

# Exploring the Effects Gut Microbiome on Mental Health Disorders



Heily Tirayan Chaires and Joan Bleecker

## Background

- Mental health disorders are one of the leading causes of disability globally, such as depression and anxiety.
- The gut and brain are connected through the gut-brain axis, a communication pathway that links the central and enteric nervous system
- Exploring the relationship between gut microbiome and mental health disorders.
- Research has shown that probiotics and prebiotics are beneficial in regulating the GM composition.

## Objective

This study aims to explore, through the analysis of scientific literature, how treatment in regulating the gut microbiota can potentially improve mental health disorders.

## Methods

To evaluate the relationship between the gut microbiome and mental health disorders, we conducted a literature review research that had to be published in peer-reviewed journals with an impact factor of at least 1.6.

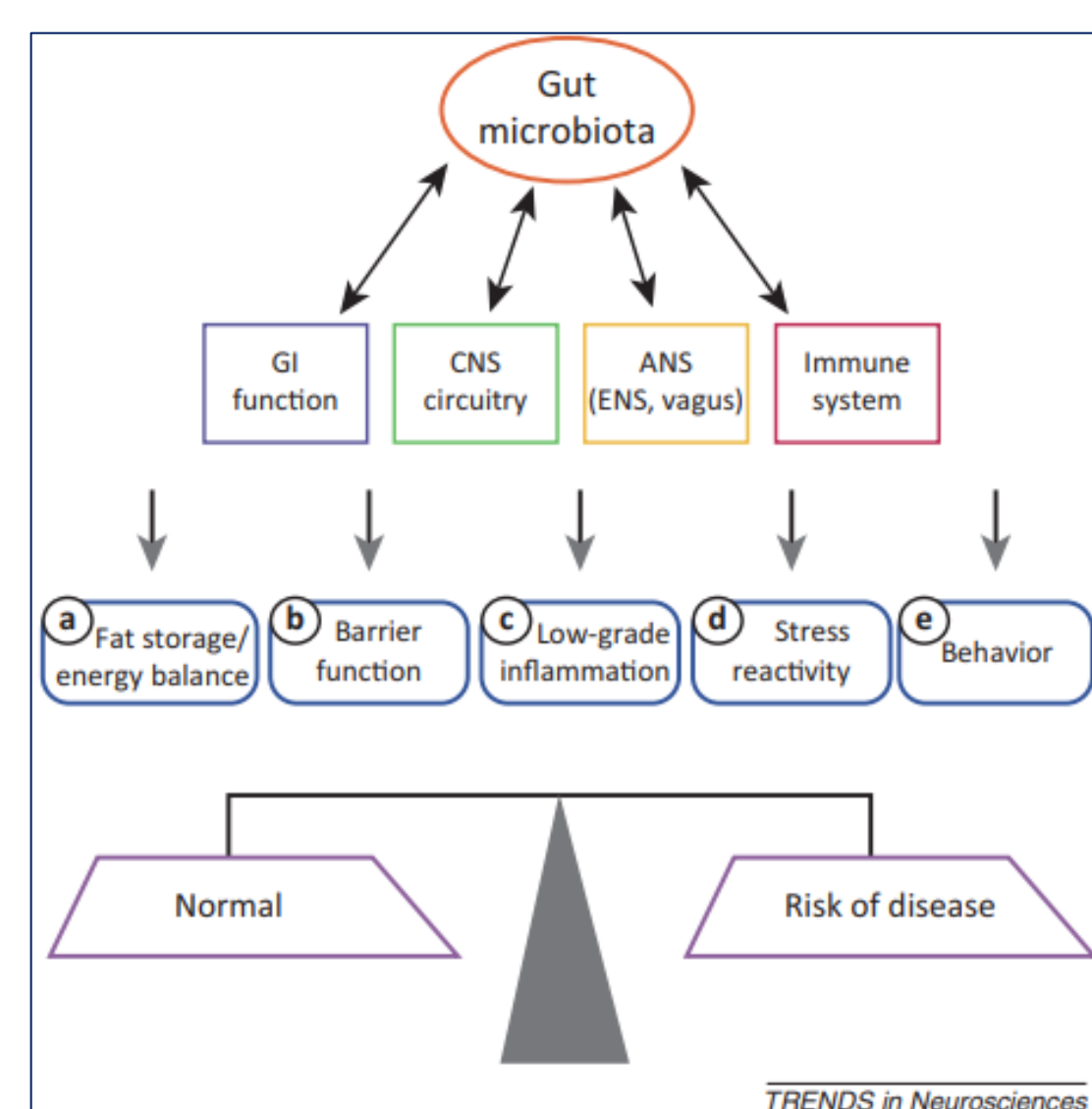


Figure 1. Bidirectional communication between gut microbiota and components of the gut-brain axis influence normal homeostasis and may contribute to risk of disease. (Foster and Neufeld, 2013).

