

The Nutrition and Stress Connection



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By Major Ann Grediagin, MS, RD

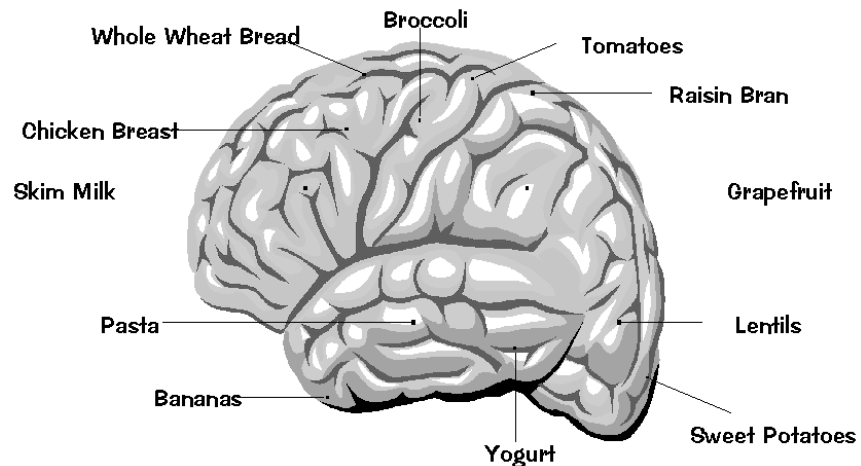
“The way we eat will not only influence our physical and emotional health but will also play a leading role in scores of other maladies--everything from lack of concentration to wrinkles” —*Anonymous*

Feeding Your Brain

What happens to mental performance as the body progresses on the continuum between a fully nourished state and a deficient state? Any nutrient deficiency will affect

performance and there is growing evidence that small or marginal deficiencies, may impact on cognitive functioning. Nutrient deficiencies, small or large, may be caused by a variety of reasons, of which stress is one.

No one knows exactly how much of what dietary components are needed for optimal mental functioning. However, it is established that nutrition plays a vital role in



into the brain. Ironically, because of this competition eating a protein-rich meal lowers brain tryptophan which leads to low serotonin levels. Conversely, a carbohydrate-rich snack, which increases insulin levels, enhances the uptake of tryptophan by brain tissues. In turn, tryptophan is converted to serotonin which produces an overall calming effect and drowsiness.

Dopamine and norepinephrine are manufactured from the amino acid tyrosine. Low levels of dopamine and norepinephrine are associated with depression, decreased ability to deal with stress, and a decline in mental functioning. The same conditions that lower tryptophan levels (high levels of competing amino acids and no insulin) are the very conditions that increase tyrosine levels. Consequently, for dopamine and norepinephrine levels to be high, serotonin levels must be low. This seesaw relationship is illustrated by a person who eats a carbohydrate-rich breakfast, thus increasing serotonin which decreases the desire to eat more carbohydrates. Therefore, at lunch, the person is likely to select a low-carbohydrate meal which will raise dopamine and norepinephrine levels.

Choline, a fat like substance that is both produced by the body and found in food, is a vital substrate for the neurotransmitter acetylcholine. Unlike amino acids, which must compete for entry into the brain, choline freely crosses the blood brain barrier. Consequently, a rise in blood choline translates into an increase of choline in the brain tissue. Acetylcholine is associated with memory and cognitive ability. A study at the University of Massachusetts showed that healthy people who took a drug that blocked acetylcholine flunked a memory test, but passed the test when they took a drug that increased acetylcholine levels. Other studies show that maintaining optimal choline levels may not only improve learning ability, but may slow certain forms of age-related memory loss.

To eat or not to eat. Eating patterns are important to mental performance and a change can affect overall nutrient intake. During periods of stress, some people will eat less, some may eat more, and others may turn to alcohol or subsist on coffee. No two individuals will react the same. Each scenario can cause an imbalance of neurotransmitters resulting in a mind and body that looks, feels, and reacts poorly.

