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Gut Microbiota and Depression: Just a Fashionable Topic?

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Editorial

In recent years, we have been witnessing a rapid growth of researches about gut microbiota and its role in health and disease. The gastrointestinal tract is inhabited by more than 100 trillion of microorganisms, among which at least 1000 different species of bacteria. The importance of gut microbiota is not limited to gastrointestinal health, since dysbiotic conditions affect the whole body, even influencing mood and behaviour [1]. In fact, the existence of the so-called "gut-brain axis", consisting in a finely regulated crosstalk between gut microbiota and central nervous system, is now universally recognized. Since the gut microbiota is involved in neurotransmission, neuroinflammation and neuroendocrine pathways, its alterations could contribute to the pathogenesis of psychiatric and neurological disorders, such as depression, bipolar disorder, Parkinson's disease and Alzheimer's disease [1].

Concerning depression, a modified gut microbiota, characterized by an increase of Bacteroidetes and Proteobacteria phyla as well as a decrease of Firmicutes, has been demonstrated among depressed patients [2]. As previously stated, the effects of dysbiosis are not limited to the gut; in fact, it has been suggested that an aberrant translocation of bacteria from the gut to the systemic circulation could sustain the chronic inflammatory status typical of chronic depression [3]. In fact, depression is characterized by a pro-inflammatory, pro-oxidant status and an altered hypothalamic-pituitary-adrenal (HPA) axis [4]. Interestingly, mice with a sterile gastrointestinal tract exposed to stress show an overactive HPA, that can be suppressed through the administration of the probiotic *Bifidobacterium infantis* [5]. However, data on the efficacy of probiotics in the treatment of depression are still controversial. In fact, on the one hand studies on healthy volunteers have reported no beneficial effects of probiotics on mood, sleep quality and anxiety [6], on the other hand a recent trial has linked the treatment with multispecies probiotics to reduced cognitive reactivity to sad mood (in particular decreased rumination and aggressive thoughts) in a sample of non-depressed individuals [7].

Another research topic pertains the potential treatment of depression with prebiotics. The latter are non-digestible fibers that "cultivate" beneficial microbiota, such as *Lactobacillus* and *Bifidobacterium*. Both animal and human studies have reported an attenuation of stress behaviour, depression and anxiety after prebiotics administration [8]. A fascinating research area is represented by the faecal microbiota transplantation, consisting in the transfer of faecal microbiota from healthy donors to ill subjects. This technique has been successfully performed in cases of refractory *Clostridium difficile* infection, but data pertaining its potential use in depression are still inconsistent [8].

In conclusion, the manipulation of gut microbiota for the treatment of depression is not just a fashionable topic, since it cannot be denied that a gut-brain relationship exists. On this ground, could it be possible that the solution to depression would literally lie within us? Further insights are needed to address this issue.

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