



## Nutrition, Attention, and Learning

*Do vitamins and supplements help children to pay attention in class? Is there any evidence for protein being a brain food? Do red dyes and other additives cause Attention Deficit Hyperactivity Disorder? How important is a good breakfast, really?*

These are many of the questions that are part of the controversy surrounding diet, attention, and learning. While there does not appear to be a consensus on these and many other issues, there are some common-sense approaches that parents can take with their children. We will provide you with some guidance so that you can make informed decisions about these matters.

First, many parents ask their pediatricians, child psychologists, and other clinicians whether their child's Learning Disability, Attention Deficit Hyperactivity Disorder, or other behavioral difficulty is a direct result of the child's diet. The simple answer is no. The vast majority of our studies indicate that these types of disorders are not caused simply by diet. While there are some exceptions with a particular food or a chemical in food causing acute distress or learning/behavioral changes, such as peanut, shellfish, and strawberry allergies; or the negative side effects that monosodium glutamate (MSG) is presumed to have on developing brains, diet does not appear to be the primary cause of learning/behavioral difficulties in the vast majority of children.

However, what complicates the answer to this question is that, of course, what you ingest has an impact on your behavior, attention, and learning. We ask parents to consider their emotional or cognitive experiences the last time they had too much, or too little, coffee to drink; if they've ever had an extra glass of wine that made them uncomfortable; or even a sense of physical and mental sluggishness after having too much to eat at any one time. The impact of food and diet on our emotional, behavioral, and attention processes is there for all of us to see. This is also consistent with the observations of many parents after their children have consumed a large quantity of sweets (think about the last birthday party your child went to) and then began to engage in out-of-control or atypical behavior.

Our advice on this matter is simple: pay attention to what your child eats and see what works best for him/her. The same rules may not hold true for each child, just as some adults may become jittery after one cup of coffee and others are finishing their tenth cup just prior to falling asleep at night. Use the thoughtful and structured attention that you pay to your child's diet as a model for helping the youngster with structured activities such as doing homework, being organized, and making good decisions. Recognize that this is only one factor among many that will help to improve your child's attention, learning, and emotional regulation

The following sections include descriptions of some of the latest research that supports the use of dietary supplements to improve attention, learning, and memory. Much of the research data is preliminary and we do not specifically endorse any of the following strategies, but want to help parents to inform themselves. We also provide links so that you can explore additional studies and reports.

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## Nutrition and Dietary Supplements: Improving Learning, Memory, and Attention

### Well-Balanced Diet

We have all heard the popular advisory of the importance of a good breakfast. Whether the recommendation came from a grandmother whipping up a special batch of pancakes, a parent slipping an apple into a child's backpack as he dashes out the door, or a teacher recommending a good meal before tomorrow's geometry quiz, the advice remains the same. A *good* breakfast can have a significant impact on academic performance and one's ability to pay attention, learn, and retain knowledge. The adage that "breakfast is the most important meal of the day" may be true as well, as it refuels the body after a night of fasting and sets the tone for the day. Yet the importance of nutritious breakfasts can similarly be translated to other meals. But what defines a *good* breakfast or meal, you may ask.

Leading experts generally agree that it is important to maintain a balance of lean proteins and complex carbohydrates (the kind that fuel your body but do not excite it), as these can improve the operation of neurotransmitters in the brain. Proteins provide amino acids which become neurotransmitters, while good carbohydrates (such as grains, vegetables, and fruits) send these neurotransmitters to the brain. Too many carbohydrates and too little protein can cause your child's blood sugar to spike and then plummet, causing your child to be overexcited and then lethargic or inattentive. Along with maintaining a good carb-protein balance, it is also important to avoid foods that are high in sugar as these can have adverse effects on learning, and to eat plenty of fiber (found in whole grains), which can also prevent blood sugar levels from rising and falling. The maintenance of blood sugar levels is particularly important for children with ADD and ADHD. For a well-balanced and brain-boosting diet it is also important to consume the right kind of fats, such as Omega-3 fatty acids, found in such sources as fish, vegetable oils, or as a supplement.

Although diet is not generally the *cause* of learning, attention or behavioral difficulties, proper food and supplement consumption can be a helpful and effective way of regulating these disabilities. Multivitamins and minerals can be a helpful way of attaining the those found in the above food sources, and are particularly beneficial with picky-eaters and when diets are deficient in these vitamins and minerals.

