What Is It?

The Diagnostic and Statistical Manual for Mental Disorders (DSM IV) is the standard by which mental disorders are diagnosed. Attention-deficit/hyperactivity disorder (ADHD) has been broken down into three categories:\(^1\)

- ADHD predominantly inattentive type – symptoms are predominantly related to a lack of attention
- ADHD predominantly hyperactive-impulsive – symptoms are predominantly related to hyperactivity and impulsiveness
- ADHD combined type – both lack of attention and hyperactive/impulsive behaviors are present

Many people still refer to ADHD as ADD (attention deficit disorder). This is common even though the disorder has not been officially named ADD since 1987. This is yet another illustration of the difficulty in labeling conditions.

There are two main positions in the debate over what ADHD is. Some claim that it is a bioneurologic disorder, which indicates that there is a physical or chemical difference that exists in people with ADHD. The other position is that people with ADHD are no different from everyone else. Rather, it is society that is intolerant of disobedient children.

There are many psychologists who say that ADHD does not exist. One argument is that, because there are no certain biological tests for ADHD, it cannot exist. They may be overstating their case, however, because other mental illnesses share this same feature of having no biological marker. Recent research in brain imaging is actually finding that the ADHD brain does differ from normal brains, so the argument that ADHD is not a biological disorder may not be valid anymore.

Some of the same psychologists who claim that ADHD does not exist point the finger to parents and teachers. They say bad parenting and poor school discipline are to blame. This also seems a bit extreme. While it is certainly true that bad parenting and insufficient schooling can influence a child to misbehave, children with ADHD still exhibit symptoms in normal homes and schools.

ADHD can also be seen as a cultural phenomenon. Between television, internet, radio, cell phones and video games, sometimes all used at once, there is little wonder that children are being raised in a hyper-stimulated environment. Then when they enter school and are expected to focus on one thing, while sitting still and remaining quiet in the traditional central-task based classroom, teachers and parents wonder why so many children are misbehaving. Rather than looking at the cause of the problem, focus is placed on the quick-fix—medication.

A recent study even recommends that teachers not limit hyperactivity in children with ADHD.\(^3\) They found that hyperactivity is a tool that these children need in order for their working memory to function better. This is another way of saying that these children learn in a different way. They think in a different way. Their learning environment may need to be altered so that they can optimize this difference.

ADHD is more than two times more prevalent in boys than in girls.\(^4\) This too has its basis in culture, but it goes back to early times when men were primarily hunters and women were householders. A hunter is in a state of hyper-stimulation. He is aware of many things at once.
His senses are heightened. Yet he can remain still for hours at a time if need be. The important thing to note is that he is not focused on one thing. He is taking his full environment into account.

At home, the woman was primarily focused on one task at a time, and had the patience and concentration to tend to even the most tedious chores. These two roles, though challenged throughout history, have actually become part of the human genetic makeup. This makeup changes and adapts over time, but it takes many generations. The high prevalence of ADHD among boys may be based on this inherent trait that has been carried on through time.

The second predominant position on ADHD is that people with the disorder do have physical and chemical differences in the brain that are the cause of their behavior. While this notion would certainly mean that the disorder includes a label, one researcher, Dr. Daniel Amen, MD, has done some interesting research with regard to brain scans in people with ADHD. He uses SPECT (single photon-emission computerized tomography) scans, which are a type of nuclear imaging test that looks at brain blood flow and activity patterns. Using SPECT scans on those with ADHD and more than 15,000 patient evaluations, Dr. Amen has categorized the disorder into six types, according to the different areas of the brain that are affected. Dr. Amen uses the term ADD:

- **Type 1:** Classic ADD – sufferers are inattentive, distractible, disorganized, hyperactive, restless and impulsive
- **Type 2:** Inattentive ADD – sufferers are inattentive, sluggish, slow-moving, have low motivation and are often referred to as space cadets, daydreamers or couch potatoes
- **Type 3:** Overfocused ADD – sufferers have trouble shifting attention; frequently get stuck in loops of negative thoughts or behaviors; are obsessive;

