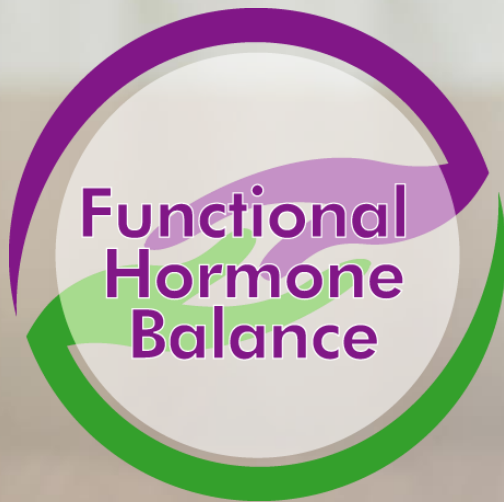


Hormones And The Gut

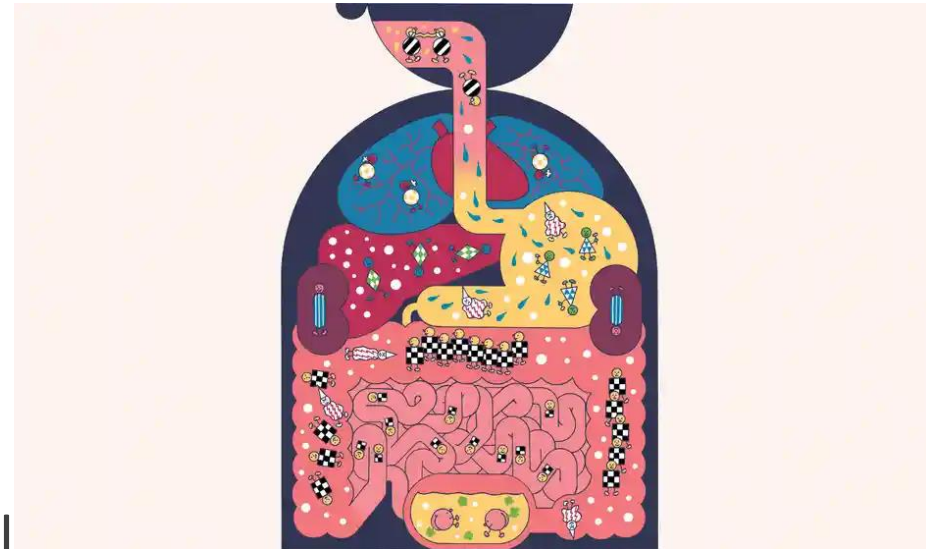


The microbiome functions as a virtual endocrine organ by:

- Directly producing hormones
- Triggering glandular production of hormones

Low microbial diversity, low keystone strains, mucosal dysfunction, and intestinal permeability can all negatively impact hormonal balance

A healthy gut protocol can help restore hormonal balance by repairing daily damage to the gut microbiome



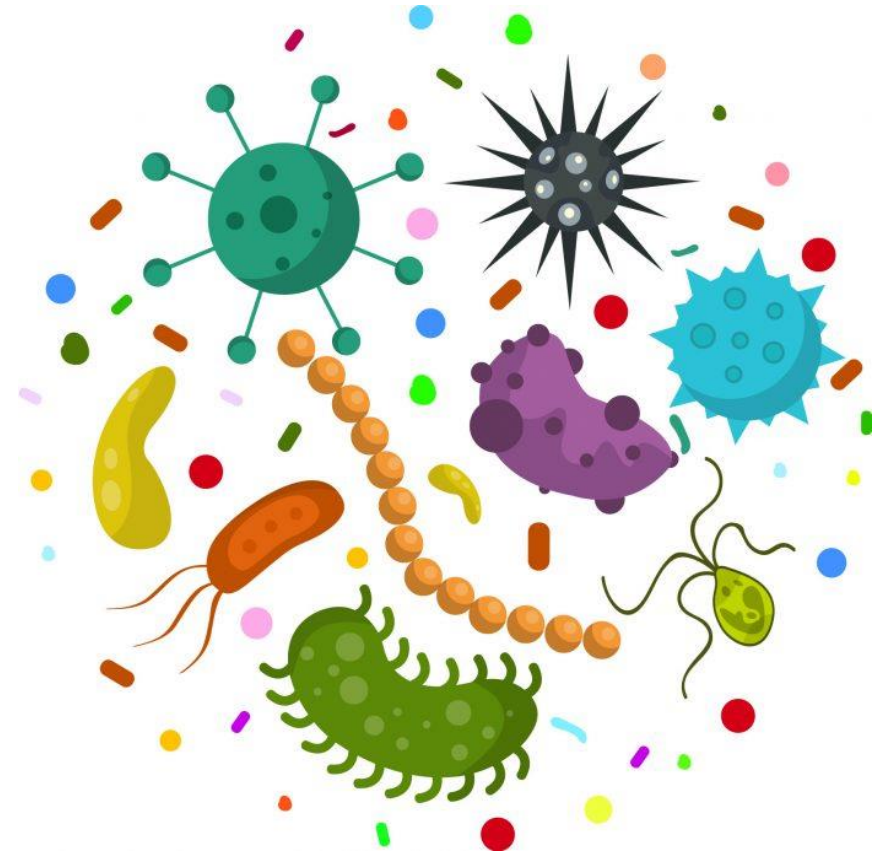
Optimizing our gut health is key to keeping our hormones in balance

Gut health is important because the microbiome has many functions.

- It aids the synthesis and regulation of hormones and neurotransmitters
- It facilitates absorption of macro- and micronutrients



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- It has an essential role in the immune system
 - It contributes to regulation of estrogen levels in the body
 - Gut bacteria modulate circulating hormone levels
 - It's also affected by certain hormones
 - It modulates systemic inflammation in the body – linked to hormonal dysfunction

