Role of the brain-gut axis dysfunction in potential mechanism digestion.

Damon Jhon*

Department of Psychology, Chinese Academy of Sciences, University of Chinese Academy of Sciences China

Abstract

Early childhood stress has been linked to a variety of psychiatric diseases, including depression and anxiety. Separation from one's mother is a well-studied model of early life trauma in rodents. Stress, on the other hand, causes changes in many systems throughout the body during this important period. As a result, a variety of different conditions linked to adversity in childhood frequently coexist with psychiatric illnesses, implying a shared aetiology. Irritable Bowel Syndrome (IBS) is a functional gastrointestinal condition hypothesised to be caused by a faulty brain-gut relationship. Spinal pathways, the hypothalamus pituitary adrenal axis, the immune system, and the enteric micro biota are all important parts of the brain–gut axis. Stress, especially early in life, appears to be a predisposing factor, according to growing data.

Keywords: Irritable bowel syndrome, Myenteric plexuses, Central nervous system.

Structure

Humans have 500 million neurons in their enteric nervous system (including various types of Dogiel cells), which is 0.5% of the total number of neurons in the brain, five times the one hundred million neurons in the human spinal cord, and roughly 23% of the total number of neurons in a cat's nervous system. Beginning in the oesophagus and extending down to the anus, the enteric nervous system is embedded in the gastrointestinal tract's lining [1].

The ENS neurons are divided into two types of ganglia: myenteric (Auerbach's) and submucosal (Meissner's). Myenteric plexuses are found between the muscularis externa's inner and outer layers, while submucosal plexuses are found in the submucosa.

Auerbach's plexus

The myenteric plexus, also known as Auerbach's plexus, is a collection of unmyelinated fibres and postganglionic autonomic cell bodies in the gastrointestinal tract that lies between the circular and longitudinal layers of the muscularis externa [2]. Leopold Auerbach, a German neuropathologist, discovered and named it. Both parasympathetic and sympathetic input is provided by these neurons, which supply motor input to both levels of the muscularis externa. The plexus has an anatomy that is comparable to that of the central nervous system. Sensory receptors, such as chemoreceptors and mechanoreceptors, are found in the plexus and provide sensory input to the enteric nervous system's interneurons. The plexus is the vagus nerve's parasympathetic nucleus of origin, and it communicates with the medulla oblongata through both sensory and motor pathways.

Complexity

For numerous reasons, the enteric nervous system has been referred to as a "second brain." The enteric nervous system is self-contained. The parasympathetic (through the vagus nerve) and sympathetic (*via* the prevertebral ganglia) nervous systems generally connect with the Central Nervous System (CNS). However, investigations in vertebrates reveal that the enteric nervous system continues to operate even after the vagus nerve is severed [3].

The enteric nervous system in vertebrates consists of efferent neurons, afferent neurons, and interneurons, which together allow the enteric nervous system to convey reflexes and operate as an integrating centre in the absence of CNS input. Mechanical and chemical variables are reported by sense neurons. Motor neurons control peristalsis and churning of intestinal contents *via* intestinal muscles [4].

The secretion of enzymes is controlled by other neurons. More than 30 neurotransmitters are used by the enteric nervous system, the majority of which are identical to those found in the CNS, such as acetylcholine, dopamine, and serotonin. More than 90% of the body's serotonin is produced in the stomach, as is around half of the body's dopamine, which is currently being researched to learn more about its function in the brain [5,6].

Conclusion

Depending on characteristics including bulk and nutrient composition, the enteric nervous system can change its reaction. Furthermore, ENS contains support cells that are comparable to brain astroglia, as well as a diffusion barrier around the capillaries surrounding ganglia that is analogous to the blood–brain barrier of cerebral blood vessels.

***Correspondence to:** Damon John**,** Department of Psychology, Chinese Academy of Sciences, University of Chinese Academy of Sciences, China, E-mail: jhon44@a.psu.edu

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