

Neurodegenerative Diseases in Relation with the Gut-Brain Axis

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Editorial Note

The association between the microbial composition of the intestines and the central nervous system, known as the "gut-brain axis," is becoming more widely recognized in the medical and scientific communities. Several neuropsychiatric diseases have been related to changes in the gut microbiome, based on the most recent research. Since the gut-brain axis regulates immunological responses in both the intestines and the brain, the activity of intestinal microorganisms has a significant impact on all aspects. It is not surprising that dysregulation of gut microbiota can lead to a wide range of disorders and diseases in the human body. Chronic intestinal inflammation has been linked to neurological diseases such as Alzheimer's and Parkinson's disease.

Alzheimer's Disease

Alzheimer's disease is a degenerative, irreversible brain condition that gradually affects memory and cognitive abilities, as well as the ability to perform the most basic activities. The disorder is characterized by an inflammatory reaction to beta-amyloid, a peptide that has the ability to activate microglia and cause an inflammatory response. A variety of intestinal infections have a detrimental influence on brain function, causing neurodegenerative diseases such as Alzheimer's disease. Species that may be involved in this process include *Helicobacter pylori*. The elimination of this species was demonstrated to increase the lifespan of Alzheimer's disease patients, indicating a potential role in etiology. Some bacteria like *Lactobacillus helveticus* have been discovered to be useful in maintaining brain function and minimizing mental disorders on the other hand.

Parkinson's Disease

Parkinson's disease is the most prevalent movement disorder in adults and one of the most common neurodegenerative diseases. It is a

chronic disease marked by tremor, stiffness, bradykinesia, and postural instability, which causes difficulty in walking, communicating, and doing simple tasks in affected individuals. Intestinal dysregulation is observed several years before the clinical presentation of Parkinson's disease in most cases. According to some novel hypotheses, the ailment begins in the stomach and then spreads to the brain *via* the gut-brain axis-particularly, *via* vagus nerve and spinal cord activation. This is proven by the fact that the parasympathetic vagal fibers that innervate the intestine emerge from the dorsal motor nucleus. Toxins in the environment are also likely to alter the profile of the gut microbiota, potentially causing negative effects on the central nervous system.

Schizophrenia

The relationship between the gut microbiota and the development of schizophrenia has been researched mainly in animal models. Furthermore, when unhealthy diets are investigated in relation to disorder, the gut microbiota has been identified as a crucial component. There is now considerable evidence that the presence of *Bifidobacteria* promotes the healthy brain; on the other hand, *Clostridium difficile* is an undesirable, aberrant pathogen. Cases of schizophrenia have been related to *Clostridium difficile* infection. This bacterial species' phenylalanine derivative has been linked to modulating effects. However, no prospective research studies have been conducted to yet to assess the fate of colonies with this bacterium. All of these findings indicate a potential gut-brain connection in brain disorders and support a quest for a possible probiotic treatment.