Individuals who cope with stress by consuming fewer calories may have their ability to think clouded. One study conducted at the AFRC Institute of Food Research in Reading, England showed that dieters who cut their calories by more than one thousand per day scored worse on a mental aptitude test compared to non-dieters. Short-term memory and the ability to quickly process information was impaired and these abilities continued to deteriorate the longer the people stayed on the diet.

Timing of meals is also important. If you are having trouble concentrating, staying motivated, or just thinking clearly, your breakfast, or lack thereof, could be the culprit. The brain depends entirely on glucose to fuel its activity. Frequent skipping of meals will exhaust glucose reserves, leaving your brain with an energy deficit. Studies with children show that eating breakfast improves school attendance, reduces illnesses,

Iron deficiency is the most common nutrient deficiency in the United States and it is estimated that as many as 80 percent of active women have low iron in their tissues. Iron impacts on brain functioning in two ways. First, too little iron means your brain will not get the oxygen it needs. Second, iron works directly with neurotransmitters and proteins including dopamine. This not only affects energy level but can also adversely affect job performance and even IQ. One study showed that as blood levels of iron increased, nerve activity in the left hemisphere of the brain (the region responsible for analytical thought) also increased.

Antioxidants are those substances which act in the body to disarm free radicals before they can do damage. Free radicals are highly reactive particles that are found in the environment but are also produced in the body during normal metabolic processes. Free radicals damage the body's cells and are implicated in the aging process. Fortunately, the body has an antioxidant system of vitamins, minerals, and enzymes to minimize the impact of free radicals.

The primary antioxidant nutrients are beta-carotene, vitamin C, vitamin E and selenium. Beta carotene prevents the formation of free radicals and vitamin E deactivates free radicals before they damage fat molecules in the nerve cells. Considering the fact that the brain is almost 60 percent fat, sub-optimal levels of vitamin E and beta-carotene could have far-reaching effects on brain cell structure and function as well as mental ability. Vitamin C not only functions as a free radical scavenger but also aids in the manufacture of nerve chemicals. Studies show that laboratory animals on a diet high in vitamin C and antioxidants lived longer than those on a diet low in vitamin C.

To B or not to B. The B vitamins (thiamin, niacin, B6, B12, and folic acid) all play critical roles in brain function and are frequently added to breads and cereals. Even so, marginal deficiencies are not uncommon, especially in adolescents, seniors, and people who abuse alcohol.

Thiamin (vitamin B1) is essential for converting glucose to energy in the brain. Fatigue, loss of appetite, weakness, mental confusion, memory loss, reduced attention, personality changes and irritability are just a few of the symptoms characteristic of poor thiamin intake. One study showed that thiamin deficient children who supplemented their diets for one year improved reaction times and scored better on memory and intelligence tests.

Niacin is the B vitamin with the strongest connection to brain function and was once touted as the cure for schizophrenia. This was later found to be untrue but a definite link between a severe deficiency and dementia and psychosis was found. Therefore, it is of no surprise that even a mild deficiency may produce symptoms including depression, confusion, anxiety, irritability, and short-term memory loss.

Vitamin B6 plays an essential role in the development and maintenance of the nervous system, as well as the breakdown of carbohydrates, protein, and fats for energy. In adults, short-term poor intake of vitamin B6 can produce changes in brain waves and

can affect thought, memory, and concentration. Again, women and seniors seem to be at particular risk for deficiencies. It is estimated that women typically consume only half the Recommended Dietary Allowance (RDA) of vitamin B6.