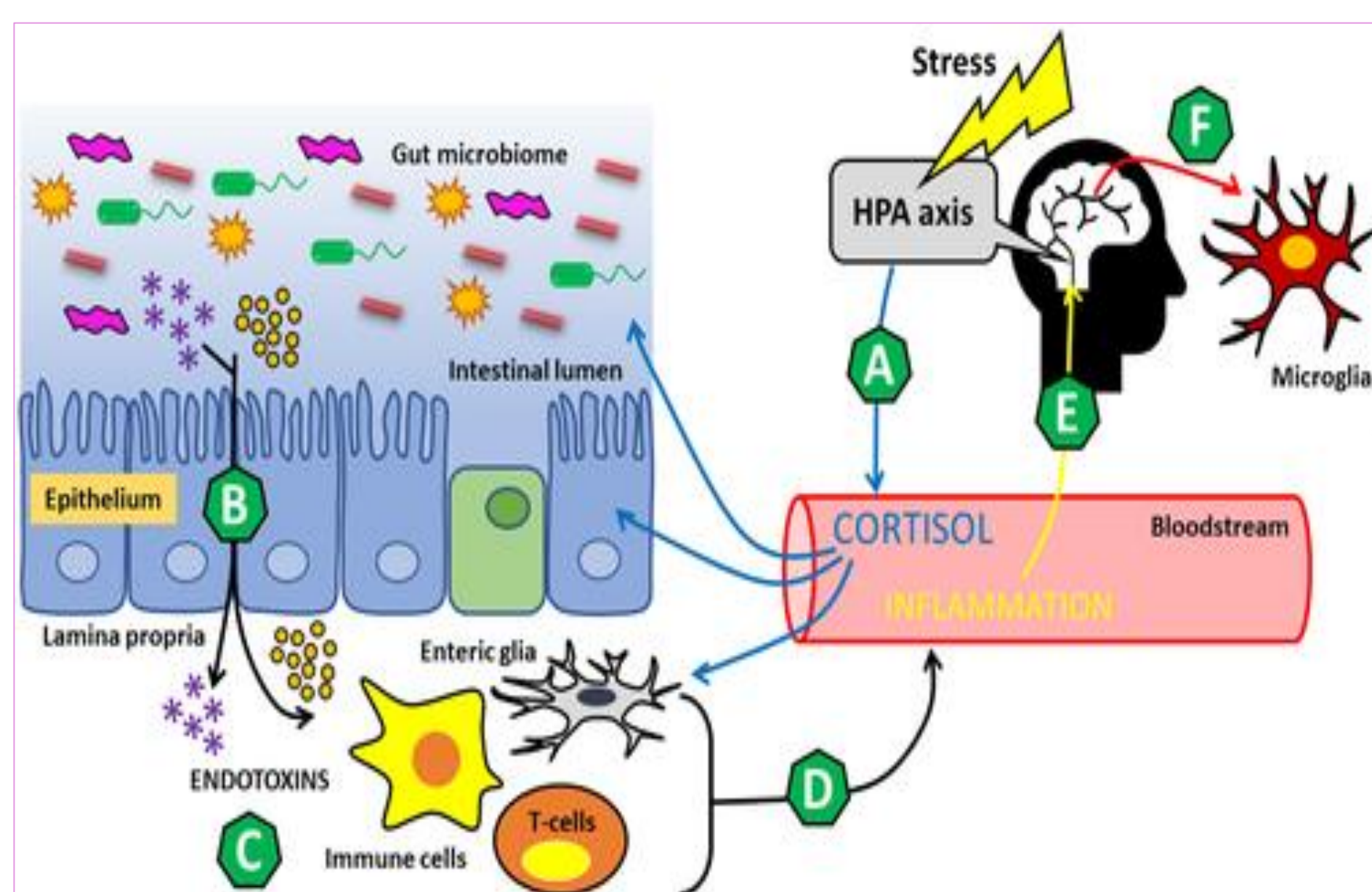


Figure 2. Bidirectional communication between the gut microbiome and the CNS is affected by stress. (Pierce and Alviña, 2019)

