

# The role of the microbiota-gut-brain axis on Alzheimer's disease pathology and progression.

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## Abstract

Alzheimer's disease and related dementias are still a serious global public health concern more than a century after the German neuropathologist and psychiatrist described the first case. The World Health Organization (WHO) estimates that over 50 million people worldwide suffer from dementia, with AD accounting for 60–70% of all cases. In addition, the global dementia epidemic is estimated to affect 82 million individuals by 2030 and 152 million by 2050. Along with genetic factors, environmental factors, and aging also increase the risks of developing neurodegenerative disorders. For example, gut microbiota can serve as non-genetic factors that define a threshold for maintaining a homeostatic balance or developing illnesses. The scientific community has explored and identified that patients with AD often present with dysbiosis of the bowel and dysregulated gastrointestinal tract. Research describes it as a bidirectional relationship by which the brain communicates with the gut's microbiome through the vagus nerve, immune and neuroimmune systems, enteroendocrine system, neurotransmitters, branched-chain amino acids, short-chain fatty acids, agonists of aryl hydrocarbon receptors (AHRs), bile acids, and the hypothalamic-pituitary-adrenal axis. In this narrative review, we explore and clarify the involvement of the microbiota-gut-brain axis in AD pathology.

**Keywords:** Neuropathologist, Neuroimmune, Microbiota-cerebrum.

## Introduction

In 1907, a German neuropathologist and psychiatrist reported a case of a patient whom he followed for four and a half years in the Frankfurt am Main insane asylum until her death. Toward the furthest limit of her life, a 51 year-elderly person, lay in an unfortunate fetal position and was incontinent. "The core and the actual cell deteriorate, and just a knot of fibrils demonstrates where a neuron was recently found. The difference in the fibrils is by all accounts an equal cycle to the testimony of a neurotic metabolic substance in the neuron, whose nearer assessment is as yet forthcoming. 100 years after the primary instance of Alzheimer's sickness was accounted for, AD and related dementias stay a critical worldwide general wellbeing concern. [1]. The World Health Organization appraises that around 50 million people are living with dementia, with AD being the most well-known structure, representing 60-70% of all cases. It is disturbing that the overall dementia pestilence is supposed to contact 82 million individuals by 2030 and 152 million individuals by 2050 (WHO, 2020). [2].

## Alzheimer's disease features

Amyloid  $\beta$  (A $\beta$ )-containing extracellular plaques and hyperphosphorylated intraneuronal tau tangles in full-length or shortened forms throughout the brain are neuropathological hallmarks of AD. Also, the biomarkers that adequately represent the pathogenesis of AD are A $\beta$ 1–42, total tau protein,

and the phosphorylated tau protein levels in the cerebrospinal fluid. The CSF A $\beta$ 1–42 levels are lower in AD patients than healthy controls due to increased. [3].

## Microbiota-gut-brain axis

The scientific community has explored the conceptuality of the gut-brain axis in recent times. Research portrays it as a bidirectional relationship by which the mind speaks with the stomach's microbiome through the vagus nerve, invulnerable and neuroimmune frameworks, enteroendocrine framework, synapses, extended chain amino acids, short-chain unsaturated fats, agonists of aryl hydrocarbon receptors on microglia and astrocytes, bile acids, the hypothalamic-pituitary-adrenal. For the beyond twenty years, the stomach microbiome has acquired expanded consideration in human wellbeing and sickness in different illnesses. Understanding the stomach microbiota-cerebrum pivot is fundamental to foster another remedial methodology for mind boggling and multifactorial AD pathology. As of late arising studies exhibit the likely job of the stomach microbiota-cerebrum pivot in clinical and preclinical examinations, incorporating mediation with probiotics, prebiotics, SCFAs, and waste microbiota transplantation. [4].

## Conclusion

The nuclear aspect of AD and its corresponding entities, studies over the years have examined the risk factors and

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recently found a correspondence between the gut microbiota, the likelihood, and the movement of the infection. Those separate examinations have found that few microorganisms in the stomach microbiota can combine synapses and impart in changed structures, either through the afferent or efferent pathway. [5].

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