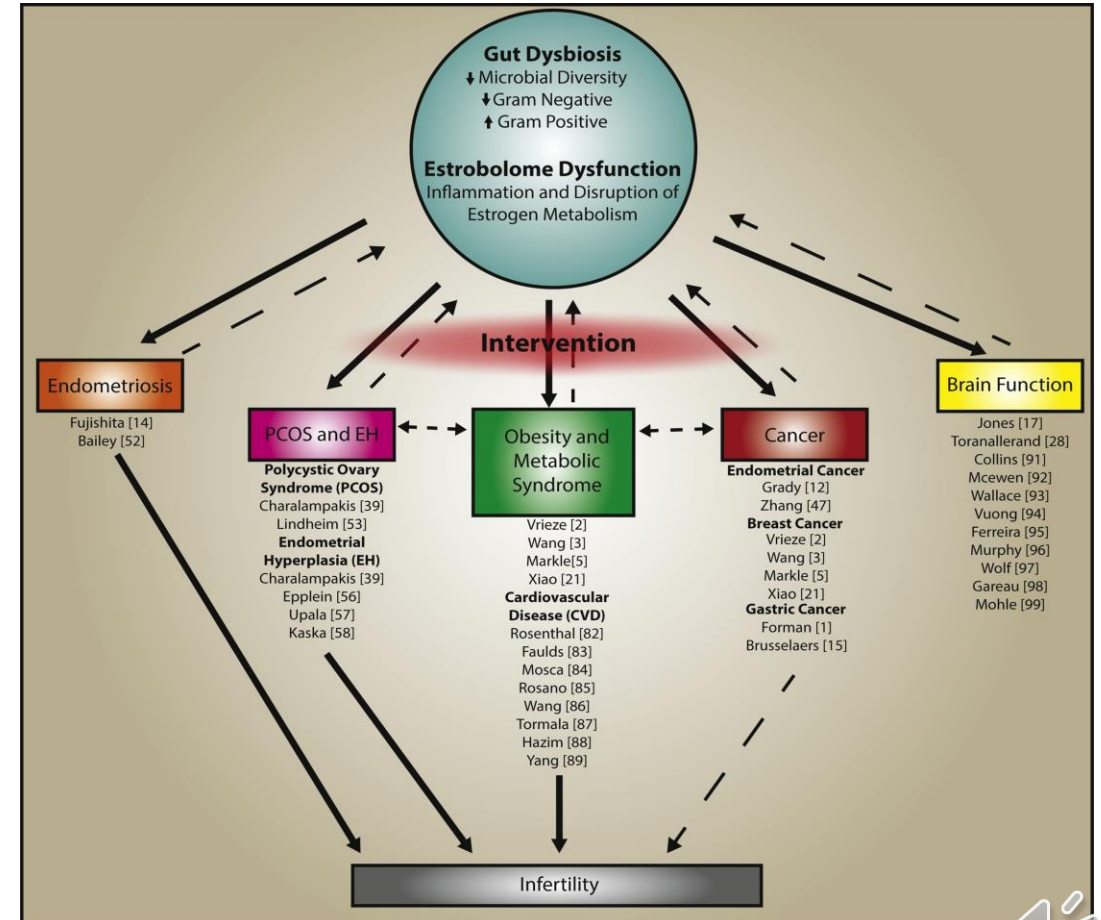


The Estrobolome

The estrobolome is also capable of metabolising and modulating the body's circulating estrogen

It's the bacteria in the gut and the estrobolome that affect estrogen levels, which in turn can impact weight, libido and mood

Can also help when estrogen is low by recirculating estrogen that had been prepared to be detoxed



When the gut microbiome is healthy, the estrobolome is producing optimal levels of an enzyme called beta glucuronidase

It can break the bond of the estrogen that's attached to bile and allow the estrogen back into the bloodstream

– Too much and estrogen levels become imbalanced

Beta glucuronidase also plays a role in breaking down complex carbohydrates and the absorption of bilirubin and flavonoids



Estrobolome Issues

Premenstrual syndrome (PMS)

Obesity

Metabolic syndrome

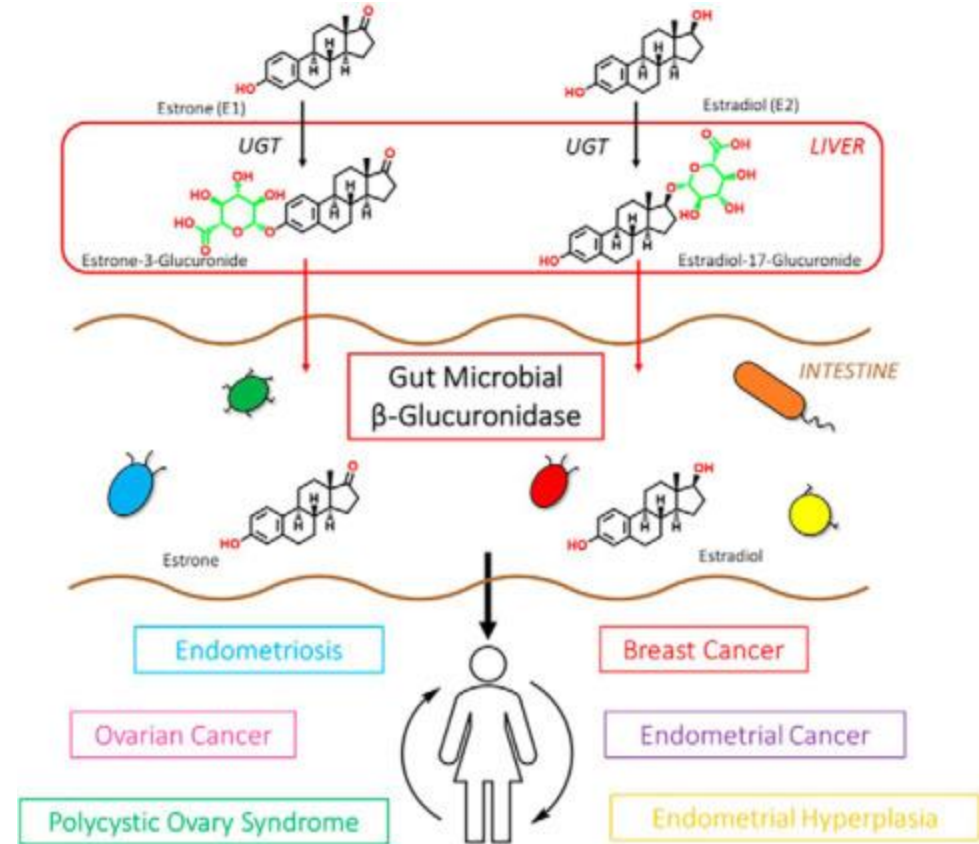
Estrogen-related cancers (breast and prostate)

