Attention-Deficit/Hyperactivity Disorder

Six percent of the American population is affected by ADHD, nearly 17 million people! Of these people, 35% percent never finish high school and 52% (that go untreated) develop alcohol and/or drug abuse problems. One half of the inmates in US prisons have been found to have ADHD. Many people, 30-65%, never outgrow ADHD and struggle with it the rest of their lives (all references above by Amen, 2001, pg. xv-xvii). ADHD has a profound effect on the people that it touches, both individually and societally. We should not brush it under the rug as a "disorder de jours." Treating ADHD is not as futile as many allopathic doctors may seem, their only recommended intervention being the prescription of pharmaceutical stimulants. My hypothesis is that Attention Deficit Hyperactivity Disorder, and its symptoms, can be reduced or eliminated through the practiced application of: proper nutrition, supplementation, improved digestion, detoxification, and exercise.

The terms used to "label" attention deficits have changed throughout the years. The Diagnostic and Statistical Manual of Mental Disorders, fourth edition, or DSM IV, classifies all attention deficits under the term "ADHD," or attention deficit/hyperactivity disorder. There are two "main" categories: ADHD predominantly inattentive, and ADHD predominantly hyperactive-impulsive. A third category, called ADHD-combined, is a combination of inattentive and hyperactive-impulsive. In any of these cases, the condition must occur before age 7 and exist for more than 6 months to be considered ADHD. DMS IV identifies a series of symptoms for each of the following disorders. Six or more of the symptoms must exist to be "officially" diagnosed with ADHD. For this paper, ADHD and ADD are interchangeable.

**ADHD-inattentive**

This is someone who has difficulty paying attention and completing assignments, frequently daydreams, and is easily distracted. Many people with ADHD-inattentive are quick learners and therefore easily bored. Teachers and parents often mistake their poor application at schoolwork as a sign of lower intelligence, but this is rarely true. They require fast-paced activities and a structured environment to keep them engaged in learning processes. Adults with ADHD-Inattentive do best when they organize themselves with a detailed to-do list and avoid procrastination. People with ADHD often describe it as having all of the stations of a radio tuned in simultaneously. As you could image, it would be almost impossible to focus on one thing.

**ADHD-Hyperactive/Impulsive**

These Individuals are always moving and tend to be forever on the go. They are unpredictable, talk a lot, and are impatient, hot tempered, and impulsive. They can, however, maintain attention for long periods. They often enjoy computer-based activities and do well in sports or music. Adults with ADHD-Hyperactive/Impulsive are more likely to have difficulty in relationships, both personally and professionally, because they tend to resent authority. They often become business entrepreneurs.
**AD/HD-combined**
This refers mainly to adults who have many of the characteristics of both groups. They have difficulty fitting in with others and are resistant to change. These individuals are more likely to have learning difficulties, behavioral disorders, and developmental disorders.

Currently, the DSM IV, which is based on subjective behavioral diagnosis, is the most widely accepted classification used by most medical doctors and psychologists, as the DMS IV is the “bible” of mental disorders for those in the medical field. However, recently Dr. Daniel Amen’s theory of classification, which is based on scientific brain imaging, is getting more recognition. Dr. Amen is a board-certified child, adolescent, and adult psychiatrist and is licensed in nuclear brain imaging. He has dedicated years of his practice to examining thousands of patients with ADHD and reviewing their SPECT studies (brain images). Through his work, he has discovered six types of ADHD, rather than two. I find his work valuable because he uses brain imaging to see and classify the types of disorders. This verifiable indicator offers a component of validity that the subjective diagnosis of the DSM IV does not. Through my research, I have identified additional behaviors, such as aggression and depression, that appear to be ADHD related, that are not addressed under DSM. Dr. Amen explores these behaviors.

The six types he has identified are:

- **Type 1 - Classic ADD** (same as ADHD-Hyperactive/Impulsive) – restless or hyperactive, has trouble listening, difficulty organizing, is easily distracted, is forgetful, is fidgety, is noisy, talks excessively, is impulsive.

- **Type 2 - Inattentive ADD** (same as ADHD-Inattentive) – is easily distracted, has trouble listening, has difficulty sustaining attention, daydreams excessively, is tired, is spacey.

- **Type 3 - Overfocused ADD** – worries excessively, is oppositional, gets locked into negative thoughts, tends to hold grudges, has trouble shifting attention.

- **Type 4 - Temporal Lobe ADD** – has periods of quick temper or rages, misinterprets comments as negative, becomes irritable, has periods of spaciness, confusion or panic, is sensitive, has dark suicidal or homicidal ideas.

- **Type 5 - Limbic ADD** (often mistaken for depression) – Moodiness, negativity, low energy, frequent irritability, tendency to be socially isolated, frequent feelings of hopelessness, lowered interest in fun activities, chronically low self-esteem.

- **Type 6 - Ring of Fire ADD** – is angry or aggressive, is sensitive to noise, light, clothes or touch has frequent mood changes, is inflexible, insists on having their own way, have periods of mean or insensitive behavior, has periods of excessive talkativeness.

For this paper, I will be using the DSM classifications unless I specifically refer to Dr. Amen’s classifications. In most cases, it does not matter which classifications are used because I believe that
many of the causes and treatment are the same. Exceptions occur when describing supplemental protocols to improve specific neurotransmitter and brain imbalances.

Diagnostic Challenges

Currently under DSM IV, diagnosis is completely subjective (which is why I prefer Dr. Amen’s use of braining scanning for diagnosis). Teachers and doctors most often make assessments and diagnoses, not parents, who know their children best. Part of the problem is that classrooms are crowded and teachers do not want to take (nor have) the extra time to manage behavior. Therefore, to make their lives easier, snap assessments and recommendations are made for drug therapy. Some teachers have even insisted that children not return to class until they are on medication. This, by the way, is illegal.

Another challenge with diagnosis is gender. Boys are 80% more likely to be diagnosed with ADHD than girls. Is this because of a defect with boys, or simply misreading "normal" boy behavior as a disorder? According to Marcia Zimmerman, a certified nutritionist and lecturer specializing in the treatment of ADHD, boys adopt adult gender-appropriate behavior more quickly than girls. This could easily be mistaken as aggression (Zimmerman, 1999, pg. 31). Closer attention must be paid to behavior before diagnoses are made.

One of the major reasons children with ADHD don’t do well in school is the way they are taught. (This could be an entire paper, but worth a mention here because poor performance in school has greater ramifications later in life) In many cases, these children are not of below average intelligence. Often, they are gifted. However, because schools teach based on a left-brained, analytic model where kids are forced to sit still and listen (not experience and create), these children often do poorly at school. Not only does this effect their self-esteem but it puts them at a disadvantage for life since many do not graduate from high school or go on to college and their career choices become limited. These children require alternative, more engaging modes of learning that best suit their way of taking in and sorting information. Given the proper learning environment, children that struggle may be able to thrive.

Although we, especially in America, are over-diagnosing ADHD, we need to be aware that there are children out there that truly have ADHD, for whom a diagnosis would be helpful. Diagnosis can bring an understanding and explanation of their challenges and help them realize they are not “bad” or crazy. The awareness it brings to parents can help them address the special needs of their children. Perhaps they could explore alternative teaching schools, or finding a teacher that understands ADHD. Discovering an organization like Kitty Petty, ADD/LD Institute in the San Francisco Bay Area is great way to identify a supportive school environment (Sevrens, 1998, A1). Additionally, they may seek out a nutritional consultant and alternative therapies. Overall, we need to be careful not stigmatize children and cause future challenges for them.
Allopathic Recommendations

For the most part, the prescription of stimulants is Western medicine’s only solution to ADHD. Unfortunately, this "solution" never leads to a cure or even the long-term reduction of symptoms. Like many allopathic treatments, it is a short-term "temporary" bandage, treating only the symptoms, often at the expense of long-term health.