**Did You Know**

ADHD occurs in males over two times more than in females. Though ADHD often disappears by adulthood or even adolescence, many adults are still affected by the disorder. See the next section on ADHD in adults for more information.
worry excessively; are inflexible; frequently behave 
oppositionally and argumentatively
• Type 4: Temporal Lobe ADD – sufferers are inattentive, 
irritable, aggressive; have dark thoughts, mood instability 
and are severely impulsive
• Type 5: Limbic ADD – sufferers are inattentive, 
experience chronic low-grade depression, are negative 
(e.g. glass half-empty syndrome), have low energy, and 
have frequent feelings of hopelessness and worthlessness
• Type 6: “Ring of Fire” ADD – sufferers are inattentive, 
extremely distractible, angry, irritable, overly sensitive to 
the environment, hyperverbal, extremely oppositional 
and experience cyclic moodiness

With the establishment of these categories, Amen was able 
to better determine treatment for his patients. He outlines 
a step-by-step program for treatment of each of these types 
of ADD based on the different areas of the brain that are 
affected and the symptoms that accompany each type.

What Causes It?

In the previous section, the causes for the creation of the 
ADHD disorder were discussed. Here, the causes and risk 
factors that may contribute to ADHD will be summarized. 
Factors that may contribute to the development of 
ADHD are:
• Neurotransmitter imbalance
• Genetics
• Poor diet
• Toxic exposure
• Lack of exercise
• Head injury

In the brain, ADHD manifests as an imbalance or 
impairment in the catecholamine neurotransmitters 
(epinephrine, norepinephrine and dopamine). Exactly 
what kind of imbalance in these neurotransmitters is still 
not entirely understood. Catecholamine neurotransmitters 
not only deal with attention, but also with executive 
function, which deals with inhibition of inappropriate 
behaviors, thoughts and actions, and with planning and 
organizing for the future.7 Difficulties with these functions 
are common symptoms of ADHD.

Genetics do appear to play a role in the development of 
ADHD. Using the identical twin model (identical twins 
share genetic material, so they are often used to determine 
a condition’s genetic probabilities), in 81 percent of 
identical twins if one had ADHD, so did the other, while 
only 29 percent of fraternal twins with ADHD shared the 
disorder.8 This shows that genes are a contributing factor. 
However, as with most conditions, genes are only part 
of the whole picture.

Diet has received a lot of attention with regard to its 
influence on the development of ADHD. Food additives 
are particularly scrutinized. In two recent studies, food 
additives, food colorings and benzoate preservatives 
were shown to increase hyperactivity in children.9,10 
Other nutritional factors that have been linked to ADHD 
are refined sugars, food sensitivities/allergies, and fatty acid 
(omega-3) deficiencies.11 The ways in which diet affects the 
brain are not fully understood. It is likely that certain foods 
or additives induce changes in the blood flow and activity 
in the brain.12

With the increase in consumption of processed and 
refined foods that has happened over the last few decades, 
the diet of today’s children looks nothing like it did in the
past. Refined carbohydrates have become a large portion of what children eat. These simple carbs (primarily sugar and white flour foods) are broken down quickly in the body. This causes a rapid increase in energy followed by a rapid decline in energy, also known as a sugar crash. What does this do to a child’s ability to focus and remain still? It makes it very difficult, even for children who do not have ADHD. Instead of a bowl of sugary cereal or donuts for breakfast, replacing simple carbs with protein and complex carbohydrates, like whole grains, will provide sustained energy that children need throughout the day.

Wheat and dairy sensitivities have also been implicated in the development of neurological impairment in children. Gluten from wheat and casein from milk both produce morphine-like proteins that can enter the brain resulting in less-than-optimal brain function. These proteins have also been associated with the development of autism, another prevalent neurologic disorder that develops during childhood. Elimination diets have been shown to be effective in some children with ADHD. (See the Gluten Sensitivity section for more information.)

Toxic exposure factors related to ADHD begin in the womb. Fetal exposure to drugs, alcohol and cigarettes have been shown to be a risk factor for the development of ADHD. Since depression, ADHD or anxiety are present in some mothers, they may be more likely to self medicate their own struggles with drugs or alcohol. Another toxic group of chemicals, phthalates (commonly found in plastics), has been associated with ADHD symptoms.

Organophosphate pesticide exposure is a major concern with regard to ADHD in children. One major recent study found that, in children who are exposed to everyday amounts of organophosphate pesticides, the children with the highest levels of these pesticide metabolites in their urine were much more likely to meet diagnostic criteria for ADHD. Organophosphates are the most widely used pesticides in the U.S. and the main route of exposure to children is through food.