Endometriosis

Infertility

Mood disturbance

Heart disease



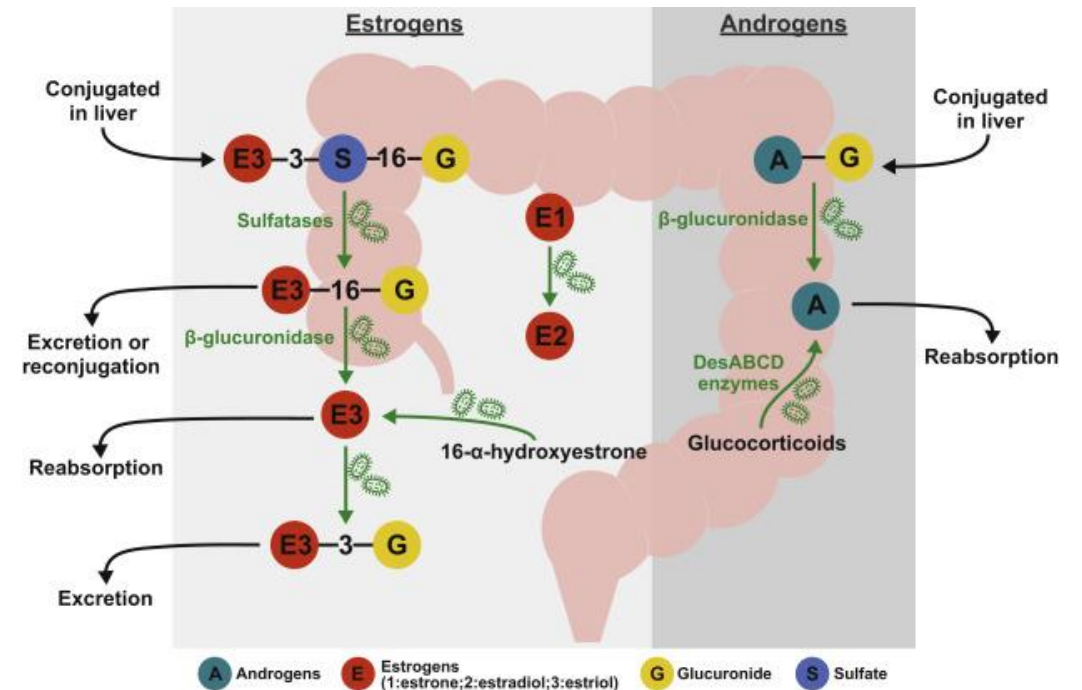
Estrogen also helps the gut function

The gut is lined with estrogen receptors

Estrogen Beta is required for proper signaling that supports the function of T-reg cells

T-reg modulate inflammation

This has a big role in inflammatory conditions in the intestines but also has implications in the rest of the body



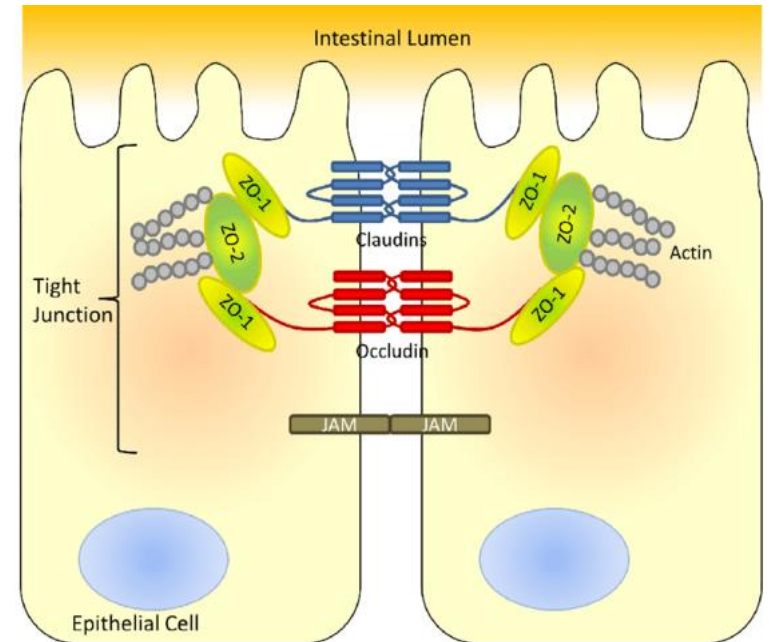
Higher levels of estrogen can delay gut motility

Stress and higher estrogen are correlated with functional GI Symptoms

Estrogen also helps regulate the tight gap junctions

Too much may play a role in more intestinal permeability

Too little may play a role in poor vaginal lubrication

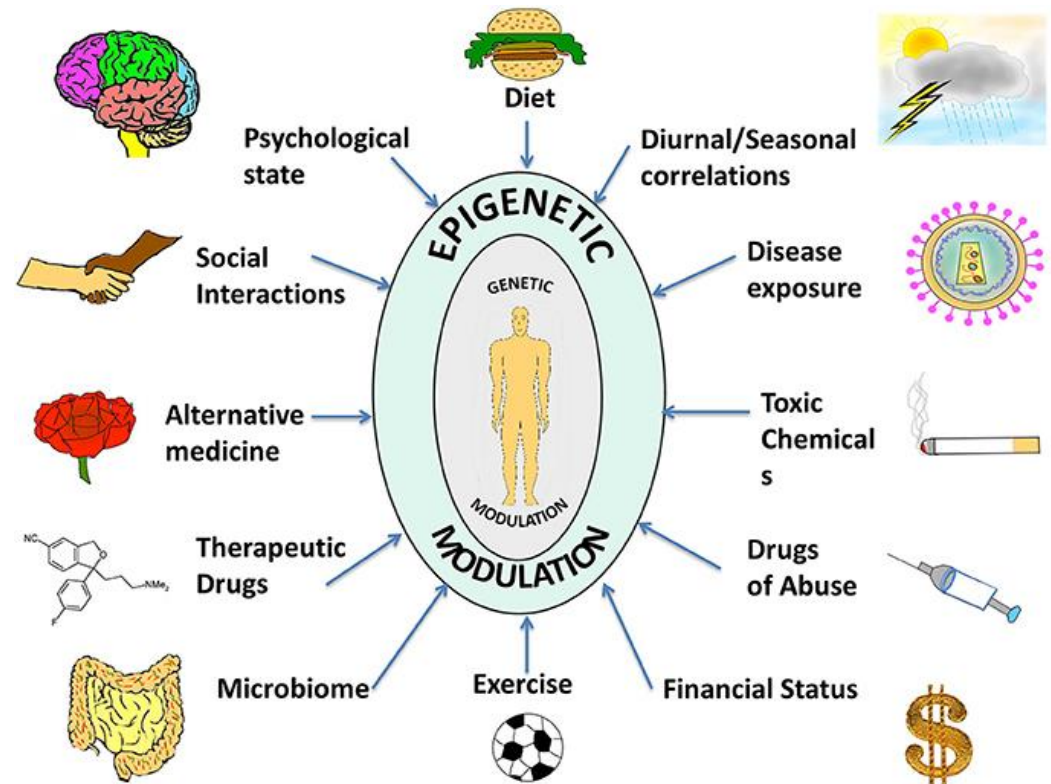


Gut dysbiosis and gut microbiome imbalance are very common

Balance of the microbiome and estrobolome can be affected by many factors

Including genetics, age, weight, diet, alcohol, antibiotics, environmental pollutants

