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Functional Medicine

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ABOUT SEROTONIN PRODUCTION AND THE GUT-BRAIN AXIS ROLE

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Influence of Tryptophan and Serotonin on Mood and Cognition with a Possible Role of the Gut-Brain Axis.

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Abstract

The serotonergic system forms a diffuse network within the central nervous system and plays a significant role in the regulation of mood and cognition. Manipulation of tryptophan levels, acutely or chronically, by depletion or supplementation, is an experimental procedure for modifying peripheral and central serotonin levels. These studies have allowed us to establish the role of serotonin in higher order brain function in both preclinical and clinical situations and have precipitated the finding that low brain serotonin levels are associated with poor memory and depressed mood. The gut-brain axis is a bi-directional system between the brain and gastrointestinal tract, linking emotional and cognitive centres of the brain with peripheral functioning of the digestive tract. An influence of gut microbiota on behaviour is becoming increasingly evident, as is the extension to tryptophan and serotonin, producing a possibility that alterations in the gut may be important in the pathophysiology of human central nervous system disorders. In this review we will discuss the effect of manipulating tryptophan on mood and cognition, and discuss a possible influence of the gut-brain axis.

KEYWORDS: gut-brain axis; mood and cognition; serotonin; tryptophan

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*"Central serotonin production represents just **5%** of total **serotonin** synthesis, with the vast majority of serotonin made in the periphery. Peripheral synthesis occurs in tissues such as bone, mammary glands, the pancreas, but **the gastrointestinal epithelium is by far the largest source**. The enterochromaffin cells in the gastrointestinal epithelium account for **~90%** of all serotonin synthesis."*

"Germ-free mice display less anxiety-like behaviours than their traditionally colonised counterparts. Meanwhile, chronic treatment with lactic acid bacteria Lactobacillus rhamnosus *to mice induced alterations in GABA receptors in cortical hippocampus and amygdala in comparison with control-fed mice, while also reducing stress-induced corticosterone levels and anxiety, and depression-related behaviour. Interestingly, these effects were not found in vagotomized mice, identifying the **vagus** as a major modulatory communication pathway between the gut bacteria and the brain."*