

A look at the Second Brain: The Brain in the Gut

By Amb. Dr. Sir Romesh Jayasinghe

Your body actually has a second brain that controls you much more than you might realise - and most people have no idea it exists. A few thousand years ago in ancient India in the Vedas they echoed the hypothesis that you are what you eat. I suppose that in a literal sense, it is true that **you are what you eat** since science is now beginning to confirm this explanation. The gut has a mind of its own, called the "**enteric nervous system**". Just like the larger brain in the head, researchers say, this system sends and receives impulses, records experiences and respond to emotions. Its nerve cells are bathed and influenced by the same neurotransmitters. The gut can upset the brain just as the brain can upset the gut.

The gut's brain or the "enteric nervous system" is located in the sheaths of tissue lining the esophagus, stomach, small intestine and colon. Considered a single entity, it is a network of neurons, neurotransmitters and proteins that zap messages between neurons, support cells like those found in the brain proper and a complex circuitry that enables it to act independently, learn, remember and, as the saying goes, produce gut feelings.

The gut's brain is reported to play a major role in human happiness and misery. Many gastrointestinal disorders like colitis and irritable bowel syndrome originate from problems within the gut's brain.

One of the main ways our brain communicates with the rest of our body is via the vagus nerve, which passes messages to the vocal chords, heart, lungs, and the digestive tract.

But researchers have also discovered that within the enteric nervous system - the extensive mesh-like network of neurons that controls your digestive tract - the messages are going the other way, too.

In fact, 80 to 90 percent of the nerve fibres in the enteric nervous system are going from the gut to the brain. And when the vagus nerve is cut, the enteric system doesn't need the brain at all.

In other words, your digestive system *is* your second brain, and it controls you far more than you realise.

Details of how the enteric nervous system mirrors the central nervous system have been emerging in recent years, according to Dr. Michael Gershon, Professor of anatomy and cell biology at Columbia-Presbyterian Medical Center in New York. He is one of the co-founders of a new field of medicine called "**neurogastroenterology.**" Research indicates how our Second Brain affects cravings and emotional well-being.

The gut contains 100 million neurons - more than the spinal cord. Major neurotransmitters like serotonin, dopamine, glutamate, norepinephrine and nitric oxide are in the gut. Also two dozen small brain proteins, called neuropeptides are there along with the major cells of the immune system.

Not only has research shown that our gut bacteria can manipulate our food cravings and behavior in order to ensure their own survival (you can blame them on your junk food obsession), but the colonies in our digestive system also affect our mood.

Studies suggest that people with healthy and diverse gut microbiomes are less likely to be depressed or anxious.

And, in mice, researchers have shown that those that grow up in sterile environments - where no bacteria colonise their guts - display social traits similar to those in humans on the autism spectrum. When these mice were fed probiotics, their symptoms were alleviated.

This kind of effect has been seen in early studies in humans too, leading many scientists to believe that one of the primary functions of gut bacteria is actually to promote social behaviours and ensure the survival of the species through reproduction.

Research has shown that the body is actually composed of more bacteria than cells. We are more bug than human! Collectively, these trillions of bacteria are called the *microbiome*. Most of those bacteria reside in our gut, sometimes referred to as *the gut microbiota*, and they play multiple roles in our overall health.

The gut is no longer seen as an entity with the sole purpose of helping with all aspects of digestion. It's also being considered as a key player in regulating inflammation and immunity.

A healthy gut consists of different iterations of bacteria for different people, and this diversity maintains wellness. A shift away from "normal" gut microbiota diversity is called *dysbiosis*, and dysbiosis may contribute to disease. In light of this, the microbiome has become the focus of much research attention as a new way of understanding autoimmune, gastrointestinal, and even brain disorders.

The benefit of a healthy gut is illustrated most effectively during early development. Research has indicated just how sensitive a fetus is to any changes in a mother's microbiotic makeup, so much so that it can alter the way a baby's brain develops. If a baby is born via cesarean section, it misses an opportunity to ingest the mother's bacteria as it travels down the vaginal canal. Studies show that those born via c-section have to work to regain the same diversity in their microbiome as those born vaginally. Throughout our lives, our microbiome continues to be a vulnerable entity, and as we are exposed to stress, toxins, chemicals, certain diets, and even exercise, our microbiome fluctuates for better or worse.

In some ways, it seems like our second brain and its gut feeling is even more influential than our logical thought.

In conclusion, the human gut has long been seen as a repository of good and bad feelings. Perhaps emotional states from the head's brain are mirrored in the gut's brain, where they are felt by those who pay attention to them.