

PARENTS' GUIDE TO BRAIN HEALTH

How can I know if my child's brain is healthy and developing normally? If he or she is having problems with learning or behavior could it have something to do with brain health? If so, how do I find out the cause and what will make it better?

Learning, cognitive development and emotional maturation require a healthy brain. So does growing up to be a happy well-adjusted adult. What does science tell us are the 'ingredients' necessary for a healthy brain? How do we reliably know if our children have them? What science-based ('evidence-based') help is available for remediation when necessary?

There is a large body of scientific evidence indicating that the commonly used brain-altering medications do more harm than good in the long run, and that this is contributing to the shocking increase in disability due to mental illness (see [Anatomy of an Epidemic](#) by Robert Whitaker) . We need an approach based on good science that can objectively identify and treat the individual needs of each child, and is *sustainable because it supports normal brain function*.

Use the *Parents' Guide to Brain Health* as a checklist to consider possible underlying causes that can be restored to normal function if found to that, if deficient, is a potential 'deal-best behavioral interventions, chemical supports.



be wanting. Each item is a critical factor breaker' for brain health—*despite the 'manipulation' and educational*

Each item has a brief description and investigation is indicated. There is an studies that validate its importance.

the kind of test to do if an objective internet link to a selection of scientific While not a 'self-help manual', the

Guide will allow you to ask the right questions (always necessary for finding the right answers). Use it to work with your health care provider and educator as a 'road map' for your child's brain health.

Naturally, not every item pertains to every child who is having learning, behavioral or developmental problems. A professional practitioner trained and experienced in the [functional medicine](#) approach can help you determine which ones are likely to be important for your child, as well as how to reliably test them. With functional medicine, getting objective answers to the right questions is the foundation for a successful and sustainable treatment strategy.

Can the *Guide* be used to optimize brain health even when there are no overt problems? Yes, *because the functional approach always examines underlying causes and uses physiological and sustainable therapies to optimize function*.

Science in this field is rapidly advancing so the *Parents' Guide To Brain Health* as well as other authoritative texts are always a 'work in progress'. We suggest you check back monthly for updates as new advances emerge. While many of the scientific studies referenced mention ADHD the principles illustrated apply to most cognitive or emotional disorders. Additionally, there is [evidence](#) that ADHD in young children is a predictor of major depression and suicide in adolescence.

WHY BE CONCERNED ABOUT THE BRAIN?

What evidence is there that the brain is involved in disorders of learning and behavior? Click [here](#) for a sampling of studies from the scientific literature that validate this.

BRAIN INFLAMMATION, ALLERGY AND AUTOIMMUNE DISEASE

Inflammation is 'enemy number one' for healthy brain development and brain degeneration. It can be necessary but also harmful. Necessary inflammation occurs when the immune system acts to



eliminate a disease-causing microbe, clear harmful materials, or eliminate malignant cells. Harmful inflammation happens when the immune system damages the body's own tissues, including the brain, due to allergy and autoimmunity. Click [here](#) for scientific studies that show the role of brain inflammation in disorders of learning, behavior and development.

How to test: brain inflammation due to allergy or autoimmunity is so common that it should be considered in any case. However, this topic requires collaboration with a practitioner experienced with the advanced tests for profiling immune system dysregulation when necessary.



BLOOD SUGAR AND INSULIN

Nothing else wrecks the brain and any efforts to fix it as much as blood sugar dysregulation, whether too low (hypoglycemia) or too much (insulin resistance). Click [here](#) for scientific studies that show the role of blood sugar dysregulation in disorders of learning, behavior and development.

How to test: does your child crave sweet or starchy food? Does behavior take a turn for the worse between meals? This is not normal and has a significant effect on the brain each time it happens. Blood sugar dysregulation leaves its imprint on a standard blood test that includes the usual glucose, hemoglobin A1c, fats and liver enzymes.



ESSENTIAL FATTY ACIDS

The brain is made mostly of fat. The right balance of fatty acids prevents excessive inflammation and is necessary for the brain cell membranes to transmit their electrical impulses normally. Click [here](#) for scientific studies that show the role of essential fatty acids in disorders of learning, behavior and development.

