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MENTAL HEALTH
& THE GUT

WHITEPAPER



GUT-BRAIN AXIS

The physiological effects of the gut microbiota are not local i.e. the effects are not limited to our digestive systems, they also play an important function for many other organs within our bodies including our brain.

The link between gut microbiota and the brain is a relatively recent discovery and has quickly become a leading field of research. The brain and the microbes of the gastrointestinal tract (GI) communicate with each other directly via several pathways including the nervous system and other cellular communication pathways such as: neuroactive molecules, endocrine and immune systems. This communication is termed the microbiota-gut-brain axis. It is likely to be a bidirectional “talk”, so that microbes and the brain influence each other mutually⁽¹⁰²⁾. This means that our gut microbes affects our mental health and our mental health can in turn affect our gut health.

MICROBIOTA AND PSYCHOLOGICAL DISORDERS

Research suggests that gut microbes regulate inflammation in our bodies with SCFAs playing an important role in this process⁽³²⁾. When simplified, an inflammation can be described as a protective reaction of our immune system to an irritating factor, and depending on the cause, this inflammatory reaction can be acute or chronic.

Acute inflammation is transient, meaning that it only lasts for a short period of time – i.e. injuries or reaction to infections. Chronic inflammation is more constant, sometimes less visible, triggered by toxins (smoking, drinking, unhealthy diet and ecological factors), stress, obesity and autoimmune disorders. Chronic inflammation has been associated with adverse effects on our psychological health and can initiate fatigue, depression, apathy, anxiety and stress^(103, 104, 105).

Short-Chain Fatty Acids (SCFAs) possess anti-inflammation effects and supply the gut cells with energy help to establish tight contacts and cohesion between them. This creates a reliable physical barrier which prevents the penetration of harmful bacteria, their products and other toxins from entering the blood and triggering inflammation. Moreover, it has been demonstrated that SCFAs can directly interact with immune cells regulating their functions and therefore altering the immune response, to better protect our bodies⁽³²⁾.

Recently a large-scale research of Belgian population demonstrated that butyrate-producing bacteria *Faecalibacterium* and *Coprococcus* were linked to better physical and mental health. In the same study two groups of bacteria, *Coprococcus* and *Dialister*, were shown to be reduced in the people with depression⁽¹⁰⁶⁾. These results are the strong indication of a link between particular bacterial species and mental health.



Besides SCFAs, bacteria are involved in the biosynthesis of some essential neuroactive molecules regulating the functions of the brain. One of these molecules is the “happy hormone” – serotonin. 95% of the serotonin made in the body is made in the gut. Low serotonin levels have been linked to depression and impaired cognitive functions^(102, 107, 108). Gut bacteria can produce serotonin themselves or promote its biosynthesis by specialised gut cells. As it has been shown, SCFAs have stimulatory activities on the synthesis of serotonin by human cells^(109, 110).

Another study has highlighted that treatments involving probiotics (probiotic - live bacteria with health benefits such as *Bifidobacterium* or *Lactobacillus* species), reduced depressive behavior^(110, 112, 113).

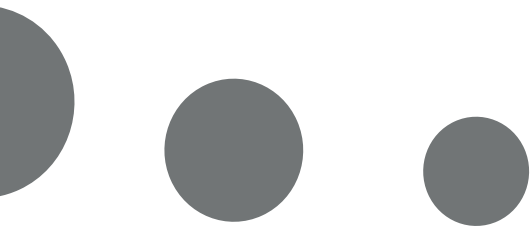
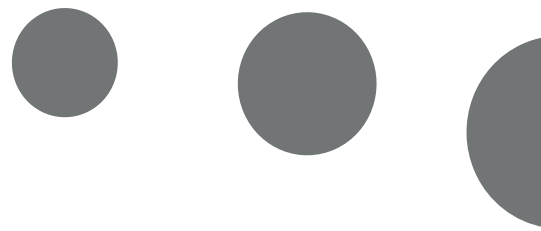
DIET INTERVENTIONS

Diet interventions are well known for their ability to alter the composition and function of the gut microbiome. For example, western diet consumption increases the risk for depression, whereas Mediterranean diet reduces the onset of depression⁽¹¹⁴⁾. Therefore, modulating diet composition may represent an approach to tackle psychological problems.

CONCLUSIONS

- The brain and the microbes of the gut communicate with each other by a two way street known as the gut-brain axis.
- Chronic inflammation has been associated with adverse effects on our psychological health.
- High-fibre diet increases SCFAs which have anti-inflammation effects which can lessen or relieve psychological disorders such as fatigue, depression, apathy, anxiety and stress.





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