



## Our Gut Feelings: Mind And Stomach

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**AfSFH Head of IT and supervisor Trevor Eddolls takes a look at the link between your GI tract and how you feel**

We're all completely familiar with our Gastrointestinal tract (GI tract) or, as we familiarly call it, our gut. We know that it's responsible for digesting and transporting foodstuffs, absorbing nutrients, and getting rid of waste. But what few of us are aware of is how much it affects our brain and how big an impact it has on how we feel.

The current theory is that animals developed brains in order to coordinate their movements – to make them less random. And once they had a brain they started to use it for other things, like thinking and feeling (although they probably didn't evolve in that order).

It's interesting to note that the gut has a huge number of nerves and these nerves are different from other nerves in the body. The Enteric Nervous System (ENS) is one of the main divisions of the nervous system and consists of a mesh-like system of neurons that governs the function of the gastrointestinal system. Some people refer to the gut network of nerves as the 'gut brain'.

With so many nerves, it could be argued the gut must do more than simply digest food. And we find that many of our common phrases and sayings refer to 'gut feelings' or actions.

Signals from the gut go to different parts of the brain, including the insula, the limbic system (including the amygdala and hippocampus), the anterior cingulate, and the prefrontal cortex. A number of studies have been carried out looking at the effects of the gut on the brain.

Because of the large surface area of the gut, it is our largest sensory organ, and information is sent to the brain so it can know about what's going on in this internal environment. In fact, for a baby, most of what it knows about the world comes from its gut – and that affects how it feels. A baby cries if it's hungry or needs its nappy changed. It smiles with the pleasure of a full stomach.

This link between the gut and the brain doesn't disappear as we grow older, and it can still affect our mood and sense of well-being. In fact, a 2013 study found that after four weeks of swallowing certain bacteria, there were unmistakable alterations to areas of the brain associated with pain and emotions of people.

In another experiment, people had small balloons in their intestines inflated. Healthy patients didn't show any unusual brain activity. People with IBS (Irritable Bowel Syndrome) showed activity in the emotional centre of the brain, making them feel uneasy.

IBS sufferers are known to show a higher than average incidence of depression and anxiety. Similarly, people who suffer from Crohn's disease or ulcerative colitis also have increased rates of depression and anxiety.

Let's suppose that you're under pressure at work – you have to complete some long and complicated task by Friday. You are feeling stressed. Your brain needs more resources (food and oxygen) in order to complete the work, and it gets it by redirecting blood that would have gone to the gut towards the brain.

Messages travel through sympathetic nerve fibres to use less energy in digestion and produce less mucus as well.

If the stress continues, and supplies to the gut stay at the lower level, the consequence can be fatigue, loss of appetite, general malaise, and diarrhoea. If the stress continues even longer, the health of the gut will decrease, resulting in a weaker gut wall.

As a result of this, immune cells in the gut (and there are more here than anywhere else in the body) become more sensitive – and so you become more sensitive to what you eat. This suggests that many food allergies are a consequence of stress.

Another suggested consequence of prolonged stress is that it affects the bacteria that live in your gut – making it a better environment for some and worse for others. And there is a time delay after the stressful period ends before the gut bacteria return to their original levels.

It may be that the brain remembers the negative feelings from the gut and is less likely to put itself in the same stressful situation again. It may be why people feel less keen on given a presentation, even though the first one appeared to be quite successful.

It's recommended that meal times are stress free events because any kind of stress inhibits digestion, which means we get less energy from our food and it takes longer to digest it, which adds to our stress.

We know that travel sickness tablets numb the nerves of the gut. It's also been found that as the feelings of nausea disappear, so do any feelings of anxiety. Alcohol reaches the gut before it reaches the brain.

Perhaps its relaxing effects come from what it does to the nerves of the gut? And if you want to achieve the same effect with bacteria, experts say *Lactobacillus reuteri* may be able to inhibit the pain sensors in the gut and they add that *Lactobacillus plantarum* and *Bifidobacterium infantis* can help with IBS.

The good news for us is that hypnotherapy has been proven to work with patients with IBS and is a recommended treatment by NICE (The National Institute for Health and Care Excellence).

If 95% of all serotonin produced by the body is in the gut then it is perhaps not surprising that taking SSRIs (Selective Serotonin Reuptake Inhibitors) may have an impact on the gut as well as an effect on the brain. It has been suggested that the next breakthrough drug for depression will only affect the gut and not the brain. It's an interesting idea.

Your gut contains a number of bacteria:

*Bacteroides* produce enzymes for digesting just about any carbohydrate. It may be these bacteria that produce more usable simple sugars from the food we eat and allow some of us to absorb more calories than someone else eating the same food with fewer of this family of bacteria in their gut. *Prevotella* tend to dominate in the gut of vegetarians.

It's also worth mentioning that invasive bacteria can change the way people behave. For instance, *Toxoplasma* in the gut can cause animals and humans to seek out dangerous activities that they wouldn't otherwise. For example, people may self-harm.

Some areas affecting the gut can be down to a feedback loop in our own bio-chemistry. Any changes in the brain cause changes in the gut. And any changes in the gut can cause changes in the brain. So, having a "funny tummy" today could be caused by the stress at work yesterday and could lead to that low mood tomorrow.

As with any medical condition then seeking advice from a fully qualified doctor is always the sensible step forward.

If the root of stomach issues lies in underlying stress then SFH may be able to help and, it could be argued, they will also benefit from seeking professional advice from a dietician to look at what changes they can make in what they eat.

It's a powerful two pronged attack on an issue which goes back to the dawn of time and is still affecting our primitive brains today.



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### **References:**

*Giulia Enders;*  
*Gut; Scribe Publications*

*Toxoplasma reference: Flegel J:*  
*'Influence of latent toxoplasma infection on human personality, physiology, and morphology: pros and cons of the toxoplasma-human model in studying the manipulation hypothesis'.*  
*In: J Exp Biol. 2013 January 1; 216 (pt 1): pp 127-33.*

*Bravo JA. 'Ingestion of Lactobacillus strain regulates emotional behaviour and central GABA receptor expression in a mouse via the vagus nerve'. In: Proc Natl Acad Sci USA 2011 September 20; 108 (38) pp 16050-55*

*Enck P et al. 'Therapy options in Irritable Bowel Syndrome'. In: Eur J Gastroenterol Hepatol 2010 December; 22 (12) pp 1402-11*