitamin C out of the blood and concentrates it in the brain.

Vitamin E, Nutri-Calm, Thai Go, IF Relief, Super Antioxidant and Green Tea Extract help protect the brain cells from free-radical damage caused by environmental toxins.

Iron deficiency can cause irritability, lack of concentration and mental alertness. It is required for neurotransmitter function. Balanced iron is the key. Too much iron in the wrong forms can be an oxidant and cause cellular breakdown. The best forms are plant forms like the I-X formula and chlorophyll capsules.

Calcium in the right form is important for brain function too. Lack of calcium can lead to impaired behavior and learning. Binding calcium is essential for the right uptake. This is where B12 and EFA's work in synergy with minerals. Herbal Ca is an excellent choice for Calcium.

In the book *Feeding the Brain: How Foods Affect Children* (Plenum, 1989), Dr. C. Keith Connors reports that children who were more hyperactive had significantly lower calcium intakes than less hyperactive children.

Fiber is another essential factor. It isn't just for colon function. It influences how nutrients affect the brain. Soluble fiber, such as Everybody's Fiber, helps lower the glycemic index of foods, thereby having a stabilizing effect on blood sugar.

Minerals are essential for creating electrical conductivity and if all your minerals are being used as buffers for toxins, acid or to balance pH to help take stress off the kidney then they aren't being utilized for brain fuel.

Gotu Kola (*Centella asiatica*) is used in India as a cerebral tonic. Containing calcium, pangamic acid, phosphorus and the amino acid glutamine, gotu kola has been used to treat amnesia, dementia, fatigue and senility. It has a revitalizing effect on the brain cells and nerves.

Ginkgo (*Ginkgo biloba*) helps improve the brain's ability to utilize oxygen and glucose by improving peripheral blood flow. Ginkgo improves nerve transmission, activates ATP (Adenosine triphosphate), an organic compound that aids

metabolic reactions. Ginkgo is one of the most prescribed herbs in Europe and recommended in treating dementia, memory loss, senility and promoting recovery from stroke. It is an antioxidant and cerebral tonic.

Bacopa (*Bacopa monnieri*) is used in Ayurvedic medicine as a nourishing brain, nerve and kidney tonic. It enhances neurotransmitter function.

Rosemary (*Rosmarinus officinalis*) Rosemary stimulates the pineal gland and improves energy levels. Rosemary contains more than a dozen antioxidants. It is a nervine, rejuvenative, stimulant and tonic. Contraindicated with high blood pressure.

Licorice (*Glycyrrhiza glabra*) is sweet and energizing, and helps stabilize blood sugar levels. It has been used to treat debility, emotional instability, Parkinson's Disease and stress. It is a tonic, nutritive and rejuvenative. Contraindicated with high blood pressure

Oatstraw (*Avena sativa*) is a cerebral and nerve tonic, nutritive and rejuvenative.

Schizandra berries (*Schisandra chinensis*) are a cerebral tonic that improve the body's ability to utilize oxygen. In China many people chew a few berries daily to improve concentration and coordination.

Siberian Ginseng (*Eleutherococcus senticosus*) nourishes the pituitary and adrenal glands. Studies done in Russia show it helps improve job accuracy.

Brain Protex, Focus Attention contain most of these ingredients.

Peppermint essential oil helps with focus and concentration. Just spritz it in the air when you need it.

Or I make the following room spray: 4 oz. distilled water 3 drops peppermint essential oil, 3 drops of lemon, 2 drops rosemary essential oil 1 drop lemon essential oil.

THESE ARE THE QUESTIONS I WANTED TO ANSWER BUT RAN OUT OF SPACE AND TIME.

The link with the brain and ADHD (three types of hormones)

How to successfully deal with ADHD

Seizure activity in kids

Dementia - chemical affects of today's world on the brain

Control center for Parkinson's

How Alzheimer's can be caused by our environment (aluminum and chlorine)

How do you identify someone with ADHD?

What is your protocol for ADHD?

Do you have any tips for dealing with serious brain disorders like dementia, Parkinson's and Alzheimer's?