### Foods & Supplements to Consider

Proteins  
Complex Carbohydrates  
Omega-3 Fatty Acids  
Whole Grains  
Oats  
Multivitamins  
Minerals (Magnesium, Zinc, Iron)

### Foods & Supplements to Avoid

Sugary snacks  
Simple Carbohydrates  
Preservatives  
Allergy-causing foods  
Artificial Dyes

*For more information on a well-balanced diet see the following resources:*

<http://www.askdrsears.com/html/4/T040400.asp> : This article explains why eating a balanced breakfast, as well as other nutritious meals, is important. It also lists which foods can promote brain functions, offers ideas for nutritious breakfasts, and discusses carb-protein balance.

<http://www.nutraingredients.com/Research/Getting-their-oats-helps-kids-perform-better> : This scientific article examines the benefits of eating breakfast, in particular, oatmeal.

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### Omega-3

Recent studies have found that omega-3s can have beneficial effects on anyone's mental focus, but in particular on that of children with ADHD. Tests have noted that ADHD symptoms decreased in children who took fish oil daily, and that ADD children often demonstrated low blood levels of omega-3. Omega -3 fatty acids are prominent in the brain and are believed to be important in cognitive, behavioral, and brain and nerve cell function.

#### Sources of Omega-3

Fatty Fish (e.g. salmon, tuna, herring, sardines)  
Vegetable & Nut Oils  
Omega-3 Supplements (e.g. fish oil)

*For more information on Omega 3 and see the following resources:*

<http://www.umm.edu/altmed/articles/omega-3-000316.htm> : This article describes the importance and uses of Omega-3 fatty acids.

<http://borntoexplore.org/omega.htm> : This web page explores the correlation between ADD and deficiencies in Omega-3 fatty acids.

<http://www.nutritionj.com/content/7/1/8> : This scientific research article analyzes the differences in the fatty acid profiles of children with and without ADHD, and explores possible explanations for the anomaly.

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## Protein

As we have noted, proteins provide the amino acids that become neurotransmitters (which carry signals from one brain cell to another.) Proteins can also deter spikes in blood sugar levels. Remember, in order for proteins to stimulate the brain, they need to be balanced properly with complex carbohydrates. Some researchers have described protein as "brain food" and suggest that a glass of milk and a protein bar can enhance the effectiveness of studying.

## Sources of Protein

Nuts

Soy

Lean beef

Fish

Pork

Poultry

Dairy Products

Eggs

Beans

Protein Bars or Shakes

*For more information on Protein see the following resources:*

<http://www.askdrsears.com/html/4/T040400.asp> : This article discusses the proper use of proteins and carb-protein balance.

<http://www.fi.edu/learn/brain/proteins.html> : This webpage examine the functions of proteins and amino acids in the brain.

<http://www.psychologytoday.com/articles/200301/brain-power-why-proteins-are-smart> : This article examines the importance of proteins in creating a healthy body and mind.

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## Magnesium

How many times have you walked into a room only to realize that you cannot remember why, or for what, you went in there? How often has your child forgotten an assignment or failed to be able to recall vital information during a History exam? Recent research is suggesting that memory lapses may be partially caused by a magnesium deficiency in the body, and that increasing magnesium intake can help to lessen these memory lapses. Research is also exploring the benefits of using magnesium with individuals with extreme memory impairments, such as Alzheimer's disease. Magnesium maintains the plasticity (or the ability to change, remember, and learn) of synapses in the brain. Thus a deficiency of magnesium would decrease this plasticity and would inhibit learning and memory. It is believed that the majority of Americans are not receiving enough magnesium in their diets. Magnesium is essential to hundreds of

biochemical reactions in the body, and it is also active in making the neurotransmitters involved in concentration and attention (particularly beneficial for children with ADHD.) The benefits of magnesium are numerous and the mineral would make a great addition to yours and your child's diet.

### Sources of Magnesium

Nuts  
Soybeans  
Dark leafy vegetables (e.g. spinach)  
Meats

*For more information on Magnesium and Memory see the following resources:*

<http://www.webmd.com/brain/news/20100127/magnesium-may-improve-memory> :

This article explores recent research regarding the relationship between magnesium and memory.