How to test: when necessary, the amounts and ratios of essential fatty acids are measured with a [blood test](#) that can now be collected at home with a finger prick (similar to measuring blood sugar at home).

BRAIN OXYGEN PERFUSION

There are a number of factors that can prevent your child's brain from getting enough oxygen. Even suboptimal levels can significantly affect performance. Borderline anemia and iron deficiency impairs the ability of every cell in the body to do its work, especially the brain because it needs so much. Problems with breathing can also contribute. Click [here](#) for some of the science on the effect of suboptimal cerebral oxygen perfusion on disorders of learning and behavior.



How to test: anemia and iron deficiency are easily screened for with standard blood tests (if the more precise functional reference ranges are used). When indicated, oxygen saturation and excessive ventilation of carbon dioxide (which impairs the release of oxygen from the blood into the tissues) are easily tested in the office non-invasively.

BRAIN METABOLISM

Genetic and circumstantial needs vary widely for the macro and micronutrients essential for the brain to generate its energy, protect itself from oxidative stress, eliminate wastes, and carry out its other complex metabolic activities. Click [here](#) for some of the science on metabolic cofactors in disorders of learning, development and behavior.

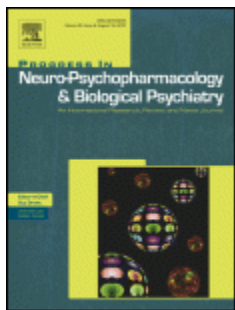
How to test: there are a number of ways to examine whether an individual's needs are being met that should be considered according to each case, but special mention should be made of [urinary organic acids](#).



ENVIRONMENTAL TOXINS AND TRAUMA

The human race is now subject to an environment pervaded by chemicals foreign to our ancient biochemistry for which we are not genetically adapted. Individuals vary widely in their ability to handle this. For some, exposure to an environmental contaminant at a level tolerated by others will cause problems for the brain. Click [here](#) for some of the scientific evidence for the role of toxins and trauma in disorders of learning, development and behavior.

How to test: a discerning clinician can help you decide if this issue needs to be examined for your child. Depending on the concern there are a number of testing resources available, but mention should be made of the [urinary porphyrins profile](#) as a screening tool.



NEUROTRANSMITTERS

Neurotransmitters, signaling molecules of brain cell communication, are often depleted these days due to both environmental and physiological demands that exceed the ability to replenish them. If deficiency of a key neurotransmitter such as dopamine, GABA or serotonin is preventing brain circuits from firing normally, providing the necessary building blocks naturally is safe and sustainable. This is very different than using pharmaceuticals that try to force the brain to run on depleted levels without fixing the inability to make more. Click [here](#) for some of the science on how depletion of key neurotransmitter circuits can contribute to disorders of learning, development and behavior.



How to test: because of how neurotransmitters localize in highly specific regions in the brain there is no reliable lab test. However, the discerning clinician and parent can effectively use a questionnaire such as [this one](#) derived from investigations into the effects of blocking specific neurotransmitters.

HORMONES AND THE BRAIN

Hormones have a profound influence on brain function and development. The brains of both children and adults are highly susceptible to hormonal dysregulation, particularly problems with the brain's hypothalamus-pituitary-adrenal thermostat. Click [here](#) for scientific evidence for the powerful effects of these hormones on disorders of learning, development and behavior.



How to test: hormones such as cortisol are mainly present in the blood in a 'storage' form bound to transport proteins., The relatively small percentage of bioactive free-fraction hormone must be measured to accurately determine the actual 'working' levels. This is best done with saliva specimens, which also allow the multiple collections necessary to assess the profoundly important rhythms of production.

THYROID PROBLEMS AND THE BRAIN

This 'subset' of hormones demands its own category. There isn't a cell in the body that doesn't depend on the stimulus of thyroid hormones to do its work. The brain cannot develop, function or maintain itself normally with even modest abnormalities of thyroid function. Click [here](#) for some of the scientific studies that demonstrate the important contribution of thyroid dysregulation to disorders of learning, development and behavior.