Heavy metal exposure also plays a role in ADHD. In a number of studies, high blood lead levels have been associated with ADHD. Even at lower levels equal to those acceptable in the U.S., there was still a link to ADHD. It is well known that lead exposure can cause a decline in cognitive ability. Since heavy metal toxicity can cause neurological symptoms, this should be ruled out in children experiencing ADHD symptoms.

Lack of exercise may be associated with ADHD symptoms. Physical education classes and recess are increasingly being dropped either as a result of budget cuts or in an effort to provide more educational classes. This plan may backfire, however, as physical activity provides children a needed respite, not to mention a place to release pent up energy that may accumulate while sitting for hours at a time.

What Are the Signs and Symptoms?

The three main symptoms of ADHD are inattention, hyperactivity and impulsivity. Some children with ADHD tend to be more hyperactive and impulsive than inattentive, and vice versa. Some exhibit all three symptoms more evenly. These three main symptoms can be broken down into subgroups of symptoms, as described by the American Academy of Pediatrics:

Inattention

- Often has a very hard time paying attention, daydreams
- Often does not seem to listen
- Is easily distracted from work or play
- Often does not seem to care about details, makes careless mistakes
- Frequently does not follow through on instructions or finish tasks
Brain and Nervous System

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• Is disorganized
• Frequently loses a lot of important things
• Often forgets things
• Frequently avoids doing things that require ongoing mental effort

Hyperactivity

• Is in constant motion, as if driven by a motor
• Cannot stay seated
• Frequently squirms and fidgets
• Talks too much
• Often runs, jumps, and climbs when this is not permitted
• Cannot play quietly

Impulsivity

• Frequently acts and speaks without thinking
• May run into the street without looking for traffic first
• Frequently has trouble taking turns
• Cannot wait for things
• Often calls out answers before the question is complete
• Frequently interrupts others

Symptoms of ADHD usually begin during childhood and may continue into adolescence and adulthood. Children with ADHD may experience school difficulties, academic underachievement, problematic relationships, and low self esteem.21

How Is It Diagnosed?

In order to make a diagnosis of ADHD, after a thorough medical history is taken, information must be obtained from multiple sources, such as parents, teachers, the child, etc.

Adult ADHD

It was long believed that ADHD (or ADD, as it was known then) did not persist after adolescence. While this is true for many children, it is not the case for all of them. In fact, about half of children with ADHD will exhibit some symptoms into adulthood,44 being classified as having ADHD in partial remission, and between 30 and 50 percent will have enough symptoms to still be diagnosed with full ADHD.45 Only since the late 1980s have professionals begun to recognize ADHD in adults. Even today, many adults with ADHD are instead diagnosed with other conditions such as anxiety, depression or even bipolar disorder. Doctors do not fully understand the disorder in adults.46

In children with ADHD, the symptoms of hyperactivity and impulsiveness are demonstrated as constant movement and activity, whereas adults usually present as having a continual feeling of restlessness and even agitation. Adults with ADHD are easily bored, procrastinate, are disorganized, have trouble making deadlines and behave impulsively. These are traits that occur in everyone, but in those with ADHD they occur regularly, and sometimes to the detriment of those around them. In adults, the symptoms of inattentiveness are most dominant. Specifically involved are concentration and organization. These are represented as trouble following conversations, difficulty finishing tasks, distraction and forgetfulness. These symptoms can be seen as positive, however. Impulsivity, excessive energy and the changing of focus from one subject to the next can be harnessed and used as creativity, flexibility and adaptation to new information—all necessities in today’s society. Another ability of adults with ADHD, paradoxically, is the ability to hyper-focus; that is, intensive attention to a specific issue. In this case, care must be taken so that the intensive energy is applied to productive projects and not to unimportant distractions.

In adults, ADHD is difficult to diagnose. There is no specific test and many of the symptoms overlap with those of other conditions like depression, emotional
Using the DSM IV, this information must be integrated and applied. It can make for a difficult diagnosis, especially when the information is conflicting. ADHD critics have thus described the diagnosis as subjective. ADHD is sometimes diagnosed by a health professional who has no training in behavioral health (like a general practitioner). Since there are no specific biochemical tests that indicate ADHD in traditional medicines the diagnosis can be difficult to determine.