<http://www.medicalnewstoday.com/articles/17114.php> : This article explains how magnesium functions within the brain to improve memory

<http://www.progressivehealth.com/adhd-vitamins.asp> : This article examines vitamins and minerals that help with ADHD including magnesium and zinc.

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### Zinc & Iron

If your child experiences rollercoaster-like highs and lows in mood, or suffers from ADHD, symptoms may be worsened by a deficiency in the minerals zinc or iron. Zinc and iron regulate the production of dopamine (a neurotransmitter that controls mood.) Research has linked low serum zinc levels to depression, and suggests that iron deficiencies can have a significant, negative impact on the symptoms of children with ADHD. Like Magnesium, zinc and iron are also essential for hundreds of other activities and functions in the body. Consider adding or boosting your zinc and iron intake to improve bodily health, and to level out roller-coaster moods. Diet is the safest way to increase zinc and iron levels but a multivitamin can also be effective.

#### Sources of Zinc

Red Meats (e.g. Beef, Pork, Lamb)  
Poultry (e.g. Chicken, Turkey)  
Beans  
Nuts  
Soy  
Seafood (e.g. oysters)  
Fortified Cereals

#### Sources of Iron

Red Meat  
Organ Meats (e.g. liver)  
Beans  
Nuts  
Soy  
Seafood (e.g. clams)  
Fortified Cereals

*For more information on Zinc and Iron see the following resources:*

<http://www.progressivehealth.com/adhd-vitamins.asp> : This article examines vitamins and minerals that help with ADHD including zinc, iron, and magnesium.

<http://www.drkaslow.com/html/zinc.html> : Examines the function of zinc and the results of zinc deficiencies including behavioral changes, depression, etc.

[http://www.mckinley.illinois.edu/Handouts/dietary\\_sources\\_iron.html](http://www.mckinley.illinois.edu/Handouts/dietary_sources_iron.html) :

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## Green Tea

The miraculous effects of green tea and green tea extract are often advertised. The sweet-smelling beverage has been said to boost metabolism and support weight loss, among various other claims. While many of these have not been substantiated, researchers are beginning to recognize the benefits that green tea may have in improving memory function. It is also believed that it may deter Alzheimer's disease by preventing the development of certain enzymes believed to be important in its development. If you consider the best part of waking up to be Folgers in your cup, consider a cup of sweet-smelling and memory-retaining green tea.

Be aware that caffeine may have adverse affects on children with high energy levels

*For more information on Green Tea see the following resources:*

<http://www.sciencedaily.com/releases/2004/10/041030144110.htm>

<http://www.nutraingredients.com/Research/More-evidence-of-green-tea-s-brain-benefits> : This article discusses experimental evidence regarding the impact of green tea on working-memory and Alzheimer's disease.

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## General Books on Nutrition and the Brain

Caruana, Vicki. (2007). *Brain Food: Recipes for Success for School, Sports, and Life*. New York, NY: M. Evans and Company.

*Examines the connection between diet and the mind and provides recipes and strategies to help children meet their maximum potential.*

Holford, Patrick. (2004). *Optimum Nutrition for the Mind*. North Bergen, NJ: Basic Health Publications.

*Examines how the brain works and how to use nutrition to improve brain function.*

Logan, Alan C. (2006). *The Brain Diet: The Connection between Nutrition, Mental Health, and Intelligence* (Rev. Ed.). Nashville, TN: Cumberland House.

*This expanded edition of the best-selling book “The Brain Diet” discusses the correlation between diet and the mind, complete with healthful recipes and charts.*

Sahelian, Ray, M.D. (2000). *Mind Boosters: A Guide to Natural Supplements that Enhance Your Mind, Memory, and Mood*. New York, NY: St. Martin’s Press.  
*Well-respected nutritional expert, Ray Sahelian, discusses the impact of food and herbal supplements on mental performance. Offers specific tips and suggestions for supplement use by patients with Alzheimer’s, depression, etc.*

Stitt, Barbara Reed. (1997). *Food & Behavior: A Natural Connection* (Rev. Ed.). Portland, OR: Natural Press.  
*Discusses the relationship between food, particularly as it pertains to the Standard American Diet (SAD), and the development of behavioral and emotional issues, such as aggression, depression, etc.*