Although allopathic medicine prescribes stimulants for all types of ADHD, other doctors believe in it’s short term effect for certain cases. Dr. Amen believes that based on behavior observation and brain imaging stimulants (at least for the short term) do help some types of ADHD, mostly hyperactivity (or Dr. Amen's Type 1 and 2). However, actually make four of the six types of ADHD worse. Although Dr. Amen’s brain imaging shows that great stimulants can improve some ADHD, I do not agree with their use. As we will see below, there is no evidence on their effectiveness to help increase learning, they cause great imbalance in the body, have many side effects, can cause permanent harm, lose their effectiveness in the long term, do not do anything to improve the underlying cause of imbalance so initial symptoms will return, often to a greater degree, after the medication is stopped, and long term effects have not been determined.

The effectiveness of stimulants was discovered by mistake. In 1938, Dr. Charles Bradley asked a nurse to administer bromide to an overactive girl. However, the nurse accidentally gave her Benzedrine, a stimulant. Shortly after, the girl fell asleep. After being pleasantly surprised by the girl’s ability to relax and fall asleep, they evaluated what they had done and realized that a mistake had been made in the medication. From this point on, stimulants have been used to treat hyperactivity. In the 1950’s, the US government, to help control the behavior of children, approved the use of methylphenidate and amphetamine.

The stimulants prescribed for ADHD include Ritalin (amphetamine-like), Metadate, and Concerta (long acting amphetamine-like), Adderall, Dexedrine, Deoxyn, Gradumet (outright amphetamines). I will be focusing on Ritalin, as it is the most commonly prescribed brand of methylphenidate (manufactured by Novartis); however, all of these stimulants act very similarly so the information applies to all stimulants prescribed for ADHD. Ritalin is classified as a Class II Drug and is a "controlled substance," according to the Drug Enforcement Agency. Other drugs in this category include cocaine, methamphetamine, and methadone. A drug becomes a controlled substance when it has a high potential for abuse and/or addiction. Because Ritalin is so common and so quickly prescribed to our children, most people are not aware of this classification.

It is counterintuitive that a stimulating drug would have a calming effect. Novartis states that “the mode of action in man is not completely understood...(Novartis, 2001:1)” Some scientists believe they work, in the short term, for hyperactive children because they don’t seem to have enough norepinephrine, a
neurotransmitter in the limbic system that has to do with inhibitory control. Stimulants prevent the reuptake of norepinephrine at the synaptic cleft - the result is a calming effect. Others believe that hyperactivity is caused by decreased activity in the prefrontal cortex and that stimulants activate the prefrontal lobe, thus providing a calming effect and the ability to focus (Amen 2001:42). Dr. Breggin states that stimulants increase activity of the nerves by: increasing the amount of neurotransmitter (dopamine, norepinephrine, and serotonin) released in the synapse, and reducing the rate of removal (Breggin 2001:64-67).

Some facts about Ritalin:
- In 1995, 10-12% of boys from 6-14 were diagnosed with ADD and treated with methylphenidate [Ritalin].
- The United States uses approximately 90% of the world's Ritalin.
- Prescription of stimulants to 2-4 year old toddlers has recently increased three fold.
- Ritalin abuse is increasing. Children and young adults have learned that they can get high by snorting or injecting Ritalin.
- Ritalin is the fastest growing drug of abuse on school grounds.

There are many harmful effects of Ritalin. Novartis states in its Ritalin Prescribing Information that the adverse reactions include nervousness and insomnia, hypersensitivity, anorexia, nausea, dizziness, palpitations, headaches, dyskinesia, drowsiness, Tourette’s syndrome (reported as rare), toxic psychosis, abnormal liver function, carcinogenesis/mutagenesis of the liver reported in lab tests on mice, to name a few (Novartis, 2001:5). In his book, Talking Back to Ritalin, Dr. Peter Breggin (a psychiatrist in Maryland) identifies the harmful effects of stimulants (gathered from stimulant experts, DEA, and the FDA) to include: psychosis, depression, zombie-like behavior, mania, brain seizures, nausea, stomach aches, cardiac arrest, aggression, confusion, mental impairment, and many more (Breggin, 2001:32). Many children on stimulants can turn into zombies, develop obsessive-compulsive behavior (from the over focusing effects of the drug), can cause permanent tics, and rebound and withdrawal effects. Moreover, children taking Ritalin are often misdiagnosed with additional problems including clinical depression, schizophrenia, and bipolar disorder that doctors often believe have been "unmasked" by the Ritalin. Instead of removing the child from stimulants, these doctors mistakenly prescribe additional drugs such as antidepressants, mood stabilizers, and neuroleptics. Some children end up taking 4 or 5 different psychiatric drugs that are intended for adults (Breggin, 2001:7).

Novartis describes drug interactions to include (Novartis, 2001:3-4): anticonvulsants, anticoagulants, the anti-inflammatory agent phenylbutazone, and tricyclic antidepressants, where Ritalin may inhibit the metabolism of the drugs. These drugs in combination with the stimulant can increase the effect to dangerous levels. Combining Ritalin with the antihypertensive, guanethidine, can decrease the effects
of the antihypertensive action. Additionally, Ritalin may increase adverse reactions when combined with other stimulating drugs such as those used to treat asthma and colds, as well as caffeine (Breggin, 2001:57). Taking Ritalin with MAO Inhibitors can result in life threatening hypertension (Breggin, 2001:57). Breggin has seen agitation worsen when stimulants are combined with SSRI’s (Breggin, 2001:57). As explained above many children are also on some form of antidepressant because of the depressive effects of the stimulant with some children: This could have serious or life-threatening complications.

I believe the following herbs should not be used while taking stimulants as well. Ephedra or ma huang and other stimulants as the can intensify the stimulating effects and cause harm. Herbs that increase blood pressure such as ginseng and licorice (panax, Siberian, and Chinese) because the hypertensive effects of the stimulant could have an adverse reaction with the similar properties in these herbs. As SSRI’s are cautioned above, I would also not use St. John’s Wort as it functions similarly to SSRI’s. Any other herbs, supplements, or over-the-counter medications that are stimulants, increase blood pressure, or act as antidepressants should not be used.

There is also a warning on the Ritalin Prescribing Information (Novartis stating, “marked anxiety, tension, and agitation are contraindications to Ritalin, since the drug may aggravate these symptoms. Ritalin is contraindicated also in patients known to be hypersensitivity to the drug (how would they know), in patients with glaucoma, and in patients with motor tics or with a family history of diagnosis of Tourette’s syndrome... Ritalin should not be used for severe depression...” However, many physicians prescribe Ritalin in such a case (Breggin, 2001:41), causing great stress, anxiety, potential harm to the child. Novartis states “long-term effects of Ritalin in children have not been well established (2001:4).”

With all of this risk, the rewards must be worth it. Right? Most children are taking these drugs to be calmer and pay more attention at school and home, in an attempt to improve learning. So what is the effectiveness in improving learning capabilities? According to the American Psychiatric Press Textbook of Psychiatry “Stimulants do not produce lasting improvements in aggressivity, conduct disorder, criminality, educational achievement, job functioning, marital relationships, or long-term adjustment.” A team of prestigious stimulant advocates assembled by the National Institute of Mental Health stated the same finding, “the long-term efficacy of stimulant medication has not been demonstrated for any domain of child functioning.”

