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# GUT HEALTH AND DEPRESSION:

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# Our gut is connected to our Brain

The digestive system's main job might be to break down food and keep us nourished, but that's not all the gut is good for. One exciting area of research is examining how the gut is connected to the brain. We're learning that the link between these systems is more than feeling "butterflies in our stomach" when we're nervous or "losing our appetite" when we're upset. Recently, researchers in Finland found a link between specific gut microbes and depression.

The authors of this recent study wrote that their findings add to the "increasing evidence" that gut microbes are "likely to influence host behaviour."

One way that they do this is through the "systemic modulation of hormones and metabolites along the gut-brain axis"—in other words, a path between the mind and the body.

Since it's a relatively new field, there are some big questions in gut-brain research.

What exactly is the gut-brain axis?

How are the two systems connected?

Can the microbes in our intestines really affect our minds?

# Understanding the Gut-Brain Axis

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## The Mind-Body Connection

Scientists used to mainly link depression to problems with certain neurotransmitters in the brain (like serotonin), stress hormones, or sleep however

Guillaume Méric, PhD, a microbiologist and a bioinformatician at Baker Heart & Diabetes Institute in Melbourne, Australia, who has participated in many studies said we need to change how we think about mental health conditions.

According to Méric, conditions we associated with the mind, like depression, need to be thought of as being more intimately connected and influenced by other organ systems.

Méric said that research has shown that patients with severe mental health conditions often have very different microbes in their guts than people who do not have the conditions. According to Méric, these findings show “that our gut and our brain are intimately connected.” That means that our diets and immune systems factor into our mood and other brain processes.

## A Complex Loop

There are trillions of microorganisms living in our gastrointestinal tract. Most are bacteria, but some are fungi and viruses.

These microbes digest what we eat by taking out the nutrients and other molecules to create metabolites, which we need to survive.

## The Gut's Nervous System

The gut-brain axis is more of a loop than a one-sided relationship. Each end informs the other using three main paths.

Méric said that the gut actually has its own nervous system. It's called the enteric nervous system (ENS). If it had to, the ENS could function independently of the central nervous system (CNS), which includes the brain. That's why the ENS is sometimes called our "second brain."

We always thought of the gut as being necessary for digestion. Now, we know that gut microorganisms can influence the brain in at least three ways:

**The bloodstream:** Gut bacteria produce and release certain metabolites that enter the blood circulation and interact with our immune system.

**The enteric nervous system:** Certain metabolites affect the brain cells (neurons) that control gut function (the ENS).

**The vagus nerve:** Some gut microbes "talk" with the brain through the vagus nerve, which connects the organs of the peripheral nervous system (like the intestines) with the CNS.

## Neurotransmitters: From Gut to Brain

The gut and brain use these pathways to stay in constant communication.

According to Méric, most of the neurotransmitters that eventually work in the brain are made in the intestines. For instance, the ENS can produce and store around 90% of our total serotonin and 50% of our total dopamine.

Méric said these neurotransmitters are “famously involved in complex modulation of mood, reward, cognition, and other physiological and psychological processes.”

In broad terms that means that having “a healthy gut is strongly linked to better psychological outcomes.”

## The Gut and Depression

Depression has long been thought to be caused by an interplay of genetic, environmental, and biological factors.<sup>4</sup>

While that’s not wrong, it’s also not completely right. Méric said that the gut microbiota is a whole new area for investigating what causes depression.

For example, research is showing that people with depression and other mental health disorders have very different gut microbiomes from people who don’t have these conditions.

The recent study supported previous research suggesting that inflammation caused by a gut bacterium called *Morganella* might influence depression.

## Pathways to the Brain

The ways that the gut bacteria have been found to influence the brain—and vice versa—are along the same lines as the gut-brain axis:

Gut bacteria can change which neurotransmitters are in the bloodstream, and inflammatory molecules produced in the gut can also play a role.

The ENS—or “second brain”—makes neurotransmitters that are known to play a role in depression, such as serotonin.

What happens in the gut can also stimulate the vagus nerve, which sends messages to the brain.

While the details have yet to be revealed, the pathways and factors that inform the gut-brain axis are becoming clearer.

## An Integrated Approach to Health

Méric said that the gut-brain axis does not exist in a vacuum.

Everything else that goes on in a person’s life also influences both their gut and mental health.

“It is always very hard to untangle cause and effect in these correlations,” Méric said. The presence—or absence—of different bacteria depends on many factors, like a person’s diet and overall health. The authors of the study felt similarly.

They wrote that “taken together, our findings highlight the intimate influence of the gut-brain axis on humans.”

However, the researchers also acknowledged that more mechanistic studies” are needed to “untangle and further interpret these predictions.

There is still so much to uncover We are just starting to get a picture of how much the gut microbiome can influence the rest of the body, including the brain. Which, for the longest time, was considered to be isolated.”

## Supporting Your Gut

Whether having your favourite food boosts your mood or you get “hangry” when you’ve gone too long without a meal, most of us have experienced the gut-brain connection.

In this way, Méric said that you can “trust your gut” and that it’s “unsurprising to know that our gastrointestinal system is one of our most advanced collection of organs after the brain.”

With that in mind, how can you support your gut health?

There is some research has shown that consuming specific combinations of bacteria called probiotics may help your mood. You can get probiotics from fermented foods (like yogurt) or as a dietary supplement.

You can also get prebiotics, which is a source of food for your gut’s “good” bacteria. However, research is still a bit inconsistent on their benefits.