The diagnosis of ADHD is further complicated due to the fact that other conditions can cause the same symptoms. Bipolar disorder (especially in children), post traumatic stress disorder and even sexual abuse show similar symptoms to ADHD. This is why it is important to obtain a thoroughly analyzed diagnosis.

When using SPECT brain scans, as Dr. Amen does, a diagnosis is made based on the results of the scans and DSM criteria as well as through a thorough interview with patient and family, and any other relevant informant. This allows for a specific evaluation of what areas of the brain are affected, which can guide a more targeted treatment plan.

Trauma or anxiety disorders. There is also a high occurrence of other conditions in association with ADHD. The criteria of the DSM IV are used as a basis for diagnosis in adults, but these criteria were specifically created for the diagnosis of ADHD in children, so they do not accurately describe the behaviors that are seen in adults.

Some researchers have suggested modifying the diagnosis for adults so that if five symptoms of the DSM IV are met (as opposed to six in children), then a diagnosis can be made. A few other criteria have been developed and are currently being used, but there is no gold standard for evaluating and confirming the diagnosis.

The medications used in adults for ADHD are the same that are prescribed in children. Stimulants are prescribed first. Many patients see good results initially, but some researchers caution doctors not to be overly optimistic with these early results. There is a lack of studies on the long-term effects of stimulant medications. Cardiovascular side effects can occur and are an even greater concern in adults than in children.

Stimulant medications treat the core symptoms of ADHD, hyperactivity, inattentiveness and impulsivity. Medications that treat other symptoms of ADHD, like depression and anxiety, do not have evidence of positive results. These medications were actually found to have a negative effect in some cases. Dr. Amen, who looks at brain scans in those with ADHD, has identified six categories of ADHD. Using these categories, he has been able to identify which patients would benefit from certain medications, nutritional therapies and supplements. This approach offers a more specific look at a complex disorder.

Psychotherapy has been shown to have comparable effects to medication, even in the long term. In some cases medication is helpful during the onset of psychotherapy so that the patient is better able to learn and apply the techniques. As time progresses, medication may not be necessary. The patient may effectively apply therapeutic techniques to control difficult behavioral and emotional patterns.
What Are the Standard Medical Treatments?

Often the first line of treatment for ADHD is stimulant medication, either methylphenidate (Ritalin, Metadate, Methylin, Concerta or Daytrana, a patch) or amphetamine (Dexedrine, Dextrosat, Adderall). The current recommendations for children who do not respond to one stimulant medication are to try each other stimulant, up to the full dosage. If a child still does not respond, the diagnosis is reconsidered. If it is determined that the child still has ADHD, antidepressant medications or other non-stimulant medications may be prescribed.

Many doctors (and parents and teachers, for that matter) are under the impression that drugs are the most effective method of treatment for ADHD. This is quite a short-sited view, however. While medication can control some symptoms of ADHD, it has not been shown to be effective for the long-term outcomes of the disorder, such as academic achievement. In 1999, a highly publicized study concluded that when medication was administered as a first treatment, many children did not need intensive behavioral interventions. If a child still does not respond, the diagnosis is reconsidered. If it is determined that the child still has ADHD, antidepressant medications or other non-stimulant medications may be prescribed.

Another major problem with the stimulants prescribed for ADHD is that they are classified as Schedule II drugs by the FDA. This means that they are highly addictive. Other drugs in this class include cocaine, methamphetamine, opiates and barbituates. Though some studies have found that, when used according to prescription, ADHD stimulants aren’t addictive, there is still reason for concern. The prevalence of alcohol and drug addiction in adolescents and adults with ADHD is high. ADHD stimulants have been called gateway drugs for this reason.

Behavioral therapy is another standard treatment for ADHD, often used in conjunction with medication, but can be used by itself. Behavioral therapy refers to interventions that modify the physical and social environment with the goal of changing behavior. Parents and teachers are trained to apply these methods at home and at school.

There are many different behavioral therapy techniques, but the most effective, according to the American Academy of Pediatrics are:

- Positive reinforcement
- Time-out
- Response cost
- Token economy

Positive reinforcement involves providing rewards or privileges for good behavior. In time-out, the child is restricted to a certain area for a period of time after performance of unwanted or problem behavior. With response cost, rewards or privileges are removed as a result of unwanted or problem behavior. Token economy combines positive reinforcement and response cost. When the child behaves well, rewards or privileges are earned. When the child misbehaves, the rewards or privileges are taken away.