Basically, everything we've been talking about



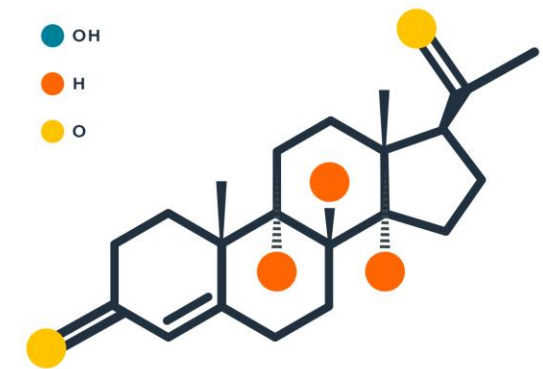
Progesterone

Helps decrease inflammation in the GI tract as it relates to the intestinal lining

It also protects the lining and prevents “leaky gut” and can increase gastric motility

Researchers look at pregnant women as it is easier to see the difference progesterone can make

Found LPS (lipopolysaccharide) was decreased in the bloodstream during weeks 24–28 (as compared to weeks 8–12) – progesterone levels go up as the pregnancy progresses



PROGESTERONE



Pregnancy

Progesterone changes the microbiota during pregnancy – promoting bifidobacterium during the third trimester of pregnancy

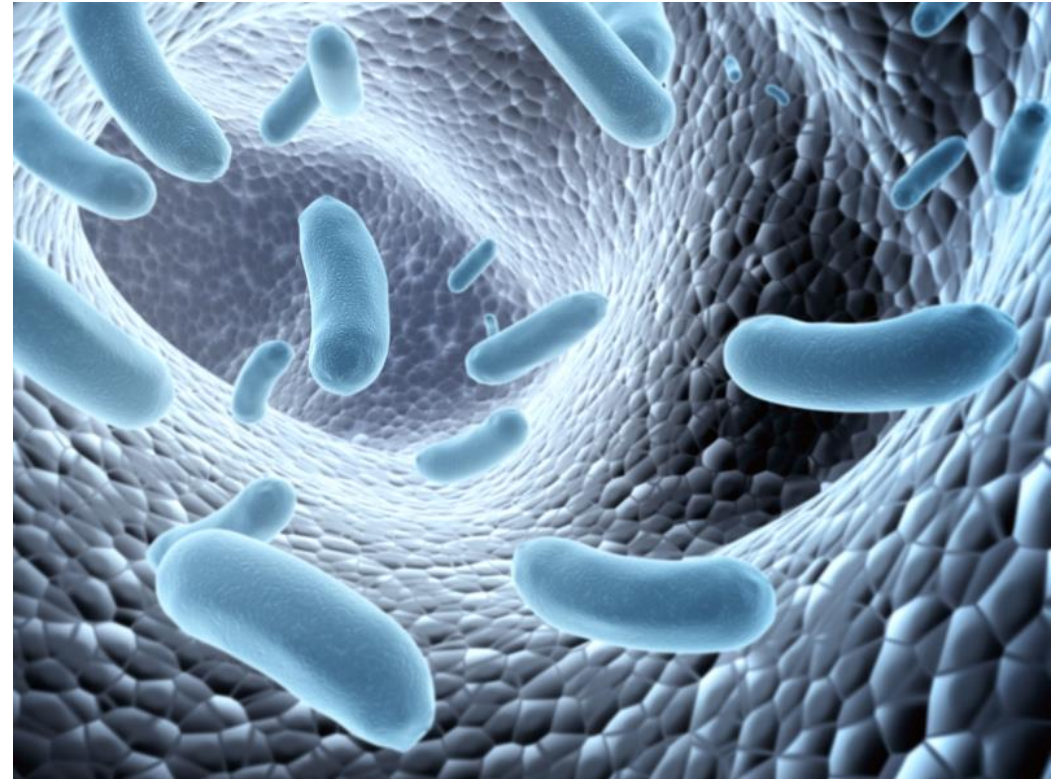
Bifidobacterium is a key family of bacteria that babies need as they're building their own gut bacteria, and it's linked to many functions including immune



Testosterone

In a mouse study, there appeared to be a feedback loop where testosterone increased gut bacteria and the gut bacteria increased testosterone

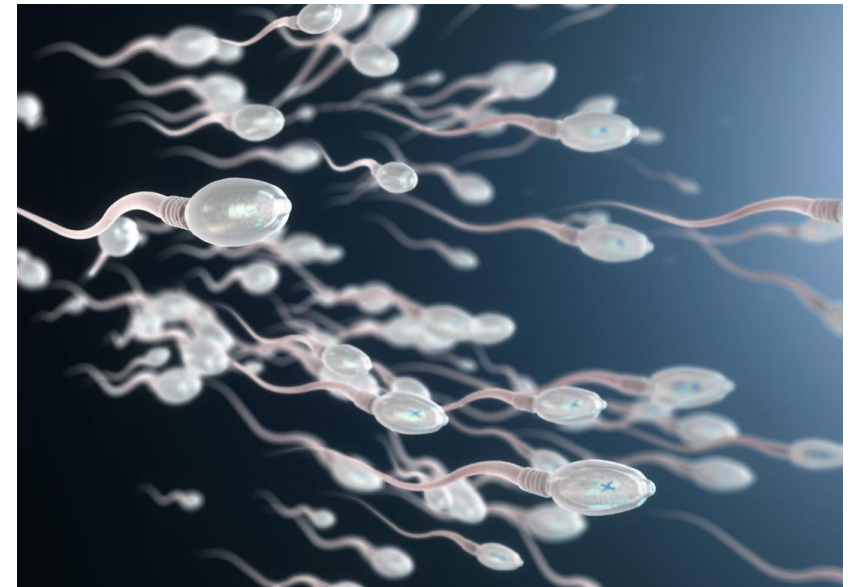
When the minimum threshold was reached, higher amounts of testosterone did not influence gut bacteria any longer



Another study with rats found that feeding them the lactobacillus reuteri ATCC 6475 strain in their water:

- Increased testosterone levels
- Had higher levels of luteinizing hormone
- Had higher levels of follicle-stimulating hormone
- Increased the amount of sperm with better mobility

