Q: My granddaughter is six years old and has been diagnosed with ADHD. Are there any alternative options using supplementation that may help improve her condition?

A: Your question is important and timely, considering that attention deficit hyperactivity disorder (ADHD) has become one of the most frequently diagnosed behavioral disorders in children today. To answer your specific question about nutritional alternatives to medication, it is important to understand ADHD.

An estimated 3-6% of American children carry this diagnosis, with up to 15% being affected in some cities. Rapidly growing numbers of children given this diagnosis are prescribed stimulant medications such as methylphenidate (Ritalin) for treatment. These commonly used medications are relatively safe and effective, but they can have undesirable side effects that increase with higher doses. Because they also have substantial potential as drugs of abuse among young people, it is critical that the diagnosis be correct.

ADHD is classified as a mental disorder in which children (and some adults) demonstrate persistent lack of attention to tasks (attention deficit) and/or an inability to control impulses and an increase in physical activity (hyperactivity) that is not typical for people at a similar stage of development. I stress these two points because all children have periods of inattention, episodes of impulsive behavior, and sometimes incredible levels of energy; these are part of normal development.

For all these reasons, my first recommendation is to be certain that your granddaughter has had a thorough developmental and behavioral evaluation by a pediatrician or a specialist in development and behavior. The important thing is having someone conduct the examination and document the findings. Children should always be observed for six months and then re-evaluated before being placed on pharmaceutical treatment—there is no way to be sure of the diagnosis based on a single exam. Meanwhile, families can do many things to help reduce the likelihood that the child will ever require medication. ADHD is actually a spectrum of disorders. In a 2003 study, scientists listed eight general categories of possible contributors to ADHD: food and additive allergies, environmental toxicity, dietary deficiencies in proteins or excesses.
in simple sugars, mineral imbalances, deficiencies in cell membrane components (essential fatty acids and phospholipids), deficiencies in certain amino acids, thyroid disorders, and deficiencies in B vitamins.7

Children with ADHD have changes in brain function that may arise from abnormalities in cell membranes, blood flow, and levels of signaling chemicals (neurotransmitters) such as dopamine and norepinephrine.8-10 Stimulant drugs such as Ritalin® promote the release of such chemicals in brain tissue.

Nutritional supplementation offers a much broader and safer approach. The growing brain requires a tremendous amount of nutrition to support its structure and function. Supplements can provide components that are used in brain cell membranes and as building blocks or cofactors for neurotransmitter production. Nutritional supplementation and avoidance or elimination of toxins can produce improvements in behavior and performance in those suffering from ADHD.1-7,11

Parents should work with their children's health care providers to ensure that any supplement or medication is provided at safe and effective doses. Many conventional physicians may not ask specifically about diet or supplements, so it is important to let them know about nutritional interventions. The following supplements have shown promise in helping children with ADHD.

Vitamins and Minerals

Multivitamin supplementation may help kids do better in school generally. One study showed that a multivitamin-mineral supplement helped reduce antisocial behavior in healthy children.12 These results suggest that multivitamins with minerals could help children with ADHD.1 High doses of vitamin A should be avoided, since excess accumulation of this fat-soluble vitamin can be dangerous.13

If a child has a known deficiency of B vitamins, supplementation may be helpful. Vitamin B6 (pyridoxine) is essential in the manufacture of many neurotransmitters that are important for healthy brain function, with potential applications for fighting ADHD. One study found that vitamin B6 supplements were as effective as Ritalin® in decreasing hyperactivity, and that the vitamin's effects persisted even after supplementation was stopped.14

ADHD has been associated with iron deficiency,15,16 and some evidence suggests that iron supplements may reduce the severity of ADHD symptoms.17 Magnesium deficiency is found in many children with ADHD; significant decreases in hyperactivity and disruptive behavior have been found in children who received dietary magnesium supplementation.18 Some individuals with ADHD have low zinc levels, and it has been suggested that zinc supplementation may improve behavior.19 Zinc may also improve the effectiveness of drugs such as Ritalin®.20

**Essential Fatty Acids**

Unsaturated fatty acids, such as the omega-3 essential fatty acids, may have a useful role in the management of ADHD.1 They are critical components of cell membranes and function as the biochemical messengers that help nerve and other cells communicate. Children with ADHD appear to break down essential fatty acids faster than other children,21,22 and almost always have lower-than-normal blood levels of these important substances.

Unfortunately, most children have an excess of omega-6 fatty acids in their diet, but suffer from a severe deficiency of beneficial omega-3 fatty acids. In two recent trials, supplementation with essential fatty acids improved conduct problems as rated by parents and attention problems as rated by teachers.23,24 Essential fatty acids have been found to enhance the effect of zinc,20,25 and were found to be effective in helping control attention and movement problems.26
Because it can be difficult to obtain optimal levels of essential fatty acids—particularly omega-3 fatty acids such as EPA and DHA—through dietary sources alone, your granddaughter might benefit from supplementation with a product that provides omega-3 fatty acids.