With results like these, why are they given? There are many explanations for this. One is the billions of dollars in revenue brought in every year by Novartis and other pharmaceutical companies. The power, money, political influence, massive marketing efforts, and deceptive publishing of efficacy could take an entire book so I will just leave the political issues at what I have mentioned. To proceed, in the short-term (4-12 weeks), stimulants can quiet some child, allowing them to sit still so the teacher can teach
without disruption. Teachers and parents often see this as “progress.” However, they are actually being drugged often to a zombie-like state. They become removed, hypoactive, and too quiet. The child is not listening or learning, but being “drugged into submission” and appears to be paying attention and learning. However, as seen above, there has been no proof of greater impact on learning.

For more information on Ritalin, see the Novartis’ Ritalin Prescribing Information.

Currently there is a class action suit against Novartis (Ciba Geigy) led by Dr. Breggin accusing them of fraud in over promoting Ritalin as well as the ADHD diagnosis. Additionally, CHADD (an “impartial” ADHD parental organization funded by Novartis), and the American Psychiatric Association, have been charged in the suits as well for conspiring with the drug company to promote sales of the drug. To see if I felt comfortable with the impartiality of Dr. Breggin, I looked up just “Ritalin” on several Internet search engines: Dozens of websites came up on Ritalin (almost all of them negative) from doctors, parental groups, and concerned grandparents and parents on the negative effects, warnings and deaths from Ritalin. I conclude that the information from Dr. Breggin is the view of many people involved with Ritalin not the exception. As these parents, teachers, and doctors have nothing to gain by speaking out and the pharmaceutical companies have everything to lose, I feel very confident about the information against Ritalin and other stimulants for children.

**Causes of Imbalance and ADHD**

The major causes of this imbalance are genetics, prenatal environment, food sensitivities, allergens, toxins/detoxification, faulty sulfur metabolism, and malnutrition/poor digestion. I will investigate each of these causes before presenting a protocol for ADHD, which I believe, can reduce or eliminate ADHD and its symptoms. This protocol comprises, nutrition, supplementation, improved digestion, detoxification, and exercise.

It is widely accepted that there is a genetic link to ADHD. Children with ADHD often have parents with ADHD, or related neurological disorders such as depression, Tourette’s Syndrome, antisocial behavior, and others. The link between a child with ADHD and a family member (or several family members) with ADHD is significant. In 1971, J.L. Morrison and M.H. Stewart published the first study that demonstrated family tendency toward hyperactivity (Zimmerman, 1999, pgs. 67-68). They found that 20 percent of hyperactive children had a parent that was hyperactive.

Very often, children with ADHD have a family member with depression (and, to a smaller degree Tourette’s or antisocial behavior). In 1995, LE. McCormick, M.D, published his findings, that there is a link between mothers with depression and a child with ADHD, in *Family Medicine* (Zimmerman, 1999, pg. 66). He reported that of 58 children with ADHD, 38% of their mothers had depression.
minor to major. He was curious about the connection. Were the mothers depressed because they had a child with ADHD? Which came first, depression in the mother, or ADHD in the child? In September 1997, Stephen Foraone, Ph.D., and Joseph Beiderman, M.D., reported in the Journal of Nervous and Mental Disease, that the body of evidence was overwhelmingly supported a familial link between ADHD and depression (Zimmerman, 1999, pg 66).

We can intuitively understand the common genetic link for ADHD, but why are depression, Tourette's Syndrome, and others so commonly found in families? I have identified two explanations. Regarding the link with depression, one of the types that Dr. Amen recognizes, that he calls Lymbic ADD (Type 5), is very similar to depression - with symptoms of moodiness, negativity, low energy, feeling of hopelessness, etc. Depression due to ADHD could be easily misdiagnosed as clinical depression, when it may actually stem from Lymbic ADD.

Another explanation for the genetic link between ADHD and other neurological disorders such as Tourette's, Autism, dyslexia, etc. is Michael Lang's theory (more detail later). Lang, parent of autistic spectrum children, biochemical researcher, and supplement formulator (www.BrainChildNutritionals.com), believes that faulty sulfur metabolism is the common link/cause of most neurological disorders. As such, we would consistently see these disorders within families, and the symptoms of many of these disorders would appear in one person. Therefore, a child with ADHD is likely to have a family member with ADHD, Tourettes, dyslexia, autism, or schizophrenia. Additionally, someone with ADHD is likely to have some symptoms consistent with dyslexia or Tourettes; or a child with autism is likely to have hyperactivity or other symptoms of ADHD.

However, a genetic predisposition is rarely the only factor effecting the development of ADHD. As we observe with most diseases, heredity often provides the weak link, but environment, behavior, and lifestyle causes the imbalance that allows the disorder to appear.

**Prenatal environment**

Before the birth of a child, the health, nutrition, stress level, and exposure to toxins of the pregnant mother and fetus affect the likelihood of the child being later diagnosed with ADHD. As referenced by Zimmerman, in a study done by R.S. Dean, if the mother is malnourished due to poor diet, morning sickness, or if its her second or more pregnancy (where the mother has been depleted of nutrients), the child is more likely to develop ADHD (Zimmerman, 1999, pg. 70). In a 1995 study in the International Journal of Neuroscience (as referenced by Zimmerman), researchers D.E. McIntosh, R.S. Mulkins, and R.S. Dean found that “the great number of medical conditions a mother had during pregnancy, the greater likelihood that the child would later be diagnosed with ADHD” (Zimmerman, 1999, pg. 70). Additionally, the study showed that children whose mothers smoked cigarettes, or were under moderate emotional stress while pregnant, were more likely to be diagnosed with ADHD. Moreover, Zimmerman
states that mothers with food sensitivities that eat those foods in abundance (and/or have a food sensitivity themselves), tended to have children with the same food sensitivities. After birth, sometimes even moderate consumption of these provocative foods by the child led to the development of ADHD.

**Food Sensitivities**

Many times, food sensitivities cause ADHD-like symptoms, or are a major contributing factor for the development of ADHD. Sometimes these are called food allergies - however, food allergies have acute symptoms. For example, when a child with an allergy to peanuts eats even one nut, his throat may close up and he'll have trouble breathing. Food sensitivities are more subtle and usually express themselves later after ingestion, though equally problematic. A food sensitivity is more difficult to identify, however it is often characterized by repeatedly eating a food in excess.

These provocative foods cause mood swings, chemical reactions affecting the brain, digestive problems and malabsorption (which cause additional health and cognitive problems), hyperactivity, depression, and more. In fact, according to Zimmerman, 75-80% of children with ADHD have allergies and/or food sensitivities (Zimmerman, 1999, pg.75). According to Doris Rapp, best known for her work with children’s allergies, the symptoms of Tourette’s Syndrome, ATFS (Allergic tension fatigue syndrome) and ADHD are very similar. Rapp feels that if a child acts allergic or has a family history of allergies and displays symptoms of ADHD, it is possible that the child may actually have allergic tension fatigue syndrome (Rapp, 1991, pg. 329). Allergic Tension Fatigue Syndrome is a medical condition that stems from allergies and can cause tension, irritability, hyperactivity and/or fatigue, depression, and apathy. Both ATFS and ADHD children are impulsive to the point of not being able to sit still. They cannot concentrate, and quickly become distracted, fidgety, irritable, and wiggly. They also exhibit a variety of learning problems. Therefore, investigating allergies and food sensitivities is vital to understanding the causes of ADHD. Moreover, addressing allergies and food sensitivities is an important step in detecting the underlying causes, and ultimately reducing the symptoms of the disorder. Figures 1 and 2 show the effects of cognitive functioning after exposure to food allergies/sensitivities (Rapp, 1991, pg. 87).
In addition to the immediate behavioral manifestations, food sensitivities also cause secondary problems of decreased health, reduced immunity, and poor digestion. This is because the allergic foods often cause irritation of the intestine that leads to leaky gut. Leaky gut is a weakening of the intestinal wall where the partially digested peptide chains (from the sensitive food) leak directly into the blood stream. This causes the immune system to mark these proteins as invaders. The immune system then attacks itself, leading to additional health problems, allergies, and potentially more serious autoimmune diseases.