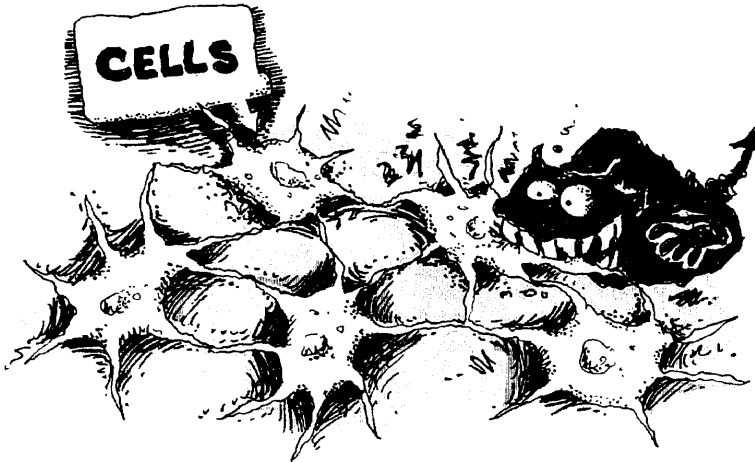
Vitamin B12 has been the acclaimed cure-all for everything from low energy, poor memory, mental deterioration, to irritability. In truth, even though B12 may not be the rejuvenator that food fadists claim, it does play an important role in optimal brain functioning. A B12 deficiency results in poor myelination of the nerve sheath resulting in disorientation, numbness in the hands and feet, moodiness, confusion, reduced IQ, and agitation. Luckily vitamin B12 is abundant in foods of animal origin and most Americans consume two to three times their daily needs. Unfortunately, vitamin B12 status is more than an issue of intake. Absorption is the key, and absorption is dependent on a digestive substance, produced by the stomach, called “intrinsic factor.” Aging causes a decrease of the “intrinsic factor”, leading many seniors to have low blood levels of vitamin B12 despite adequate intake.

Folic acid is the B vitamin most likely to be deficient in the diet. Folic acid is found in dark green leafy vegetables such as broccoli, spinach, chard, and romaine lettuce. Unfortunately, the typical American diet is woefully void of such foods. This void may lead to diminished brain power because of folic acid's role in maintaining serotonin levels and in replication of brain and red blood cells.

Choline is a building block for the essential component of the cell membrane as well as the neurotransmitter acetylcholine. Choline is produced in limited quantities by the body, but a dietary source is also required. Richard Wurtman, Ph.D. at Massachusetts Institute of Technology believes that choline intake is low enough in some diets to cause memory problems. Large supplemental doses of choline have been shown to improve learning performance in mature animals, while people suffering from memory loss who are given choline supplements often show improvements in short-term memory and abstract thinking.

Feeding Your Immune System

Have you ever gotten sick during or immediately after a big project? If so, you most likely experienced the direct link between stress and your immune system. Stress



reduces the ability to fight colds, infections, and disease, leaving your body vulnerable to attack when you can least afford it. So, if nothing can be done about the stress, is there anything you can do to enhance your immune system?

The answer is yes. Providing substrates to the brain to optimize its functioning is half of the

nutrition equation. The other half involves maximizing immune function. The best thing you can do during periods of undue stress is feed your body nutrient dense foods three times per day. There is no evidence that calorie and protein needs are affected by moderate levels of stress. However, stress does stimulate the breakdown of serotonin, suggesting that increased intake of complex carbohydrates could aid in mediating the stress response.

A high fat diet can further inhibit an already weakened immune response. According to Dr. Darshan Kelley, in humans, dietary fat, especially polyunsaturated fat, a type of fat typically found in vegetable oils, suppresses the immune system. Studies on stressed animals show that a low fat diet improves wound healing and immunity. To optimize your immune response, fat should be limited to less than 30 percent of your daily calories.

Depletion of minerals can jeopardize the immune system and aggravate the stress response. Minerals, such as chromium, copper, iron and zinc which are at risk for increased loss during periods of mental stress, are crucial for proper immune function. Studies have shown that people with low blood levels of zinc and poorly functioning immune systems can improve their immune function by increasing their intake of zinc-rich foods.

