

The Gut-Brain Connection – How it Affects Your Life

Your brain is the commander-in-chief of your body. It constantly receives information from your internal and external environment and decides the best course of action to take for your survival. The brain carries out this action by sending messages through the nerves of the nervous system to the appropriate parts of the body.

For example, when the sympathetic nervous system is activated, it will help simultaneously change the behavior of the heart, lungs, eyes, brain, digestive system, adrenal glands, bladder, and skeletal muscles. All of this is done to achieve one goal – survival. On the other hand, the parasympathetic branch of the nervous system stimulates digestion, recovery, and rest throughout the organs of the body when we are not faced with a threat.

These two branches of the autonomic nervous system help us explain how our brain controls our body, but can our body control our brain?

You are the Sum of Your Neurobiology

In his book, *Incognito: The Secret Lives of the Brain*, Neuroscientist David Eagleman explains:

...who you are depends on the sum total of your neurobiology."

Neurobiology is dictated by more than just the brain. Just like any government, even a dictatorship, the leader is influenced by other members of the governing body. Even though the brain can affect every organ in the body through the

sympathetic and parasympathetic branches of the nervous system, the brain cannot veto the power of the gut.

Other common diseases like Alzheimer's and Parkinson's may actually start in the gut.

Our Second Brain

The gut is sometimes known as our second brain. In fact, it has its own branch of the nervous system called the enteric nervous system that can function on its own, even if it is disconnected from the brain.

The enteric nervous system also resembles a brain because it:

- has glial cells to support the neurons in the gut
- contains 500 million neurons
- uses 40 (and possibly many more) neurotransmitters
- produces 50% of the body's dopamine (important for motility)
- produces 95% of the body's serotonin (important for the enteric nervous system's growth & cell protection)
- has a barrier that resembles the blood brain barrier
- may even have its own memory

How the Gut Influences the Brain



The brain and gut are intimately connected by the vagus nerve. The vagus nerve connects with most of the organs and plays a prominent role in activating the parasympathetic nervous system.

Around 90% of the signals passing along the vagus nerve come not from the brain, but from the enteric nervous system to the brain. This is because one of the brain's most effective ways of learning about its environment is through the gut, and this relationship starts before we are even exposed to the outside environment.

The Development of the Brain & Gut Connection

When we were in the womb, we were constantly picking up signals about the outside environment.

Is there enough food?

Is it safe out there?

What adaptations will I need now to ensure survival?

All of these questions were answered by the chemical signals that we received from our mothers through the umbilical cord, and the development of our brain and gut depended heavily on these signals. For example, if there was a lack of nutrition in our mother's diet, we may be predisposed to obesity due to altered metabolic function.

What we are fed in our youth also greatly impacts the development of our gut and its enteric nervous system. Breastmilk is essential because it promotes oxytocin and serotonin release, which promotes gut growth and the development of a healthy gut microbiome. When the gut is able to develop with a healthy gut microbiome, the risk of food allergies and gut issues later on in life is greatly reduced. A damaged gut, on the other hand, increases the risk of obesity, depression, anxiety, autism, multiple sclerosis, and cardiovascular disease.

Other common diseases like Alzheimer's and Parkinson's may actually start in the gut. For example, in people that died from Parkinson's disease, scientists found the same protein clumps that damage dopamine-producing neurons in the gut as they did in the brain. The same phenomenon exists in people with Alzheimer's disease. Plaques and tangles that form in the brain of people with Alzheimer's disease also form in their gut. This means that we may be able to use gut biopsies to diagnose and treat these conditions before they take hold of the brain.

Stress and the Gut

When we are stressed our sympathetic nervous system is activated to prepare our body for survival. At the same time, the hormone Ghrelin is released from our stomach. Ghrelin is known as our hunger hormone because it stimulates appetite and promotes fat storage. This explains why when we are stressed we may feel the compulsive need to eat.

Ghrelin also inhibits serotonin activity, which leads to digestive issues and increased anxiety and depression over time. Anxiety leads to more ghrelin production, and this starts a vicious cycle of stress that may have been triggered by a stressful fetal or neonatal environment.

Recommended Reading: *How Candida Leads to Depression, Anxiety,*

Irritable Bowel Syndrome – When Gut & Brain Disharmony Becomes Chronic

Stress also increases the risk of irritable bowel syndrome (IBS), a digestive disorder that affects 10-15% of the world population. IBS is what happens when the enteric nervous system, gut, gut microbiome, and brain are in disharmony.

It usually begins with a stressful childhood. Traumatic events, like maternal separation, can lead to a dysfunctional connection between the brain and gut. If these children are also fed the wrong food, their gut microbiome will not develop correctly. This establishes a dysfunctional gut microbiome that does not produce the substances needed for a healthy gut and a healthy enteric nervous system.