Often, sugar is identified as a cause of hyperactivity. Sugar alone is rarely the only cause of ADHD (and is a common myth), but it can definitely be a key factor. Sugar, upon initial consumption, often causes a “sugar rush” that leads to hyperactive behavior in some children. Excess consumption often causes wide swings in blood sugar and the development of hypoglycemia, which is common among those with ADHD. The symptoms of hypoglycemia include shakiness when meals are missed, nervousness, irritability, exhaustion, depression, headaches, digestive disturbances, forgetfulness, mental confusion, twitching or jerking of muscles, antisocial behavior, and more. Many of these are similar to the symptoms of ADHD and can cause ADHD-like symptomology, or exacerbate ADHD. Additionally, sugar is a common provocative food that causes food sensitivity symptoms, as discussed above.

N.L. Girardi reveals an interesting observation that offers an explanation of hyperactivity in ADHD children after sugar consumption. As reported by Zimmerman, after Girardi administered the sugar to the children, they experienced a rise in insulin, as expected. However, after blood sugar returns to normal levels or slightly below, typically the body compensates to increase glucose to the brain with epinephrine or norepinephrine. Girardi observed that ADHD children have a 50 percent lower rise in epinephrine and norepinephrine than non-ADHD children. This is significant because norepinephrine is a neurotransmitter that increases alertness and the flow of information to the brain and cells. Upon further investigation, he revealed that these children had a significant increase in physical activity as their blood sugar plummeted. His research interpreted this as the way these ADHD children compensate. This is because physical activity increases the level of norepinephrine, which would theoretically “jumpstart” their brain. It is believed that this is the way for ADHD children to try and compensate for a loss of information flow and alertness from sugar consumption.

Figure 2:
During a test with egg allergy extract in a four-year-old, his handwriting changes to backwards and upside down

Before Test During Test After egg treatment

In addition to the immediate behavioral manifestations, food sensitivities also cause secondary problems of decreased health, reduced immunity, and poor digestion. This is because the allergic foods often cause irritation of the intestine that leads to leaky gut. Leaky gut is a weakening of the intestinal wall where the partially digested peptide chains (from the sensitive food) leak directly into the blood stream. This causes the immune system to mark these proteins as invaders. The immune system then attacks itself, leading to additional health problems, allergies, and potentially more serious autoimmune diseases.
Environmental Allergens/Toxins

In addition to food allergies, allergens such as pollen, mold, or chemicals can lead to ADHD. The offending allergen not only causes a runny nose, but also can cause headaches, leg pains, irritability, and behavioral problems. If food elimination testing does not eliminate or significantly reduce the symptoms, I recommend serum allergy testing to determine if additional environmental or chemical allergies might be present. Doris Rapp suggests the Provocation/Neutralization Method (P/N Method) also called the Miller Method, a newer serum allergy test that seems to work well; although, most allergists have not, yet, accepted it as an effective test (Rapp, 1991, pg. 40). As it is similar to the accepted methods and appears to be a more sensitive, accurate, and exact testing method; it is strange that it is not more widely accepted.

Gary Null explains that chemicals, and chemical sensitivities, affect the brain and one's propensity to develop ADHD. In Null's book, The Food-Mood-Body Connection, he quotes Dr. Joseph Debe from a recent study on children diagnosed with ADHD that found “65 percent had parasites, one-third had yeast over growth, and 75 percent had a condition called Leaky Gut Syndrome... of these children who had impaired intestinal barrier function, toxins were making their way into the blood stream at greater than normal concentrations (Null, 2000, pg. 210).” These toxins in the blood stream can lead to severe ADHD symptoms and even autism.

Additionally, children can simply be sensitive to chemicals and environmental toxins without having leaky gut and still have cognitive problems and other ADHD symptoms. In tests run and referenced by Null and Rapp, we are able to see the effects of chemicals on cognitive functioning. The child is exposed to environmental toxins (even food sensitivities) and asked to draw or write their name. The neurological effects are profound. Before exposure, the child is able to draw or write his/her name with no problem. During exposure to the chemical, the child could not write his/her name, scribbles wildly, or refuses to draw at all (See Figure 3 below, from Rapp).

Figure 3:
Changes in ability of a four-year-old to draw due to exposure to disinfectant aerosol.

Before test  During test  After treatment with oxygen

Elizabeth Guillette conducted a study of the people of the Yaqui Valley that was published in the Environmental Health Perspective in June 1998 (Guillette, 1998, pp. 347-353). This was one of the few studies that have been done on the cognitive effects of pesticides. It was unique because of the groups that were studied - the study and control groups were almost identical in all aspects of life.
including genetic backgrounds, diet/nutrients, water mineral content, culture, social behaviors, etc. The only major difference was that the study group (the “Valley” families) used pesticides and the control group (the “Foothill” families) didn’t. The Valley farmers routinely applied pesticides to their crops forty-five times per each of the two growing seasons and sprayed in and/or around the home. They pesticides used are very similar to most that we use in the United States.

Guillette recruited thirty-three preschool age children from the Valley and seventeen preschool age children from the Foothills. Both groups were tested for gross motor and fine hand-eye coordination, memory, stamina and drawing ability. The results showed that the Valley children (the group exposed to pesticides) were significantly impaired in these tasks compared to those of the Foothills (Guilette, 1998, pg. 350-351). The drawings below show some of the results from Guillette’s study. This shows that exposure to pesticides can impair cognitive function (Guilette, 1998, 347-353). Therefore, it is important to know that pesticides could exacerbate ADHD symptoms and/or could be an underlying cause of ADHD. Since those with ADHD often have decreased detoxification abilities (as seen in the Faulty Sulfur Metabolism section), they should limit their exposure to pesticides.

Phenols and Salicylates
Toxins are everywhere. Many things that the average person would never consider toxic, such as artificial food coloring, flavoring, and preservatives, actually are poisonous to some people. Many of these food additives are phenols. A phenol is an organic compound of at least one hydroxyl group attached directly to the benzene ring. Almost everything edible has some phenolic compound. However, petroleum based additives are significantly high in phenols and can be a problem for those with ADHD, for reasons we will explore shortly.
Synthetic food colorings and flavorings, in most cases, are made from petroleum products. Synthetic preservatives including BHA, BHT and TBHQ are also related to petroleum. (You wouldn’t give your child a thimble full of Quaker State motor oil!). Since the end of World War II, Americans have been using preservatives with reckless abandon. For some reason, we think red maraschino cherries, that are redder than natural cherries and taste nothing like real cherries, are better than the real thing, and blue lollipops are normal. How can we make something taste more like strawberry than a strawberry itself?