The antioxidant nutrients, including vitamin C and vitamin E also help regulate the immune system. Both emotional and physical stress increase the amounts of dietary vitamin C needed to maintain normal blood levels. The adrenals and the pituitary gland are major storage sites for vitamin C. During periods of prolonged stress these storage sites are depleted and a vicious cycle develops: stress depletes vitamin C, which reduces

the body's resistance to infection, which increases the stress, which depletes vitamin C, etc.

American diets are often low in vitamins C and E and researchers disagree on whether diet alone is enough during times of stress. According to Robert Jacob, Ph.D. at the Western Research Center, it takes approximately 200 mg of vitamin C to keep the immune system running optimally during times of stress. In reality, 90 percent of the population fails to consume the recommended number of servings of fruits and vegetables and do not get even 60 mg (the RDA) of vitamin C, much less 200 mg. Therefore, the question of supplementation is raised.

To Supplement, or Not to Supplement...

Most people agree that wholesome foods are the best source of vitamins and minerals. However, national nutrition surveys report that many individuals do not get



enough. Nine out of ten diets are marginal in chromium, only 50 percent of Americans consume adequate magnesium and folic acid, and up to 80 percent of women may be iron deficient. To top it off, try as you might, you can't always eat a balanced diet.

Until recently many nutrition advocates considered vitamin and mineral supplementation quackery and, unfortunately, most of the megadosing is. However, in light of the fact that recent and reputable studies report that certain vitamins and minerals in amounts greater than current recommendations may be of benefit, supplement usage is now recommended for certain populations. However, because vitamin and mineral supplementation can pose health risks, what and how much are the key questions.

A vitamin and mineral supplement that supplies between 100 and 300 percent of the RDA is normally a safe choice. Single nutrient megadose supplements are generally discouraged, because they may cause a secondary deficiency of one or more different nutrients. For instance, a woman who supplements her diet with only calcium could

increase her risk of a magnesium deficiency, since calcium and magnesium compete for absorption. Similarly, chromium supplementation may increase iron deficiency, and zinc supplementation may not only decrease copper absorption but may also suppress immune function. Additionally, some vitamins, such as vitamin A can be stored in the body in toxic amounts. Megavitamin/mineral therapy is based on the belief that more is better. At best, such therapy may be just a waste of money, at worse it may create a secondary deficiency, suppress immunity, or have a toxic effect on the nervous system.

If you decide to supplement, be sure to select a preparation that includes not only the basic vitamins and minerals but copper, zinc, chromium, and selenium as well. Avoid supplement claims of “natural,” “organic,” “high-potency,” and “chelated.” Your body cannot distinguish a natural from a synthetic nutrient. Additionally, avoid supplements that contain useless substances such as inositol, vitamin B15, and PABA.

The most important thing to remember regarding supplement usage is that there really is no substitute for a high quality diet. Supplements cannot grant immunity to a body that is otherwise unhealthy.

In addition, many other substances in foods besides vitamins and minerals aid in the prevention of disease and the promotion of optimal emotional, physical, and mental health. We don't know everything there is to know about human nutrition and, in the future, even more food-related compounds that enhance well-being are likely to be identified.

JAVA...an Emergency Brain Aid?



Coffee's welcoming aroma and ability to drive the grog from one's mind make it this country's number one mind-altering drug. Americans brew up and slurp down half of the world's coffee. That's an average of 450 cups per person per year. Theoretically, this practice should make us more alert than any other country. Yet, a quick peak at afternoon meetings will tell you this is not true.

For the groggy morning employee, a cup of coffee improves driving skills in rush-hour traffic, increases typing speed, elevates mood, and improves short term memory. According to Psychologist Harris Liberian caffeine works by blocking the

neurotransmitter adenosine, which normally calms the brain. Lieberman confirmed that moderate coffee consumption can help sustain attention during performance of various cognitive tasks.