If the child continues to be deprived of nutrient dense food and human connection, their immune system will become hyperactive, leading to food allergies and a chronic state of stress. This vicious cycle of brain, gut, and gut microbiome disharmony continues into adulthood until it is defined as IBS.

Recommended Reading: *Gluten, Candida, Leaky Gut Syndrome, and Autoimmune Diseases*

The Gut, Brain, and Behavioral Disorders

The enteric nervous system, gut, gut microbiome, and brain disharmony play an essential role in the development of neurological/behavioral disorders like autism, ADHD, and various mood disorders. Antibiotics, environmental, infectious agents like vaccines, and other forms of neonatal stress create gut dysbiosis (imbalance in gut bacteria) and vagus

nerve dysfunction. These two factors set the stage for neurological/behavioral disorders by stimulating an already hyperactive immune system and sympathetic nervous system that causes children to be extremely impulsive and in a state of persistent hyper-arousal. If these children are then fed a highly refined diet that keeps their blood sugar levels high, their symptoms will continue to get worse.

You may have actually experienced a small taste of what it's like to have ADHD or autism the last time you ate processed foods filled with toxins. When you eat highly refined, toxin laden foods, your body must fire up its immune system and sympathetic nervous system to protect you from the threat. This will cause blood flow to be directed away from your prefrontal cortex while your blood sugar rises. When your blood sugar is high, it creates plaque build up in the brain and impairs blood vessel function, which reduces your cognitive abilities. Combine that with the lack of activity in your prefrontal cortex, and you will feel impulsive and anxious and make illogical decisions.

When you add stress and poor food choices together, it creates a cascade of negative effects in the gut microbiome, gut, enteric nervous system, and the brain that lead to poor decision-making, a greater incidence of pain, more allergies, and more disease.

But don't worry, even if your environment was filled with stress and poor food options from the womb to adulthood, even if you were diagnosed with ADHD, IBS, autism, depression, chronic pain, Parkinson's disease, and/or Alzheimer's disease, you can still restore the harmony between your gut, gut microbiome, enteric nervous system, and brain.

Synchronizing the Gut and Brain

One of the most effective ways to improve your health is by starting with what you put in your body. When you feed your

body what it needs while eliminating the foods that cause issues, you will establish a healthy gut microbiome, heal your gut lining, and improve the function of your enteric nervous system. This will send the message to the brain that you are not under attack, the immune system will calm down, and your body will be able to rest and reverse disease.

Improving Brain Health with the Gut

Limit Your Consumption of FOD MAPs

FOD MAPs is an acronym that stands for:

- **Fermentable** – meaning they are only broken down through fermentation
- **Oligosaccharides** – made up of individual sugars joined together in a chain
- **Disaccharides** – a double sugar molecule
- **Monosaccharides** – a single sugar molecule
- **And Polyols** – sugar alcohols

These are short-chain carbohydrates that tend to be poorly digested by those with digestive issues like IBS. This is because when the FOD MAPs make their way through the digestive tract, they draw water into the large intestine from surrounding areas, which leads to bloating. Simultaneously, the bacteria in the large intestine starts digesting the FOD MAPs and producing gas which builds up along with the water. The intestines expand, the message is sent to the brain, and it responds with more pain, discomfort, and stress.

Eating a low FOD MAP diet has showed promising effects in treating people with IBS and may transfer to others with a comprised digestive system. It is commonly suggested to limit the consumption of FOD MAPs for 3-8 weeks to help balance the gut microbiome, heal the gut, and reduce symptoms. After that time, it is best to slowly re-introduce high FOD MAP foods into your diet to see which ones are safe to eat and which

ones cause the most issues for you.

Recommended Reading: *Detox Cheap and Easy Without Fasting - Recipes Included*

Eliminate Foods that Cause Problems for You

Food sensitivities and allergies are becoming more and more common and the link between stress, the immune system, and the gut is mostly to blame. When the body is in a stressed and inflamed state, your immune system and gut may react to previously harmless foods as if they are a threat to the body.

To reduce your food sensitivities and allergic reactions, start by eliminating these common, allergy-causing foods from your diet:

- Milk
- Eggs
- Peanuts
- Tree Nuts
- Soy
- Grains with gluten in them (wheat, barley, rye, and oats)
- Fish
- Shellfish

When you eliminate some of these foods from your diet, you may notice that you have more energy and less stress. This is a sign that you may be sensitive or allergic to one or more of the foods that you eliminated. Keep in mind that almost any food can trigger an allergy. If a certain food item always makes you feel worse after eating it then it is safe to say that you should eliminate it from your diet.

Think of this approach as a temporary experiment designed to see what the ideal diet is for you. After a couple weeks of eliminating a specific food from your diet, try periodically

reintroducing that food back in. You may find that you can eat eggs or almonds again, and they make you feel energized now!