Preservatives increase shelf life, which decreases spoilage and increases profits. While this is great for commercialism and multi-billion dollar corporations, it comes at the expense of our health and the health of our children. We think that because our grandma has used and trusted General Mills for 80 years (and their beautiful marketing schemes) that their products are 100% safe for everyone. After all, if they are harmful to people how could they put them in our food? Well, that's commercialism at work. We must become smarter. Outside the influence of American big business, many European countries have banned these artificial colors and flavors because of the severe health concerns associated with them. In America, in order to get a powerful multi-billion dollar company to take something off the shelves (and cut into their profits), you have to perform an extensive, 5-year multi-million dollar study and prove it is killing people before our government will force its removal from the shelves.

A subgroup of phenols is salicylates. These are naturally occurring compounds in certain fruits and vegetables, even those that are organically grown. Because they are so commonly ingested, Dr. Ben Feingold, (Chief Immunologist and Allergist at Kaiser Permanente in San Francisco in the 1970’s who did significant research around phenols), recommends testing all salicylates for reactions. The Feingold Diet describes the process for testing for sensitivities to these foods. Examples of food items with salicylates are apples, almonds, cherries, and aspirin. Acetaminophen is actually one of the worst phenols possible. Unfortunately, it is commonly administered to children, especially those with ADHD because they are so often sick.

It is believed that salicylates evolved in plants as protection from insect’s destruction. This compound required insects to vary their diet and prevented them from destroying entire regions of a specific plant. In nature, the buildup of salicylates would kill the insect. However, it is not the salicylate that kills the bug. Instead, the salicylate interferes with the bug’s ability to metabolize sulfur. This inability to metabolize sulfur causes the immune system to be destroyed and the insect then dies from mold, dampness, bacteria, etc. Evolution is clever, so, making matters worse, some phenolic fruits, like apples and grapes, have also developed PST (or phenol sulfotransferase) inhibitors (Lang). PST is an enzyme that metabolizes high-phenolic compounds. Feingold says that salicylates can suppress PST by up to 50 percent.

Let's explore how these artificial ingredients and high phenolic compounds cause behavioral and learning disorders, which can cause ADHD or exacerbate existing symptoms.
Faulty Sulfur Metabolism

Dr. Ben Feingold recognized that these artificial ingredients (phenols) made some children inattentive, hyperactive, and display autistic-like symptoms. In general, many people are sensitive to chemicals like these. Additionally, the phenols in these petroleum-based are toxic to humans because they disrupt sulfur metabolism and the immune system and must be detoxed from the body. In a healthy person, there are several phase II detoxification pathways in the liver to clear phenols: glutathione conjugation, glycine conjugation, sulfation, and glucuronidation. However, for many of those the ADHD (and autism), proper detoxification of phenols does not occur. Faulty sulfation, or faulty sulfur metabolism, is what Dr. Feingold and Michael Lang believe to be a major factor contributing to ADHD (and autism).

Sulfation involves an enzyme called PST (phenol sulfotransferase). Feingold’s theory is that phenols appear to overload PST, especially in individuals with neurological disorders including ADHD and autism. Feingold states that those with ADHD and autism are also low in PST (www.feingold.org). According to Rosemary Waring, of England, 73% of people with autistic spectrum appear to have a sulphation deficit. The study found that these individuals have an inability to effectively metabolize phenolic amines that are then toxic to the central nervous system that could exacerbate autistic behavior. (Waring, 1999, abstract) Given autism research and the success of the Feingold diet for those with ADHD, one could extrapolate that many individuals with ADHD have difficulty with sulphation.

Feingold also believes that PST is needed in the brain by neurotransmitters that are also phenolic. This means that the enzyme needed for the phenolic neurotransmitters to work (PST), is overloaded and the brain cannot “fire” properly. Additionally, in these individuals, the petroleum additives act more directly on the brain, like a drug. Because they are low molecular weight chemicals and have been shown to be 99% bound to blood proteins, they can pass through membranes such as the blood brain barrier. This is how some psychoactive drugs work. For these reasons, many researchers and experts in nutrition, such as Doris Rapp, Gary Null, Marcia Zimmerman, and Ben Feingold agree that removing artificial colors, flavors, and preservatives from the diet is an essential step to eliminating or reducing ADHD symptoms.

Lang believes that phenols do not actually overload PST, rather that these individuals are low in PST and that sulfation problems are a major cause of their ADHD challenges. Lang says that phenols and partially digested proteins are similar to neurotransmitters, and that in ADHD individuals they are able to cross the blood/brain barrier and “dilute” the neurotransmitter pools, causing them to not be able to fire properly. In some individuals, phenols are a neurotoxin. They distort the processing signals and cause hyperactivity, disorientation, and more serious neurological dysfunctions. Additionally, Lang says that phenols and partially digested proteins are similar in chemical structure to opiates and bind to opiate receptors causing drugged-like feelings.
Lang’s theory states that most neurological disorders are on a continuum - all related to faulty sulfur metabolism (or faulty sulfation). (See Figure 4)

Lang believes these disorders, that include ADHD and autistic spectrum, are due to faulty sulfur metabolism that result in compromised:

- **Membranes** (both gut and brain)
- **Digestion**
- **Detoxification**
- **Cellular function** – cellular metabolism, brain/neuron function, etc.

The concept of faulty sulfur metabolism appears valid for several reasons. If you add more sulfur supplementation to these kids with ADHD, their symptoms improve in the short-term, 5-10 days, but after that it appears sulfur overloads the system and their original symptoms worsen (Lang). Lang believes that it is not a lack of sulfur, but an inability to metabolize sulfur properly. The supplement MSM (methylsulfonylmethane) has been very effective as a sulfur compound that can be metabolized and used by the body to reduce existing symptoms (more about MSM in the Accessory Nutrients section)

Understanding what sulfur does in the body will help explain further why this faulty sulfur metabolism theory seems logical. Sulfur is a component of four amino acids – methionine, cystine, cysteine, and taurine (and present in two B vitamins thiamine and biotin) – and these amino acids perform a number of functions in enzyme reactions and protein synthesis. Sulfur is used to produce insulin, which helps regulate carbohydrate metabolism. I believe this is why many people with ADHD have blood sugar regulation problems and hypoglycemia. Taurine is found in bile acids, which are used in digestion. Sulfur is important to cellular respiration, which aids brain function and all cell activity. This explains why cellular function including brain activity are affected. It is necessary for the formation of collagen, the protein found in connective tissue in our bodies. This would explain a compromised intestinal track. Sulfur also helps the liver produce bile secretions and eliminate toxins. L-cysteine is thought to generally help body detoxification mechanisms through the tripeptide compound, glutathione. This would explain the presence of detoxification problems in these individuals and the need for ways to increase glutathione in the body.

**Poor Detoxification**
As detoxification is often poor in people with ADHD, toxins tend to build up – such as heavy metals. Heavy metals such as mercury and lead are known to negatively impact the brain and cause cognitive impairment. These toxic minerals cross the blood/brain barrier and can interfere with cognition. According to Lang, studies have been done testing children with ADHD for heavy metals and they are often high. This makes sense - if faulty sulfation causes problems with detoxification, we would see more heavy metal toxicity in those with ADHD – which we do. Additionally, this detoxification problem increases their toxic burden and total load causing many health, allergy, and immune problems.

Doris Rapp recognizes the compromised digestion and detoxification systems in people with ADHD and suggests nutrient supplementation to enhance the total body’s immunity and help restore normal digestion and natural detoxification mechanisms (Rapp, 1991, ppg. 314-315, 330, 533). These may help to diminish allergies and the propensity to other medical problems.” I’ll explain more about this in the Nutritional Protocol section. This leads me to explaining how lack of nutrients negatively effect ADHD.