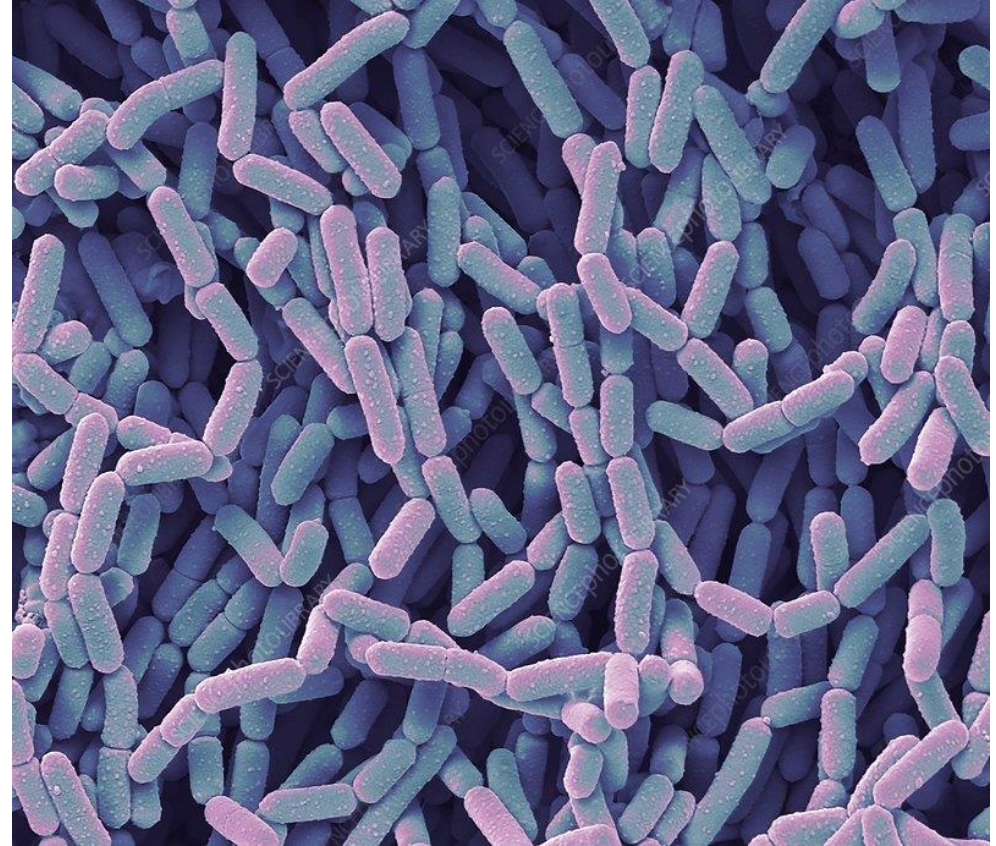
And this is just one strain



Testosterone helps the regeneration of cells in the intestinal lining – may be why bacteria increase it

High levels of cortisol are linked to lower testosterone

In a mouse study, ingestion of lactobacillus rhamnosus lowered cortisol levels and was able to help anxiety and depression-related behavior in stressful situations



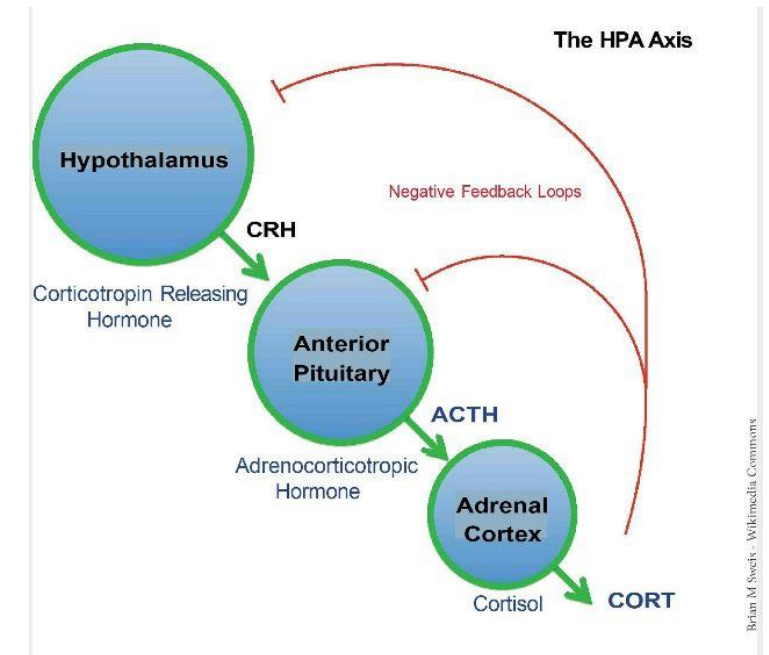
HPA Axis

Bacteria found in the GI tract directly affect the HPA axis as part of the brain-gut connection

Part of this process requires that the intestinal wall lining be functioning

Dysbiosis and poor intestinal wall integrity affect the HPA axis and lead to a broken feedback loop

This can lead to what's known as hormone resistance where the communication between hormone receptors, hormones, the brain and the cascade of hormone production is hindered



Thyroid

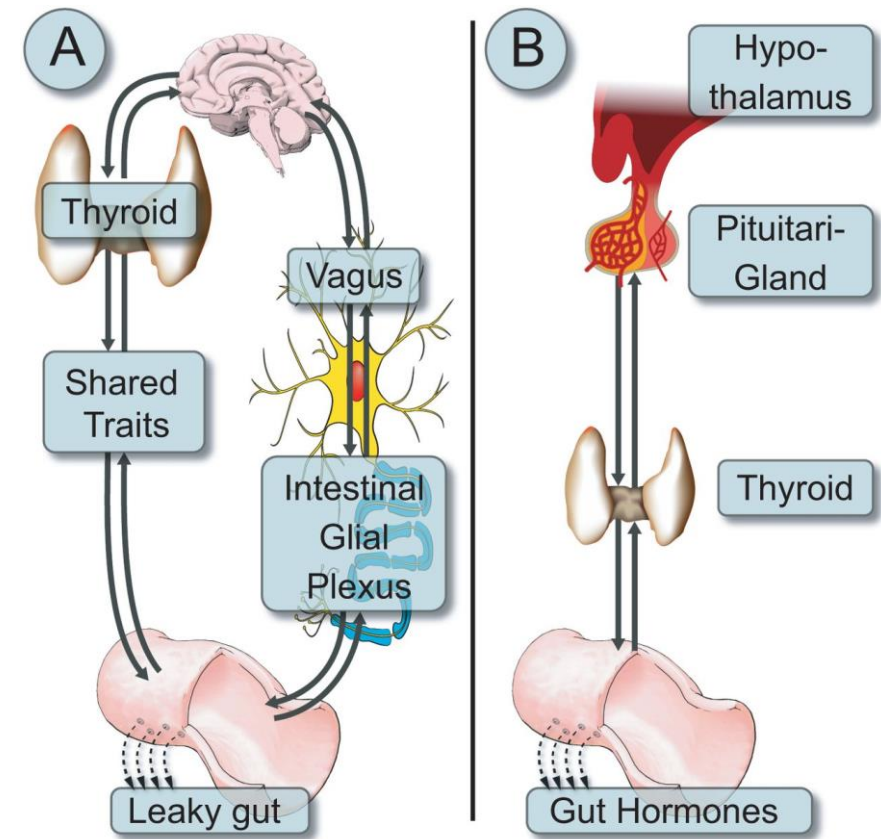
Low thyroid function is linked to lower gut motility