It is estimated that approximately 4.6 million children between the ages of 6 and 17 have, at some point, received a diagnosis of ADHD, though children as young as 4 can be diagnosed with the disorder. Worldwide, ADHD affects 8 to 12 percent of children. In contrast, in 1985, between 650,000 and 750,000 children were diagnosed. That number climbed to 4 to 5 million by 2000.

One study mentions that, in children who experienced hallucinations, visual and/or tactile sensations of insects, snakes or worms were common. This is an unsettling fact. Furthermore, the stimulant drugs used to treat ADHD have been linked to an increase in sudden death in otherwise healthy children.
ADD/ADHD is another condition with many labels and subcategories. Again, we return to the gut. We look once again at the model of increased intestinal permeability. Increased intestinal permeability equals increased immune dysregulation. This can be due to heavy metals, dietary toxins, physical and psychological stress, food allergies and sensitivities, and nutrient deficiency ranging from the fat soluble vitamins D, E, A, K, to minerals like calcium, magnesium, zinc and selenium. Also included are amino acids; including glutamine, glycine, cysteine and arginine; and deficiencies of fiber, essential fats, probiotics and enzymes. These factors can lead to increased intestinal permeability, which allows partially digested food and microbial antigens to cross the epithelial (gut) lining causing the gut-associated lymphoid tissue (GALT) to go into high gear (immune upregulation).

Overactivated GALT can easily lead to overactive systemic immunity due to increased inflammatory cytokines like IL-6, IL-1, and TNF-alpha, which can increase blood-brain barrier permeability. So leaky gut syndrome may lead to leaky brain syndrome. The glial cells in the brain, which are a large part of the brain’s immune system, then increase their production of nitric oxide synthetase, thereby increasing brain production of nitric oxide levels. The right amount of nitric oxide is good, but too much is really bad. It causes the neurons to open their NMDA (N-methyl d-aspartate) receptors for too long, and allows too much calcium into the cells. The mitochondria “mop up” the calcium, and it causes them to undergo apoptosis (death from the inside out), which results in decreased ATP production in neurons which equals so-called “brain brownout.”

Depending on which areas in the brain that brown out, there will be variable and overlapping loss of function from mild to severe. This may be as simple as mild ADHD, to bipolar disorder, depression, to serious cases of autism, schizophrenia, Parkinson’s disease, frontal lobe dementia (FLD) or Alzheimer’s. I honor the fact that each of these conditions, including all the subcategories of ADHD, have some differences and may require different approaches to treatment. However, we need to be ever mindful that the starting point for most illnesses, including neurological disorders, begin with genetic susceptibility, toxicity, nutrient deficiency, diet, and the gastrointestinal tract.

As mentioned, toxins, and the body’s inability to remove toxins in a timely manner can be a major trigger for increased inflammation, leading to neuro-inflammation, decreased blood flow and decreased function to various areas of the brain. A recent article in Biological Psychiatry showed that low levels of lead (<1.3 mcg/dl) were found in kids with ADHD. The acceptable level according to the government is <10 mcg/dL and will need to be lowered based on this data. A recent article shows that organophosphate pesticides are implicated in ADHD. Their main recommendation is to switch to all organic foods whenever possible. The frontal lobes seem to be particularly affected with the decreased function seen in ADHD. Another recent article on neuroimaging showed that ADHD involves the prefrontal cortex, and includes its relationship with the basal, thalamic and cerebellar areas of the brain. Thus, it is likely that all of these areas are part of the pathophysiological foundation of this disorder.

There is clinical evidence that suggests that exercise is beneficial in decreasing the symptoms of ADHD. According to Dr John Ratey, clinical associate professor of psychiatry at Harvard Medical School, there are many ways exercise helps. First, exercise can increase dopamine and norepinephrine creating an effect similar to Ritalin. Exercise also wakes up the frontal cortex, and thereby decreases impulsive behavior and cravings. In addition, it has been shown that exercise increases the stem cells in the peripheral circulation of the blood. These cells can travel to the brain and have beneficial effects on brain function. I think we will soon see the use of intravenous stem cells to treat serious cases of ADHD in the same way stem cells are being shown to help improve children with autism.
I believe that, in many cases ADHD begins with a nutrient-poor diet and/or overuse of antibiotics during childhood, both of which create gut imbalance that can result in food sensitivity and a lack of beneficial bacteria. It is very important to address diet with this condition. Eliminate artificial ingredients and choose organic foods when possible. Be sure that the diet includes plenty of omega-3s and, if not, supplement with fish oil. Also, excess sugar in the diet and sugar cravings may signal an underlying Candida overgrowth. A comprehensive stool analysis (CSA) may be helpful to take a closer look at any gut imbalances. I have seen very low or even no Bifidobacteria in many people with ADHD.