**Poor Digestion/ Nutritional Deficiencies**

Interestingly, poor digestion is one of the symptoms of faulty sulfur metabolism. The process of proper digestion is the breakdown of food into small enough particles for maximum absorption of minerals and nutrients. Poor digestion leads to poor absorption, which produces nutritional deficiencies. For this reason, poor digestion and malnutrition should be examined.

Nutritional deficiencies are linked to decreased cognitive function, decreased neurotransmitters, irritability, aggression, clouding thinking, and lack of attention. Nutrients are essential for proper brain functioning. Additionally, overuse of antibiotics and leaky gut result in poor digestion and poor nutrient absorption. Allergies and sensitivities often cause picky eating behavior, which results in a lack of variety and often the consumption of poor quality food and malnutrition.

The following are examples of nutrient deficiencies among those with ADHD and their respective impact. To start, essential fatty acids are required for proper cognitive function and brain development. In a study reported by Zimmerman, performed by Dr. E.A Mitchell, low levels of essential fatty acids, specifically DHA and AA were found in children with ADHD (Zimmerman, 1999, pg. 73). It has been shown that essential fatty acid deficiency and ADHD have similar symptoms, and that boys with ADHD are low in EFAs. John Brugess ran a study where 53 boys with ADHD were compared to 43 boys without ADHD. He found that the ADHD boy had significantly lower blood lipids of EFAs arachidonic acid, AA (omega 6), eicosapentaenoic acid, EPA (omega-3), and DHA (omega-3). 40% of the ADHD boys had symptoms of omega-3 deficiency including increased urination and thirst, compared to only 9 % of those without ADHD (Stoll, 2001, ppg. 158-159). In a parallel study by Brugess, he found that those boys with low omega-3 fatty acids in the blood were more likely to display behavioral problems.
consistent with ADHD, regardless of whether they were actually diagnosed with ADHD (Stoll, 2001, pg. 159). In a study referenced by Andrew Stool in his book The Omega-3 Connection, preformed by an unnamed team of Dutch scientists (Stoll, 2001, pg. 176), high levels of AA (an Omega-6 fatty acid) can be a neurotoxin, while high intake of EPAs were associated with less cognitive impairment. It is becoming accepted that omega-3 fatty acids, DHA and EPA, are necessary for the development of the human nervous system. One of the contributing factors for developing ADHD is baby’s formula because it does not contain omega-3.

Calcium, magnesium, zinc, vitamin C and its cofactors, and vitamin B6 are just a few of the nutrients required by the brain to function properly. Polish researcher Tadeusz Kozielec, and his team, found that out of 116 children with ADHD, 95% had low levels of magnesium (Zimmerman, 1999, pg. 149). In a study completed by Dr. Paz Toren, (Zimmerman, 2000, pg. 149) children with ADHD had reduced zinc at 2/3 the serum level of zinc compared with the non-ADHD children.

**Holistic Protocol**

**Food Testing**

We have talked a lot about the harmful effects of food sensitivities. The following are two diets that can test for these provocative foods. They are the elimination diet and the Feingold diet. I strongly urge diligence with all steps of food testing, because if one provocative food is overlooked and not removed from the diet, the entire test may be compromised. I recommend that the entire family go on this diet for compliance, fairness, and to reduce negative associations and feelings.

Which test first? If there are any extremely unusual eating habits, for example eating large quantities of grapes, apples or raisins (the Feingold diet) or eating only wheat and dairy, like pizza, macaroni and cheese, grilled cheese (the elimination diet), then start with the corresponding diet. Personally, I recommend (for parents) to begin with the elimination diet. Some people believe that up to 50% of the population is sensitive to wheat or dairy - this is why I would start with the elimination diet. If someone does not have the time or patience for both tests, or have tried them to no avail, I suggest thorough allergy testing.

One elimination diet is Doris Rapp’s "Multiple Food Elimination Diet." This is similar to any elimination/provocation diet where the suspecting foods are eliminated for one week, including dairy products, wheat, eggs, corn, sugar, chocolate, peanuts, citrus, food colorings, food additives and preservatives. Then, one food is introduced into the diet, in excess, each day by ingesting either a teaspoon or 1/4-1/2 cup of the test food and doubling the amount eaten every few hours - so that by the end of the day at least a normal amount of the food has been eaten. Record the results. If the food is not offending it may be continued through the remainder of the test. A new food is tested each
day. In my opinion, the benefit of this test is that foods can be added back more quickly, thus providing greater variety - kids like this! The disadvantage of this test is that it does not take into consideration more subtle symptoms that can take several days to appear. One may want to try this test by adding one food every three to five days. Of course, I would recommend never adding any additives and preservatives back into the diet.

If the parent still suspects further problem foods and is confident it is not one of the provocative foods above, I would try the Feingold Diet. The Feingold diet involves eliminating all foods and substances with phenols and salicylates, which are artificial colors (such as “FD&C Red #2,” “Yellow #5,” “U.S. Certified Color,” “Color Added,” etc.), artificial flavors (including “vanillin,” “artificial flavoring,” “flavoring,”) and preservatives (such as BHA, BHT, and TBHQ), apples, grapes, cucumbers, oranges, aspirin, corn syrup, MSG, Hydrolyzed vegetable protein, Nitrites and nitrates, benzoates (sodium benzoate, benzoic acid), and sulfating agents (including sulfur dioxide, sodium sulfite, sodium bisulfate, etc.). After eliminating these foods and additives for at least 4-6 weeks, if you observe a positive response, you may re-introduce the foods back one at a time if you’d like to test them. Observe the response for five days and record the results. If you feel they are non-offending items, you can add them back permanently and you can go on to the next food for testing. If you have already determined foods that the child is sensitive to, do not add these foods back even if they are “allowed” in the Feingold Diet. Again, never add back petroleum-based additives.

Nutrition and Supplementation: Macronutrients, Micronutrients, Accessory Nutrients

Macronutrients/Diet
So what can you eat? Let’s begin with the basics – carbohydrates, proteins, and fats.

Carbohydrates come in two major forms – simple and complex. Simple carbohydrates include refine carbohydrates such as bread, flour products, sugar, processed foods, and grains. The problem with simple carbohydrates is that they act like sugar in the body. They cause a rapid increase in blood sugar that the body must work to reduce by releasing insulin. Insulin works so efficiently that blood sugar then drops too low, causing fatigue and irritability. This triggers you to eat more by causing you to crave more simple carbohydrates, which initiates a "roller coaster" of blood sugar, hormones, mood swings, and fatigue. This can also lead to hypoglycemia, hyperinsulinemia and diabetes, all of which exacerbate ADHD symptoms. Additionally, many people with ADHD have blood sugar regulation challenges. The solution to this is to eat complex carbohydrates like brown rice, quinoa, amaranth, root and leafy vegetables, etc, which do not cause this blood sugar response.

Protein is an important macronutrient for most people with ADHD. It stabilizes moods and helps regulate blood sugar. Protein provides the body with the essential amino acids. These amino acids build all of...
the proteins, neurotransmitters, and hormones that help reduce ADHD symptoms and help build and balance the body.

Fat is a necessary nutrient. Essential fatty acids are required for the development and functioning of the brain. They help reduce inflammation and improve mood. However “bad” fats do the opposite. Essential fatty acids include Omega 3 and Omega 6. It is important to include “good” fats like fish oil, nuts, and seeds. It is equally important to reduce “bad” fats, or transfatty acids and hydrogenated oils such as margarine, fried foods, processed foods, and mayonnaise.