How to test: are there problems with excess weight gain, fatigue or hyperactivity? Your collaborating health care practitioner can help determine if there is a possible thyroid problem, but must be knowledgeable and experienced in the various ways thyroid function can go awry. Autoimmune thyroiditis is very common, and there are possibilities of hormone conversion defects, peripheral resistance, excess binding by transport proteins, and more



that are often missed unless the clinician is well-versed in the functional approach.

GUT HEALTH AND THE BRAIN

What goes on in the digestive tract does far more than determine whether or not we are adequately nourished. The gut has been called the 'second brain' due to the size and influence of the enteric nervous system. Most of the immune system tissue in the body is there as the 'gut associated lymphoid tissue'. Their influence crosses the blood-brain barrier as a mutually regulating feedback system. "When the gut is inflamed, the brain is inflamed." Click [here](#) for examples of the scientific evidence for the influence of the gut on disorders of learning, development and behavior.



How to test: a good examination and history go a long way in determining whether gut dysregulation may be a contributing factor, but these indications should be objectively confirmed and precisely determined by tests like the [gastrointestinal function profile](#) and others that investigate specific aspects of GI function.



GLUTEN AND THE BRAIN

It's surprising how common reactions to gluten that can seriously damage the brain and nervous system have become. These non-celiac manifestations can occur without any overt intestinal symptoms. Click [here](#) for some of the scientific evidence regarding gluten sensitivity as a contributing problem to disorders of learning, development and behavior.

How to test: this is tricky because there are a number of factors that can cause the antibodies that the tests seek to not be expressed even while damage is being done, rendering the usual blood and skin tests non-definitive. Moreover, there are no available tests at this time for some of the gliadins (from gluten) and transaminases (associated with the tissues under attack) relevant for neurological damage from gluten. [Screening](#) for the genes that confer serious gluten sensitivity is reliable, easily done from cells collected by a cotton swab of the inside of the cheek, and not susceptible to change by circumstance or timing. For food allergy and intolerance in general the 'gold standard' is the elimination-provocation protocol.

VITAMIN D AND BRAIN HEALTH

There is a huge amount of science being done on the many jobs that vitamin D does including its role in brain health. There is ample evidence that suboptimal vitamin D levels are prevalent among American children. Even children that spend a lot of time outdoors can be affected. No health assessment is complete without ascertaining that vitamin D needs are being met. Click [here](#) for a selection of scientific studies that identify vitamin D deficiency as a contributing problem to disorders of learning, development and behavior.



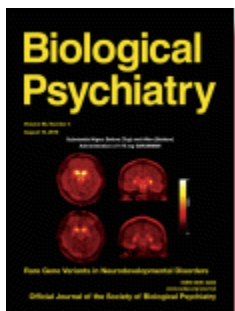
How to test: this is relatively easy—the blood test for 25-hydroxy vitamin D. Bear in mind, however, that the reference range that many labs use is too low for optimal function.

THE ELECTRICAL BRAIN

The brain works electrically ('brain waves') as well as chemically, and brain function can be objectively examined by electroencephalography (EEG). This is especially useful because with brain wave biofeedback (neurofeedback) the brain can learn normal patterns of function and development that are stable and free from side-effects. Click [here](#) for some of the scientific validation of EEG examinations and neurofeedback for disorders of learning, development and behavior.



How to test: quantitative electroencephalography (QEEG) applies computerized algorithms and validated normative databases to thoroughly examine the brain's electrical function. It offers the most detailed and dependable assessment. This is non-invasive (sensors attach to the scalp with conductive paste) and can be easily arranged by your neurofeedback professional or doctor.



IMPLICATIONS FOR ADULTS

- This checklist also applies to adult brain health.
- Brain problems that go unrecognized or untreated can persist into adulthood with weighty consequences.

Click [here](#) for a sampling of the scientific evidence that brain dysfunction underlying child and adolescent disorders of learning, development and behavior can be linked to problems in adulthood.

Dr. Jonathan Miller, D.C.

Sloan Johnson, Neurotherapist

Acknowledgements

Thanks to all of our patients past and present, the 'spear tip' of the clinician's learning and development. Thanks with deep appreciation to the many dedicated scientists around the world whose work is referenced here. The compassionate work of Karen McCown and the Synapse School are a great inspiration. Thanks also to Chris and Scott Gordon for their generosity that helped make the production of this guide possible.