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Butyrate as a potential therapeutic agent for neurodegenerative disorders

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Abstract

Maintaining an optimum microbial community within the gastrointestinal tract is intricately linked to human metabolic, immune and brain health. Disturbance to these microbial populations perturbs the production of vital bioactive compounds synthesised by the gut microbiome, such as short-chain fatty acids (SCFAs). Of the SCFAs, butyrate is known to be a major source of energy for colonocytes and has valuable effects on the maintenance of intestinal epithelium and blood brain barrier integrity, gut motility and transit, anti-inflammatory effects, and autophagy induction. Inducing endogenous butyrate production is likely to be beneficial for gut-brain homeostasis and for optimal neuronal function. For these reasons, butyrate has gained interest as a potential therapy for not only metabolic and immunological disorders, but also conditions related to the brain, including neurodegenerative diseases. While direct and indirect sources of butyrate, including prebiotics, probiotics, butyrate prodrugs and glucosidase inhibitors, offer a promising therapeutic avenue, their efficacy and dosage in neurodegenerative conditions remain largely unknown. Here, we review current literature on effects of butyrate relevant to neuronal function, the impact of butyrate in a range of neurodegenerative diseases and related treatments that may have potential for the treatment of neurodegenerative diseases.

Keywords: Butyrate; Gut microbiome; Neurodegenerative disease; Prebiotic; Probiotic; Short-chain fatty acids.

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