**Phosphatidylserine and Related Nutrients**

Phosphatidylserine is a critical component of cell membranes and plays a role in nerve cell signaling. Phosphatidylserine has been found to improve memory and concentration in adults, and one report found that it significantly improved attention and learning in children with ADHD. In a small, controlled study, dimethylaminoethanol (DMAE), which cells convert to cell membrane constituents, was shown to reduce hyperactivity. Be sure to check with the child’s doctor, since DMAE can have adverse effects when used at high doses.

**Amino Acids**

Most brain neurotransmitters are manufactured from amino acids, which are protein building blocks found in the blood. Levels of the amino acids phenylalanine, glutamine, tyrosine, tryptophan, and isoleucine are often low in the blood of adults and children with ADHD. In separate trials, supplementation with tyrosine or S-adenosylmethionine (SAMe) produced improvement in adult attention, though the results may be short-lived. According to one study, the amino acid L-theanine, found in green tea, is more effective than a common prescription drug in promoting relaxation.

**Phytotherapies**

A number of plant-derived antioxidants hold potential in the treatment of ADHD. Extracts of ginkgo biloba improve brain blood flow and can improve cognitive ability, though there have been no controlled trials of its use in children with ADHD. In Europe, individual reports suggest that an extract of pine bark called pycnogenol, which has antioxidant and cell-protective properties, improves cognitive function in those with ADHD. Grape seed extract contains many of the same compounds (proanthocyanidins) that are known to improve cognitive function.

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**NUTRIENT DOSING FOR ADHD PATIENTS**

It is important to use the proper dose of any nutrient, especially in children. The following list provides the best-known dosages for many of the nutrients listed in this article. Always consult a child’s primary care physician before beginning any supplement, and be sure to list any supplements (along with medications) in the child’s medical record.

**Multivitamins:** All children with ADHD should take a standard children’s or teen’s multivitamin once daily. Check the manufacturer’s label for the correct number of tablets (or teaspoons, if liquid). Use a multivitamin with iron if recommended by the child’s physician.

**Vitamin B6 and magnesium:** Both of these nutrients are essential for neurotransmitter production and may benefit both adults and children. The best dosing data are for products that provide a daily dose of 250 mg of vitamin B6 and 125 mg of magnesium.

**Iron:** Daily iron supplements of 5 mg per kilogram of body weight (about 2 mg per pound) have been found to be effective in reducing some symptoms of ADHD. Because iron supplements (such as ferrous sulfate and ferrous gluconate) can vary greatly in the amount of elemental iron (pure iron) that they provide, check the label to determine the correct amount needed to provide the recommended dose of elemental iron.

**Zinc:** Supplementation with zinc sulfate alone at a dose of 150 mg per day or in combination with prescription stimulant drugs at a dose of 55 mg per day has been shown to improve symptoms of ADHD.

**Essential fatty acids:** The omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) may be helpful for individuals with ADHD. Doses that have been effective in treating ADHD are 80-500 mg of EPA and 175-500 mg of DHA.

**L-theanine:** At a dose of 200 mg, this amino acid has been found to be effective in promoting relaxation.

**Ginkgo:** A study in children using a combination of 50 mg per day of ginkgo extract and 200 mg per day of ginseng (Panax quinquefolium) produced improvement in symptoms of ADHD after two weeks of treatment.

**Pycnogenol:** Children given a daily dose of 1 mg per kilogram of body weight (about 0.5 mg per pound) of this pine bark extract for four weeks showed significant improvements in multiple standard measures of ADHD.

**Melatonin:** In combination with lifestyle modifications, a daily dose of 5 mg of melatonin produced marked improvement in insomnia in children with ADHD who were taking stimulant medications.
memory and cognition with age, suggesting that it may have applications in treating ADHD.

Melatonin

Sleep disorders are common in children with ADHD, especially in those taking stimulant medications. Melatonin, an antioxidant hormone produced in the human pineal gland, has powerful effects on sleep-wake cycles, sleep variation, and many other biological rhythms. In combination with a good "sleep hygiene" program (careful attention to bedtime, place of sleep, and bedtime rituals), melatonin may help improve insomnia in children with ADHD who are using stimulant medications.

Summary

ADHD is a puzzling condition that has frustrated medical researchers for years. Dietary supplements clearly have a role in managing ADHD. They could reduce and may even eliminate a child's need for pharmaceutical drugs. It is critical that a diagnosis of ADHD be made correctly. Physicians and experts in child nutrition and child development and behavior all have an important role to play in the integrative management of ADHD. Ongoing research in all of these areas is likely to provide additional insights into nutritional supplements that improve brain function and behavior.

References


47. Young GS, Conquer JA, Thomas R. Effect of randomized supplementation with high dose olive, flax or fish oil on serum phospholipid fatty acid levels in adults with attention deficit hyperactivity disorder. Reprod Nutr Dev. 2005 Sep;45(5):549-58.