High thyroid function linked to increased motility

Also, autoimmune gastritis, or esophageal compression by a thyroid process

Symptoms usually resolve by fixing the thyroid condition

But good gut health is needed for this, too

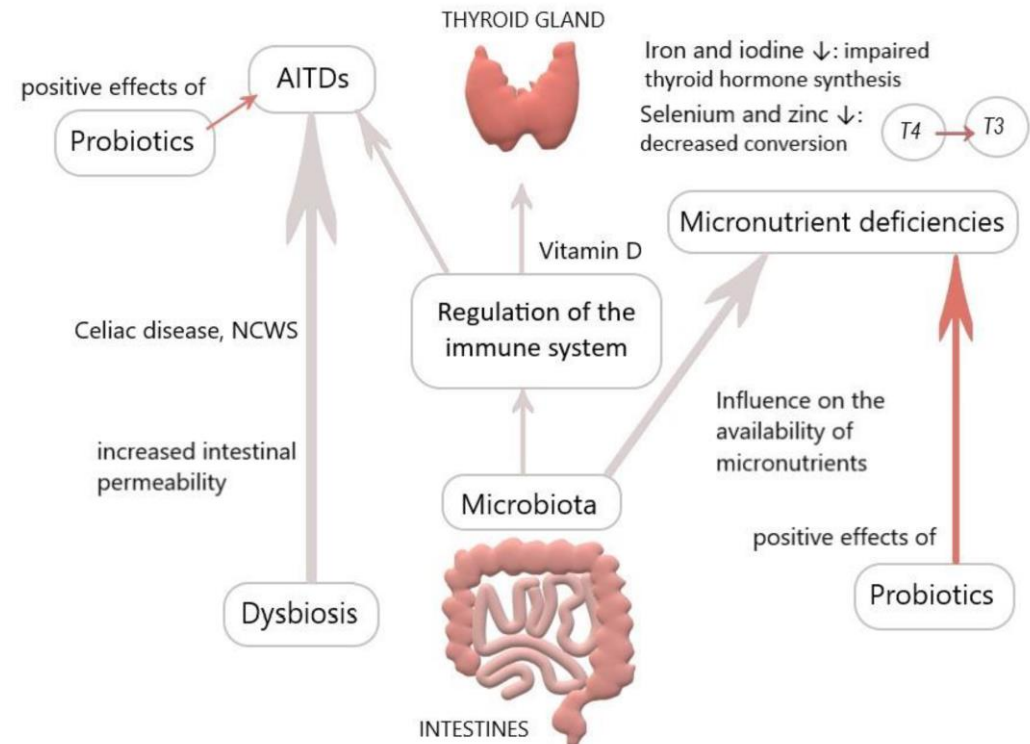


Some conversion of T4 to T3 occurs in the gut (20%)

T3 and T4 also regulate the tight junctions between the intestinal wall lining

Can be blocked by high cortisol – as cortisol increases, T3 decreases

This includes in the gut



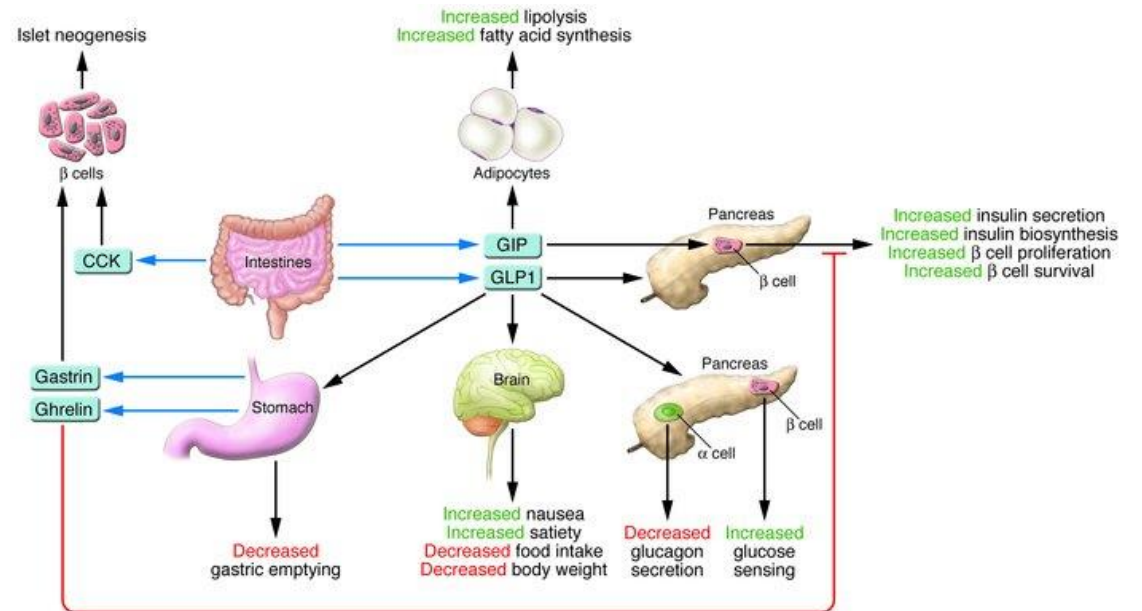
Glucose, Insulin And The Gut

The overall levels of gut bacteria shift in parallel with glycemic status in humans

The shifts are observed in the absence of diabetes treatment

The variations are strongly associated with insulin resistance but not fasting glucose

