Microbiome, probiotics and neurodegenerative diseases: deciphering the gut brain axis.

Westfall S¹, Lomis N¹,², Kahouli I¹,², Dia SY¹, Singh SP³, Prakash S⁴,⁵.

Abstract
The gut microbiota is essential to health and has recently become a target for live bacterial cell biotherapies for various chronic diseases including metabolic syndrome, diabetes, obesity and neurodegenerative disease. Probiotic biotherapies are known to create a healthy gut environment by balancing bacterial populations and promoting their favorable metabolic action. The microbiota and its respective metabolites communicate to the host through a series of biochemical and functional links thereby affecting host homeostasis and health. In particular, the gastrointestinal tract communicates with the central nervous system through the gut-brain axis to support neuronal development and maintenance while gut dysbiosis manifests in neurological disease. There are three basic mechanisms that mediate the communication between the gut and the brain: direct neuronal communication, endocrine signaling mediators and the immune system. Together, these systems create a highly integrated molecular communication network that link systemic imbalances with the development of neurodegeneration including insulin regulation, fat metabolism, oxidative markers and immune signaling. Age is a common factor in the development of neurodegenerative disease and probiotics prevent many harmful effects of aging such as decreased neurotransmitter levels, chronic inflammation, oxidative stress and apoptosis-all factors that are proven aggravators of neurodegenerative disease. Indeed patients with Parkinson's and Alzheimer's diseases have a high rate of gastrointestinal comorbidities and it has be proposed by some the management of the gut microbiota may prevent or alleviate the symptoms of these chronic diseases.

KEYWORDS: Gut microbiota; Gut-brain-axis; Neurodegeneration; Oxidative stress; Probiotics; Short-chain fatty acids

PMID: 28643167 DOI: 10.1007/s00018-017-2550-9
Microbiome, probiotics and neurodegenerative diseases: deciphering the relationship.

Publication type, MeSH terms, Substances

LinkOut - more resources