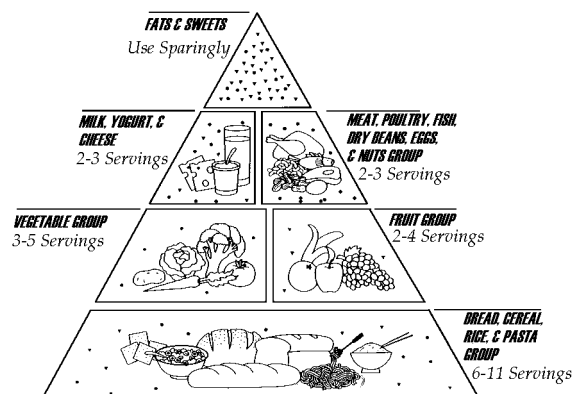
The problem is that many Americans consume way more than their fair share of caffeine. This can cause anxiety symptoms as well as other undesirable side effects. Coffee consumed with food interferes with mineral absorption, especially iron, by as much as 90 percent and can rob the body of other important minerals such as calcium and magnesium needed during stress. Caffeine in doses greater than 900 mg (the equivalent of five cups of coffee a day) may increase total blood cholesterol and Low Density Lipoproteins (LDL)-cholesterol (a bad form of cholesterol) and may cause a rise in blood pressure levels leading to heart disease. Another outcome of over indulging at the coffee pot is habituation. As it turns out, the body gets use to high levels of caffeine which diminishes it's effectiveness in improving performance. One study of sleep deprived people found that for individuals who did not routinely consume caffeine, intake of 1-1/2 cups of coffee boosted their concentration, energy, and confidence levels. However, those who routinely consumed caffeine were not affected.

The best advice regarding caffeine is to consider caffeine an emergency brain aid to be used only under certain conditions. Say, for instance, you have to pull an all nighter or cross six time zones and be alert and oriented for a morning meeting. This is when you want to have one or two cups of java and to know it will work.

One word of caution: Cut back on coffee gradually to avoid symptoms of caffeine withdrawal such as headaches. Try decreasing the number of cups to two or switching to mixture of half decaffeinated and half regular coffee, then in a few days move to all decaffeinated.

Summary

Neurotransmitters, which are manufactured from the foods we eat, affect behavior, sleep, and energy levels. High levels of stress hormones and poor eating patterns lead to nutritional deficiencies that may impact on neurotransmitter levels. These nutritional deficiencies also affect the immune system by decreasing its ability to fight off infection and disease. Diet, stress, and immunity are so interrelated it is hard to establish which is the causative factor for a decline in the other. In an ideal world, to break the cycle, you would decrease your level of stress. However, if this is not practical or probable, the next best solution is to arm your body and brain with a strong defense: a well



nourished body.

Are You Feeding Your Brain?

How do your dietary habits contribute to your mental capabilities?
To find out, respond to the following statements.

Score as follows:

3=always, 2=often, 1=seldom, 0=never

1. Do you make an effort to eat "healthy"	
2. Do you eat four or more meals/snacks per day?	
3. Are your eating habits consistent from day to day?	
4. Do you avoid eating large meals?	
5. In the evening, do you snack lightly or not at all?	
6. On average, do you eat 6 or more servings of grains per day?	
7. On average, do you eat 5 or more servings of fruits and vegetables per day?	
8. On average, do you consume at least 2 servings of lowfat dairy products?	
9. Do travel and social functions allow you to maintain your normal eating habits?	
10. Do you limit alcoholic beverages to less than 5 drinks per week?	
11. Do you limit caffeinated beverages to less than 20 ounces per day?	
12. Do you drink at least 6 glasses of water per day?	
13. Do you limit fat and sugar intake?	
14. Do you limit "fast food" to one meal per week?	
15. Do you feel, look, act, and function your best?	
TOTAL SCORE	

What Does It All Mean?

39-45: **Outstanding!** You are ready for the mental Olympics.

32-38: **Very good**, but a few changes could improve your mental agility.



- 25-31: **Caution**, your diet could be causing your mental torch to burn dimly.
<25: **Red Alert!!!** Your dietary habits are interfering with your cranial capabilities.

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