In summary, people with ADHD should strive to eat a diet high in protein, moderate in complex carbohydrates, and low in refined carbohydrates with 30% of calories coming from high quality fats. Of course, planning a diet is not this simple, so this is simply a guideline from which to begin. Always refine the diet to suit individual needs. Food quality is very important. To avoid pesticides and herbicides, choose organic produce only. For meat as well, choose organic to help avoid hormones and antibiotics.

Good foods to eat are: organic meat, fish, organic fruits and vegetables, organic butter and dairy (assuming one is not sensitive to dairy), nuts and seeds (preferably raw), and beans/legumes.

**Micronutrients – Vitamins and Minerals**
A few of the most important micronutrients and their functions are explained below. I suggest a high quality multivitamin and multimineral supplement, because micronutrients often require cofactors for absorption.

**Vitamin C and Cofactors (bioflavinoids)** The brain contains more vitamin C than any organ of the body, except the adrenal glands. Vitamin C is required for the production of norepinephrine, dopamine, and serotonin, which are important neurotransmitters involved in ADHD. Vitamin C is a cofactor for folic acid, a vitamin essential for the development of the nervous system. Vitamin C is an antioxidant that protects the brain from free-radical damage due to heavy metals, toxins, iron, and copper. Vitamin C acts to chelate toxin minerals including lead, mercury, cadmium, and aluminum. As it is water soluble, a split dose twice per day is better because it is not stored in the body. Because laboratory manufactured vitamin C (ascorbic acid) is made from corn syrup (a common food sensitivity), I highly recommend a natural form, such as those made from acerola cherries.

Bioflavinoids are cofactors for vitamin C - in other words, they help with the absorption and utilization of vitamin C. Proanthocyanidins (PCOs) are bioflavinoids and their sources include pycnogenols like pine bark or grape seed extract. Vitamin C and pycnogenols improve attention, provide antioxidant protection of vitamin C, and DHA and phospholipids in brain cell membranes, improve microcirculation to the brain,
reduce histamine release and edema, improve visual adaptation. However, Lang warns that pycnogenols contain phenols and individuals should proceed with caution if sensitive to any phenols.

Of the B-vitamins, B6 (pyridoxine) is the most important for neurological disorders. In a report published in the Annals of the New York Academy of Science, A.L. Bernstein found that many neurological disorders such as seizures, autism, depression, headaches and chronic pain (many of which are related to ADHD) can be improved with B6 (Zimmerman, 1999, pg. 152). B6 and many cofactors (magnesium, zinc, ascorbate, biotin, folic acid and niacin) are needed to synthesize neurotransmitters. Some of these neurotransmitters include dopamine and norepinephrine, which control attention and hyperactivity. Others requiring B6 are serotonin (or 5HTP), which regulate depression, aggression, sleep, pain, impulsivity, and eating disorders many of which are common in those with ADHD. All of the B-vitamins work together as cofactors so one should take a B-vitamin complex and extra B6.

Calcium is very important to brain function. It regulates the speed, intensity, and clarity of every message that passes between brain cells. Calcium signals uptake and release of neurotransmitters. Calcium also interacts with potassium and sodium to maintain proper levels of nerve-cell stimulation, which balances nerve cell activation and inactivation in the brain. Calcium also interacts with zinc in the regulation to histamine (a neurotransmitter) and is dependent on DHA for all membrane functions. Dairy inhibits the absorption of calcium and actually leaches calcium because it is so high in protein. Since dairy is a provocative food for many children with ADHD, it will not be eaten - or at least not significant amounts, so less is required. Examples of non-dairy foods that are high in calcium are leafy greens (collards, kale), sardines, salmon canned with bones (also high in omega-3), and chicken stock. Cofactors for calcium are magnesium, vitamin D (always in the form of D3), vitamin K, and boron.

Magnesium is a muscle relaxant and has a calming effect. It pulls mercury and copper out of the tissues to help detoxify. Cofactors for magnesium include B6, calcium, sodium, phosphorus, potassium, B1, and B5. Magnesium should be in a 1:2 ratio to calcium.

Zinc is a very important mineral for brain function. Most zinc in the body is concentrated in the brain membranes where it protects DHA, AA and phospholipids from free-radical damage. Additionally, zinc acts on the surface of neurons as an electrical contact for neurotransmission and helps convert serotonin or 5-HTP to melatonin (aiding in sleep). I recommend 10 milligrams daily as a maintenance dose in the form of an amino acid chelate.

Trace minerals, iron, manganese, copper, cobalt and molybdenum, regulate brain metabolism by activating the metabolic enzymes. It is believed that selenium may protect the integrity of message sending between neurons by preventing free-radical damage. Chromium is an important trace mineral because it regulates blood sugar and increases insulin tolerance. Because many children with ADHD
have faulty glucose metabolism, this process is crucial in providing energy (sugar) to the brain. Before someone supplements with iron, I recommend they test for iron deficiency to be certain it is needed. Too much iron causes free-radical damage, which could negatively affect the brain and body. Chelated minerals are the most absorbable and therefore most effective. They include Kreb cycle chelates and amino acid chelates.

I feel that all of these supplements should be given to the ADHD child throughout their childhood. Because there are dozens of vitamins and minerals that need to be taken in the right proportion, you will most likely be taking these in the form of multivitamins or multiminerals. I like BrainChild Nutritionals (from Soquel, CA at www.brainchildnutritionals.com) because they were created specifically for children (and adults) with ADHD and autism in forms that are highly absorbable, with consideration for food sensitivities and phenols.

**Accessory Nutrients**

**L-Glutamine** is an important amino acid that heals and improves the integrity of the gut. Since many ADHD children with food sensitivities have leaky gut, L-glutamine will help heal the intestine, improve health, and prevent autoimmune disorders. It also reduces sugar cravings that might be present upon the elimination of sugar and refined carbohydrates from the diet. This can be purchased in powder form and added to a glass of water or a smoothie.

**Probiotics** improve digestion and enhance nutrient absorption. Friendly flora inhibits the growth of harmful bacteria and candida. It promotes a healthy intestinal track. Lactobacillus acidophilus, one of the probiotics, produces B vitamins including B6, folic acid, niacin, biotin, and B12. It also produces lactase and improves digestion of milk (assuming milk is not a provocative food). Find a formula that has many (around 6) different strains of bacteria to provide balance of the intestinal track. Take one capsule (approx. 3 Billion cells, 300 milligrams) three times per day on an empty stomach for one month. After this time, the friendly flora has been repopulated and the frequency may be reduced to once per day. Flora has a short lifespan and should continuously be replenished daily.

**MSM – methylsulfonylmethane** is a formulated physiological sulfur compound. Sulfur has been shown to aid digestion and detoxification. As explained earlier, faulty sulfur metabolism appears to be an important factor in ADHD. MSM provides those with ADHD with a form of sulfur that is available for absorption and utilization; therefore improving symptoms of ADHD.

**Essential fatty acids** - Because of essential fatty acids’ association with increasing cognitive function and importance in brain development, EFAs are an important part of a nutritional protocol for children with ADHD. EPA (omega-3) is an anti-inflammatory and helps reduce inflammation associated with allergies. Because EFA’s are important in brain development, it is important that pregnant and lactating
mothers include Omega-3 in their diet. For children, I suggest eating cold-water fish twice a week and adding 1 teaspoon of flax oil to the diet. For pregnant and lactating women, I recommend 2 Tablespoons of flax oil per day and wild cold-water fish. Because of the potential for mercury in fish, I recommend smaller fish such as herring, sardines, and salmon.