Recommended Reading: *Increase your IQ with the Right Foods, Herbs, Vitamins, and Exercises for Your Brain*

Increase Your Fiber Intake

Fiber cannot be broken down by the body, so bacteria in the intestines feast on it. As a result, the bacteria produce butyrate. This short chain fatty acid helps to improve the function of the digestive tract and protect and enhance brain function.

Supplement with Probiotics

Probiotics have been found to reduce anxiety and depression. In studies done on mice, the amount of lactobacillus in their gut effected the amount of a metabolite in the blood called kynurenine, which has been shown to drive depression. Probiotics also help produce serotonin in the gut, which has protective effects against irritable bowel syndrome, cardiovascular disease, and osteoporosis.

Recommended Reading: *Probiotics, Bacteria, and Our Health*

Make Sure You Consume Enough Folate and Vitamin B12

Folate and Vitamin B12 are essential for brain health, nervous system function, and overall health. They also help to prevent depression and heart disease. On its own Vitamin B12 decreases the loss of brain volume with age, while increasing cognitive function.

Although these vitamins are produced by the gut microbiome, we are not sure how much is actually made and absorbed by the body. It's best to make sure you are consuming animal products like pasture raised eggs for Vitamin B12 and plenty of organic

dark leafy green vegetables for folate.

Increase Your Intake of Omega 3s and Decrease Omega 6s

The omega 3 fatty acids, DHA and EPA, are effective at reducing the symptoms of depression, and positive effects may carry over to other neurological disorders as well. This is partly due to the decrease in inflammation that is associated with diets that are lower in omega 6s and higher in omega 3s.

To decrease the amount of omega 6s in your diet, replace vegetable, seed, and soybean oils with highly saturated fats like coconut oil, butter, ghee, and tallow. If you need a liquid oil for salad dressing use avocado oil or olive oil.

Omega 3s are best when consumed as minimally cooked and processed as possible. Wild caught salmon, sardines, mackerel, and oysters are great sources of DHA and EPA.

Before You Eat, Improve Your Gut with Your Mind

Before you take the first bite of food from your brain and gut revitalizing meal, take a deep diaphragmatic breath. This will stimulate your vagus nerve and prepare your body to digest your food. Chew each bite thoroughly, enjoy every flavor, and take at-least one deep breath after every couple of bites.

Use your brain to improve your gut and your gut to improve your brain. If you apply this advice to your life, you will replace the vicious cycle of disease with a nutritious cycle of vitality.

Related Articles:

- *Candida, Gut Flora, Allergies, and Disease*
- *How to Improve Brain Health and Reduce the Risk of*

Alzheimer's

- *How to Detoxify and Heal the Lymphatic System*
- *Holistic Guide to Healing the Endocrine System and Balancing Our Hormones*
- *Increase your IQ with the Right Foods, Herbs, Vitamins, and Exercises for Your Brain*

Recommended Supplements:

- Shillington's Brain Tonic
- B Complex
- Shillington's Cayenne Tincture
- Krill Oil
- Omega-3 w/CoQ10
- Shillington's Intestinal Cleanse
- Formula SF722
- Floramend-Prime by Thorne

Sources:

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- *The microbiota–gut–brain axis: neurobehavioral correlates, health and sociality – Frontiers in Integrative Neuroscience*
- *The Dutch Hunger Winter and the developmental origins of health and disease – PNAS*
- *Impact of stress and stress physiology during pregnancy on child metabolic function and obesity risk – NCBI*
- *Immune Responses to the Microbiota at the Intestinal Mucosal Surface – Cell*
- *Gut instincts: The secrets of your second brain – New Scientist*
- *An Integrative Review on Role and Mechanisms of Ghrelin in Stress, Anxiety and Depression. – NCBI*
- *Ghrelin inhibited serotonin release from hippocampal slices – Research Gate*

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- *Facts About IBS* – About IBS
- *Even More Evidence Has Linked Parkinson's Disease to Our Gut Bacteria* – Science Alert
- *Sugar and the Brain* – Harvard Medical School
- *Attention-Deficit/Hyperactivity Disorder: Is it Time to Reappraise the Role of Sugar Consumption?* – NCBI
- *Stress and Allergic Diseases* – NCBI
- *Butyrate, neuroepigenetics and the gut microbiome: Can a high fiber diet improve brain health?* – Science Direct
- *Gut-Microbiota-Brain Axis and Its Effect on Neuropsychiatric Disorders With Suspected Immune Dysregulation* – Clinical Therapeutics
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- *Vitamin B12 status and rate of brain volume loss in community-dwelling elderly.* – NCBI
- *The Complete Beginner's Guide to a Low FODMAP Diet – Diet Vs Disease*
- *Microbes Help Produce Serotonin in Gut* – Caltech
- *Omega-3 fatty acids in depression: a review of three studies.* – NCBI
- *David Eagleman's Incognito: Not The Masters Of Our Destinies* – Science 2.0