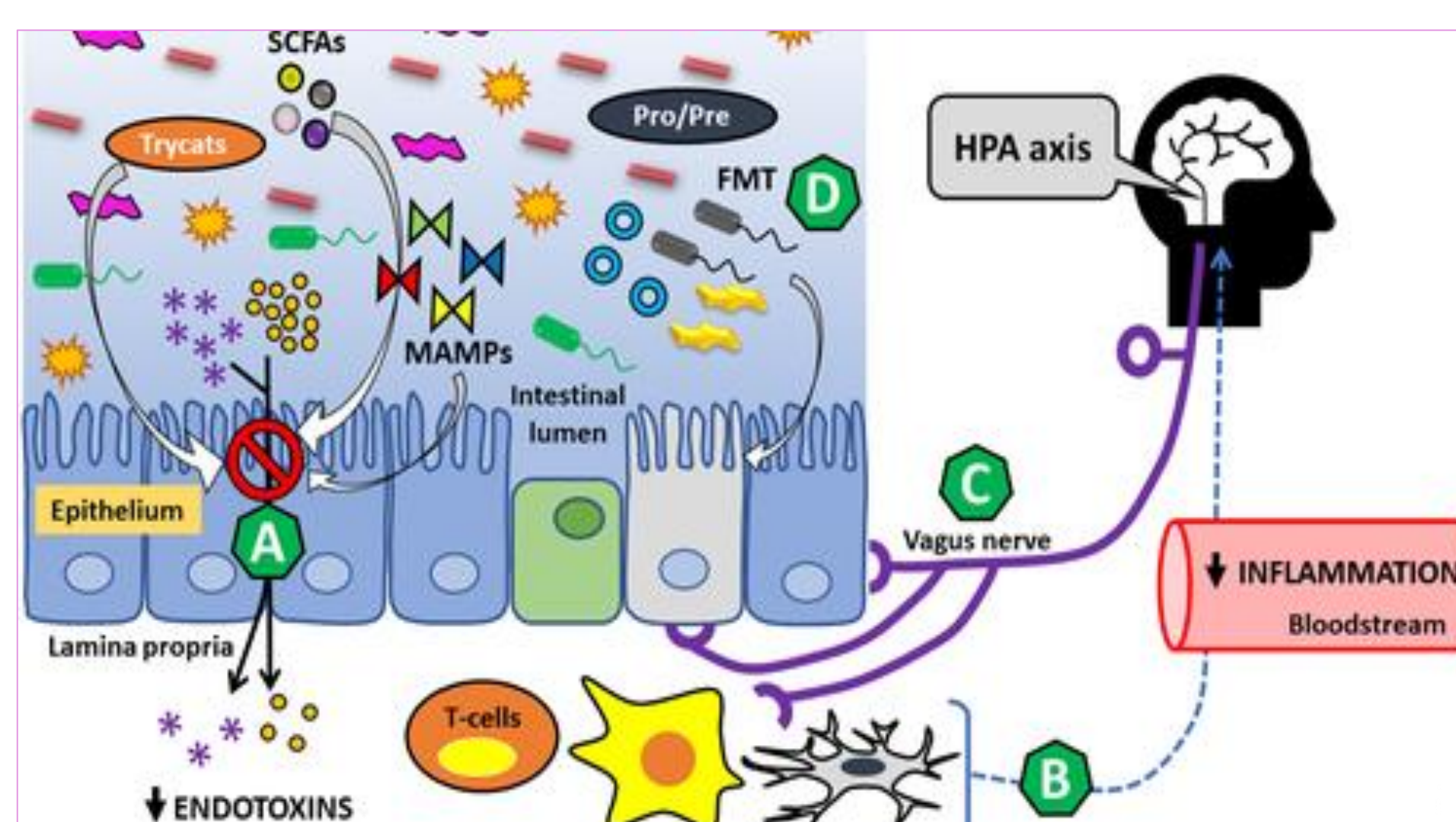


Figure 3. Gut microbiome-brain axis mechanisms that can influence CNS function. Short-chain fatty acids (SCFAs), tryptophan catabolites (Trycats) catabolites, and microbial-associated molecular patterns (MAMPs) bolster the intestinal barrier (a) preventing endotoxins from leaking through the intestinal epithelium. This results in reduced inflammation (b). The vagus nerve (c) communicates with the gut epithelium, including enteroendocrine cells (gray), to exert antidepressive and anxiolytic effects. (Pierce and Alviña, 2019)

## Results

- Microbes altered stress response, which confirmed that gut bacteria interact with the brain (Figure 2.)
- The hypothalamic pituitary adrenal (HPA) axis regulates the body's stress response. As stress activated this response, the intestinal permeability increases, allowing bacteria from the GM to enter the bloodstream (Figure 2.)
- Murine studies have shown that the endotoxins released into the bloodstream can trigger an inflammation response

## Discussion

- Microglia release nitrogen and oxygen into the brain, causing damage to brain epithelial cells. The release of these neurotoxins impacts brain activity and is perilous for mental health (Figure 2.)
- The Bifidobacteria and Lactobacillus families are the most frequently utilized probiotics for treating various disorders
- Probiotics suppress restraint stress-induced by hyperpermeability in the colon and prevent any bacteria from leaking into the bloodstream (Figure 3.)

## Future Directions

- Future research is needed to understand if prebiotics and probiotics can prevent anxiety and depression.
- Further research into how brain development throughout the early age can impact actions as an adult.

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## Citations