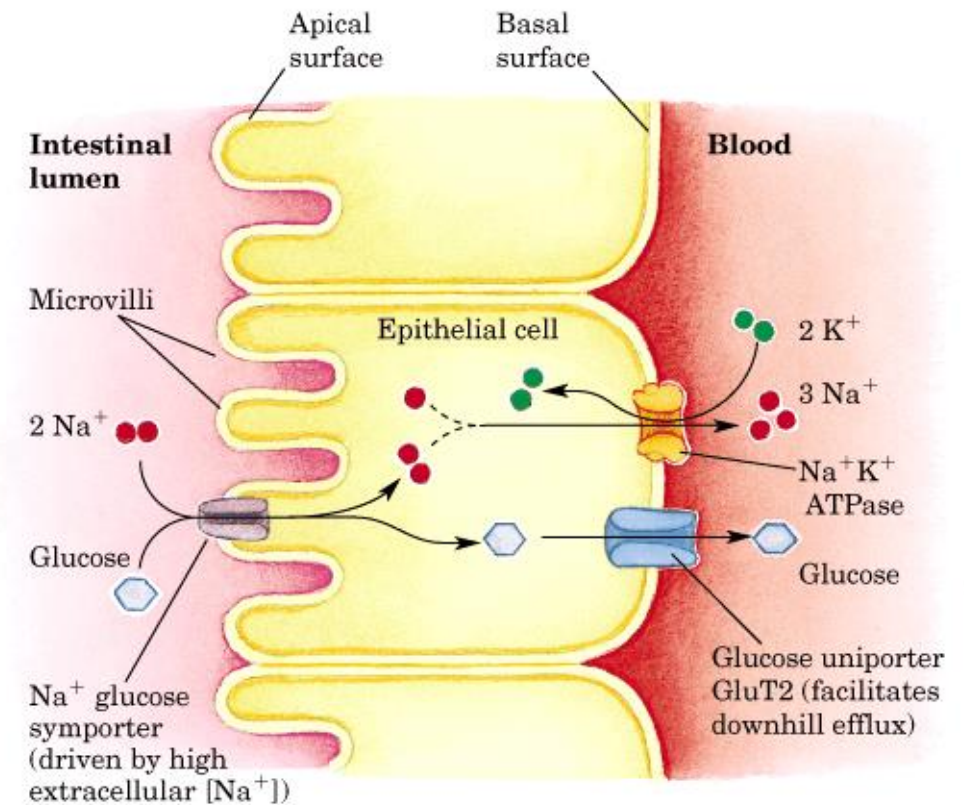
Bacteria that produce the SCFA butyrate are reduced in prediabetes and type 2 diabetes



In an animal study it was found that adrenaline increases the uptake of glucose from the intestines

This shows another connection between stress, the adrenals and the gut

Gut glucose homeostasis allows for the controlled uptake of glucose – no matter how much glucose has been ingested



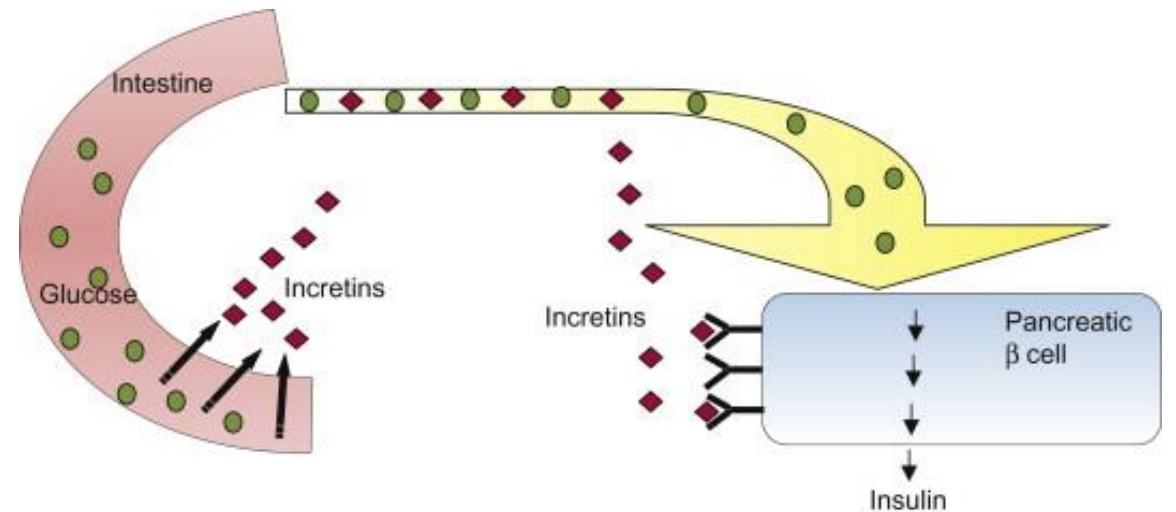
Incretins

Are gut-released metabolic hormones that belong to the glucagon family

They respond to the ingestion of glucose and fat

2 main ones: GIP (glucose-dependent insulinotropic peptide, also known as gastric inhibitory peptide) and GLP-1 (glucagon-like peptide-1)