Because omega-6 should be in a 2:1 ratio with omega-3, and the typical American diet contains 10 - 20 times the recommended amount of omega-6, I suggest cutting down on omega 6 for the short term, then later adding good omega 6 back in. Omega 6 includes safflower oil, sunflower oil, corn oil, sesame oil, hemp seeds or oil, soybeans, and evening primrose. “Bad” omega 6 would include anything fried. “Good” omega 6 would be evening primrose, hemp seeds, soybean, and small amounts of unrefined and uncooked vegetable (safflower, sunflower, corn or sesame) oil, for example on a salad. Additionally, excess omega-6 and increased amounts of animal meat, turn into Arachidonic Acid, which act as a neurotoxin. I would recommend limiting meat consumption to 5 meals per week (this does not include fish). If a child refuses to eat fish and has chronically high insulin, I would recommend fish oil capsules.

**Digestion**

Digestion is an important part of improving the health of an individual with ADHD because it is the process that breaks down food to allow for the absorption of nutrients. As we have seen, nutrient deficiencies cause many of the problems we see in people with ADHD; and many with ADHD have compromised digestion.

**Assessing and improving improper digestion:**

Food sensitivities negatively effect digestion; therefore, eliminating food sensitivities will improve digestion. Stress and hypoglycemia reduce the ability to digest food properly. If stress is present try relaxation, meditation, and breathing exercises, especially before eating. If hypoglycemia is present consider pancreatic enzymes as supplementation for a few months. Probiotics help improve digestion and absorption of nutrients. MSM is important for reducing inflammation and healing in the mucosal lining of the intestine.

Hypochlorhydria (low hydrochloric acid) does not allow food to be broken down and nutrients absorbed properly. One way to assess this is the beet juice test. Drink a cup of beet juice and notice the color of urine for the next 24 hours. If the urine is reddish (like beet juice), the individual is low on hydrochloric acid. In this case, I would recommend one of two approaches: Swedish or other bitters taken 5-10 minutes before eating stimulates hydrochloric acid (HCl) production. Additionally, HCl capsules can be taken – proceed according to instructions on the bottle.
Detoxification
The ability to detoxify is often compromised in those with ADHD. There are several ways to check for diminished detoxification: A hair analysis can be used to test for toxic levels of heavy metals like mercury, lead, cadmium, etc. This would determine either high exposure to heavy metals and/or faulty detoxification. Additionally, Great Smokies Laboratory has a detoxification test that checks for weaknesses in Phase I and II of the liver’s detoxification process.

If detoxification is diminished, toxicity is often present. There are two things to do: Improve the body’s ability to detoxify, and remove the toxins currently in the body. To enhance the body’s own detoxification process, you must support the liver and kidneys. Herbs and acupuncture are two effective ways to improve the liver and kidney’s ability to detoxify. Milk thistle supports the liver and improves its detoxification process. Borage is a kidney tonic that supports the kidneys, and cleanses and stimulates the kidneys to improve their ability to flush toxins out of the system. As faulty sulfur metabolism appears to have an impact on ADHD and sulfur is necessary to the liver’s ability to detoxify, supplementing with MSM, a bioavailable form of sulfur, helps improve the process of detoxification.

The glutathione conjugation pathway and glutathione, a peptide, are crucial for detoxification and preventing oxidative stress. Although glutathione is sold in supplement form, it is not very bioavailable, so other supplements are better. NAC (N-Acetylcysteine), and Vitamin C produce glutathione within the body. Additionally, alpha lipoic acid is a strong antioxidant bonded with sulfur that is both fat and water-soluble. Finally, all of your “basic” antioxidants Vitamin A, E, C, Selenium, and Zinc are great for detoxification.

To remove toxins, I suggest diet and supplementation. A gentle cleansing diet for 1-2 weeks is helpful. This diet should consist of vegetables, fruits, high alkaline content foods, lots of water, herb teas, etc. Because people with ADHD often have hypoglycemia, a pure cleansing diet with little protein could be difficult and unbalancing. Nutrients, homeopathic remedies, and other detoxifying substances will vary depending on the individual needs.

Exercise
Finally, exercise is an important part of an ADHD health protocol. Exercise increases coronary blood flow, improves blood sugar disorders, increases endorphins and other brain neurotransmitters, burns off nervous energy and improves sleep. In a 1997, Celiberti and Bobo, studied the effects of exercise on an autistic boy (Celiberti, 1997, abstract). Immediately before the academic testing, he engaged in exercise. When jogging was performed, he had an acute decrease in physical self-stimulation and "out of seat" behavior that continued for over 40 minutes. As autistic and ADHD symptoms and causes are often similar, this supports the evidence that exercise reduces hyperactive behavior in those with ADHD.
For all of these reasons, exercise is very important. I highly recommend parents get involved and set a good example – it will be fun, a good bonding experience and good for the parent too. Dr. Amen recommends vigorous exercise at least 5 days per week with all of his patients for 40 minutes or more. In an ideal world, this is great. If someone is having difficulty with this, any exercise is better than no exercise. Start with walking quickly enough to get your heart rate up to your target zone and work up to 40 minutes. At the beginning, someone may only be able to do 15 minutes, but if a person is truly exercising in their target heart zone, within a couple weeks, they should have no problem with 30 minutes. Heart rate is the key. I highly recommend using a heart rate monitor (a $100 investment). A rule of thumb heart rate calculation is: 220-age=maximum heart rate (Target zone is 70-80% of maximum). Example for a 15 year old child: 220-15=205. Target range is 143-164 beats per minute.

Additionally, yoga is a great exercise for children. It has a calming, relaxing effect, and helps promote sleep. Children are limber and find this activity fun.

**Conclusion**

ADHD has great impact on many lives, not only the individuals with the disorder, but their families as well. As allopathic medicine has not offered any long-term solutions, people are more often turning to alternative therapies. Once we understand the many causes behind the disorder - food sensitivities, environmental toxins, faulty sulfur metabolism, poor digestion, and nutritional deficiencies - nutritional and holistic solutions become easier and more natural choices to pursue. These approaches include eliminating food sensitivities, allergens, and environmental toxins, the use of nutrition and nutrient support, understanding and improving the processes of the body such as sulfur metabolism, detoxification, digestion, and exercise. Through clinical experiences and research by leaders in these fields such as Doris Rapp, Gary Null, Michael Lang, Marcia Zimmerman, Ben Feingold, and many others, we have discovered the significant impact of these natural and holistic approaches for those with ADHD - from a lessening of the symptoms, to a total elimination of the disorder.

Ultimately, if we know the root cause, does it matter what we call the disorder? The symptoms of ADHD can often be observed and diagnosed as different disorders. For example, ADHD and allergic Tension Fatigue syndrome can have similar, if not the same, symptoms and can be caused by the same thing, i.e. food sensitivities or environmental allergens. Additionally, we have seen most neurological disorders: depression, ADHD, autism, and bipolar have a similar set of causes.

Does the diagnosis matter as long as the root cause is identified and the disorder, and its symptoms, ultimately relieved? I believe not.
Although this paper was about ADHD, these same principles can be applied to children or adults with depression, aggression, anxiety, hyperactivity, autism, and other neurological and cognitive disorders. Unearthing the root causes of any disorder is the key to eliminating it.
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