**Rule Out:**
- Food sensitivities (See the Gluten Sensitivity or Allergies section.)
- Candida overgrowth (See the Candidiasis section.)

**Recommended Testing**
- Gluten sensitivity test (See the Appendix.)
- Comprehensive stool analysis (CSA) (See the Appendix.)
- Hair toxic element profile (See the Appendix.)

**Diet**
- Follow the Fiber 35 Eating Plan found in the Appendix of this book.
- If Candida overgrowth is present, follow the Candida Diet found in the Appendix.
- Limit or eliminate processed sugars and refined carbohydrates. Opt for high-fiber whole grains instead.
- Include plenty of fruits and vegetables into the diet.
- Reduce consumption of saturated fat and eliminate trans fats from the diet.

**Lifestyle**
- Regular physical activity is helpful for reducing symptoms of ADHD.
- Spending time outdoors is beneficial for people with ADHD.
- If overweight, lose weight.
- Reduce toxin exposure.
- Quit smoking.

**Complementary Mind/Body Therapies**
- Stress reduction therapies such as yoga, biofeedback, massage, and meditation can be helpful to relieve stress.
- Colon hydrotherapy is helpful to remove toxins.
<table>
<thead>
<tr>
<th><strong>Recommended Nutraceuticals</strong></th>
<th><strong>Dosage</strong></th>
<th><strong>Benefit</strong></th>
<th><strong>Comments</strong></th>
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<tbody>
<tr>
<td><strong>Critical Phase</strong></td>
<td></td>
<td><em>Daily maintenance recommendations should also be taken during this phase unless otherwise indicated.</em></td>
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</tbody>
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| L-Glutamine Powder with Gamma Oryzanol | Age 1–5: 1200 mg twice daily  
Age 6–12: 2500 mg twice daily  
Adults: 5000 mg twice daily | Helps repair digestive tract lining and reduce inflammation. | Best if taken in loose powder form. |
| Probiotics | Child: 100 billion  
Adult: 200 billion culture count daily for two weeks | Protects the intestinal lining, helps improve immune and digestive function. | Look for high amounts of bifidobacteria, the main bacteria in the colon. |
| Steps of Cleansing | Adults: See Appendix | Helps support the body’s seven channels of elimination, eliminates microbial invaders and provides targeted detoxification. | Look for high-quality cleansing and detox formulas. |
| **Helpful** | | | |
| Multivitamin/mineral Formula | High potency | All vitamins and minerals support cardiovascular function. | Be sure vitamins are in their natural forms. |
| **Daily Maintenance** | | | |
| Probiotics | Child: 50 billion  
Adult: 80–100 billion culture count daily after critical phase | Protects the intestinal lining, helps improve immune and digestive function. | Look for high amounts of bifidobacteria, the main bacteria in the colon. |
| Critical Liver Support Formula | Adults: use as directed | Enhances liver detoxification. | Should include milk thistle seed extract containing silymarin, N-acetyl-cysteine, alpha lipoic acid and L-glutathione. |
| Omega-3 Fatty Acids | Child: 500–1500 mg  
Adult: 2-4 g | Helps support healthy brain function. | Get a concentrated, enteric coated, high dose EPA/DHA formulation. |
| Fiber | Child: age + 5 grams of fiber daily  
Adult: 4–5 grams twice daily | Helps produce healthy bacteria levels and good bowel elimination. | Use in conjunction with a high-fiber diet to obtain 35 grams of fiber daily. |
| Digestive Enzymes | Use as directed | Helpful to fully digest foods and absorb nutrients important for brain function. | If stomach acid is low, adults should use a formula that contains HCl. |
| Vitamin D<sub>3</sub> | Child: 500–1000 iu daily  
Adult: 1000–2000 iu daily | Helps heal leaky gut, decrease inflammation, increase overall health. | Research is showing many health conditions are associated with low vitamin D levels. |

See further explanation of supplements in the Appendix