Stimulate insulin production and protect beta cells in pancreas

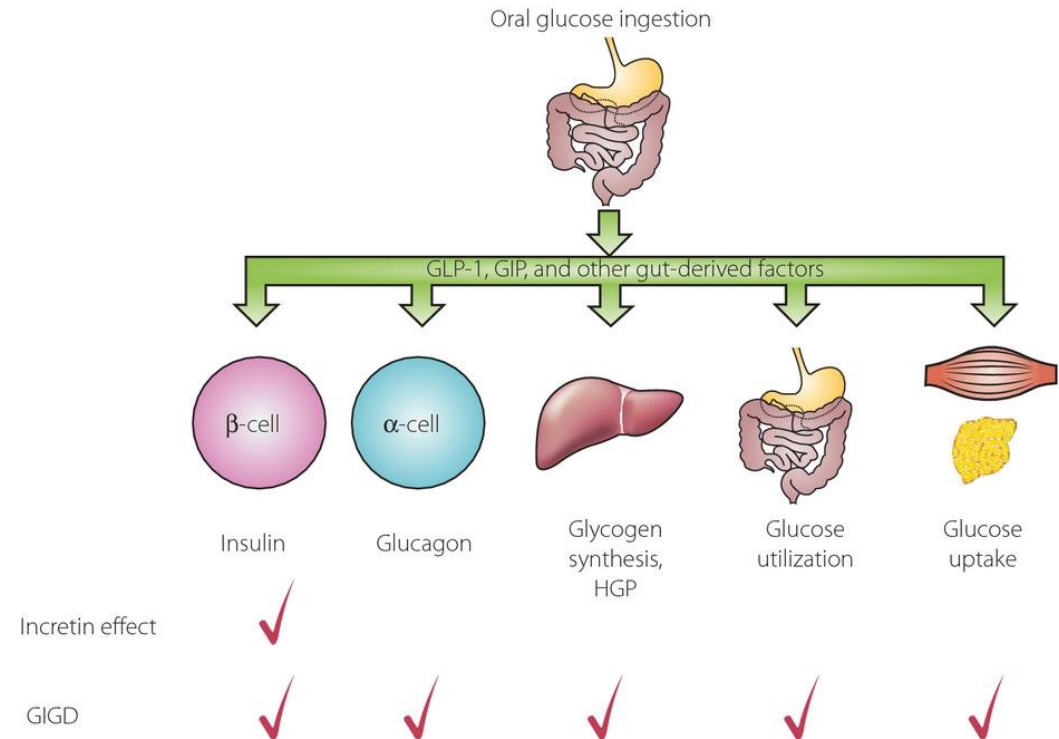


They also inhibit glucagon

This shows the regulatory role the gut can play

Incretins are made by the endocrine system in the epithelium

One more reason to consider gut work for blood sugar and insulin issues



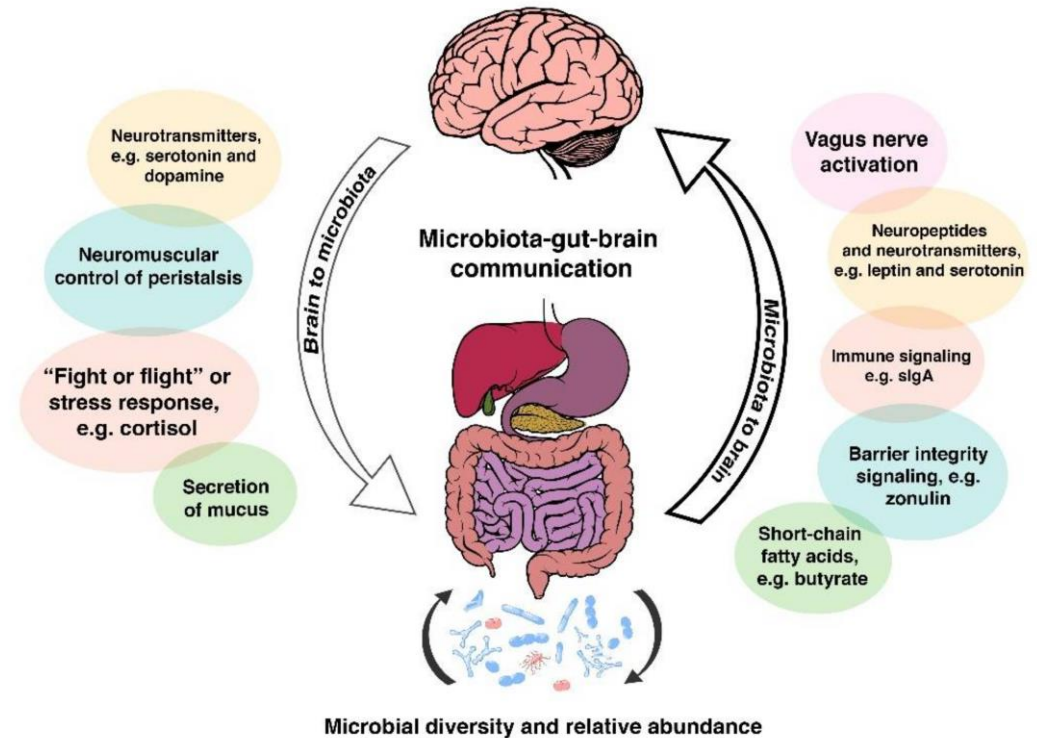
Cortisol

Gut may use cortisol as part of the signaling process for brain development

Cortisol is considered a communication pathway for the gut-brain

Because of this relationship, dysbiosis can increase cortisol and cortisol can increase dysbiosis

Cortisol relationship with other hormones can also affect their gut function



Melatonin

Maybe 400 times as much melatonin may be produced in the gut than the pineal gland

Acts as an antioxidant

Regulates HCl and smooth muscle function

Helps protect the mucosal lining along with tryptophan (serotonin)

This helps protect the gut lining

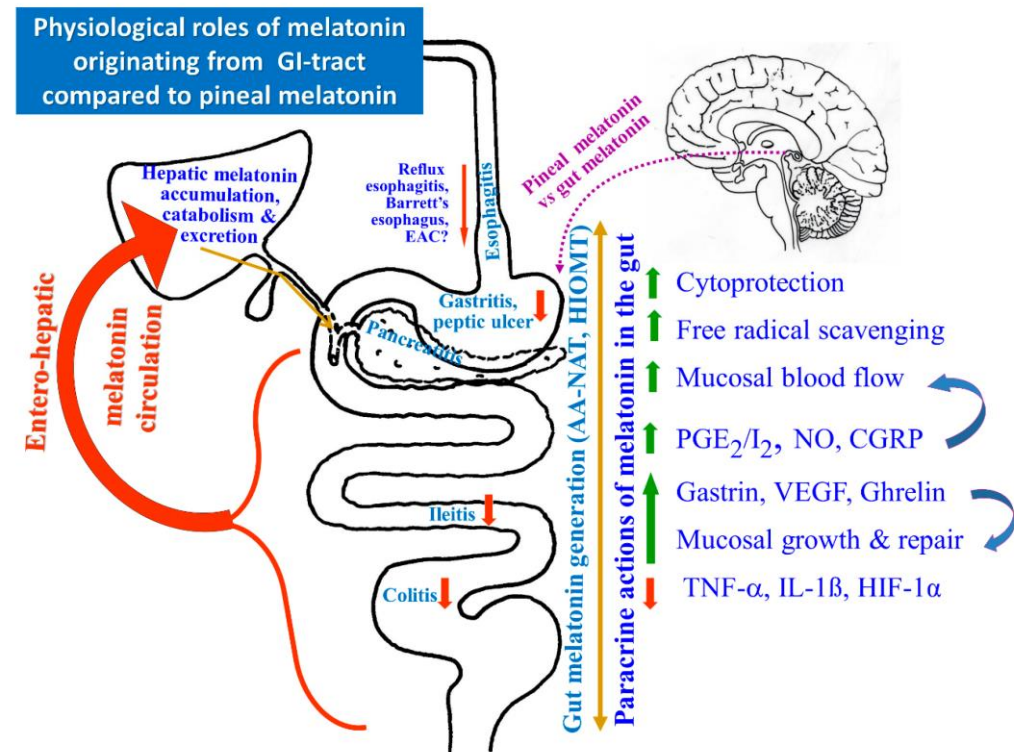
Also acts as a carrier of information between the brain and gut



Hormones are dependent on amino acids and cholesterol being properly absorbed from the intestines

The balance of hormones in the body is also dependent on the body's main detoxification pathway, the GI tract including the liver and gallbladder, but also the urinary tract

This means everything we've been talking about is involved



A healthy, diverse gut microbiome with a rich collection of different bacteria is critical for hormonal balance

Restoring gut health is not easy

It takes time and patience

Many of the foods for hormone health are also gut foods

This makes it easier to develop a protocol for hormones and the gut

