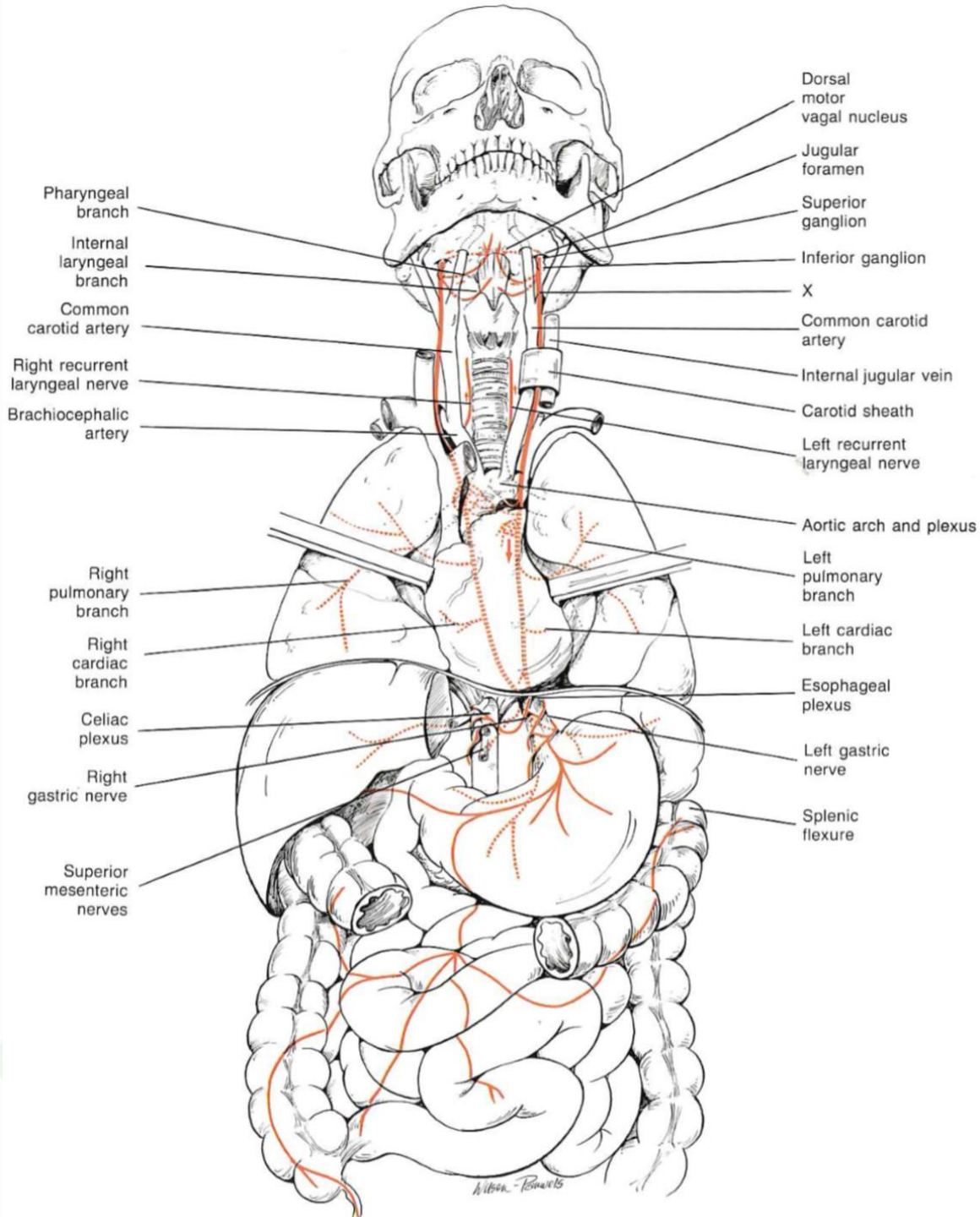


An Introduction to the Vagus Nerve

Our “great wandering protector”

Anatomy of the Vagus Nerve



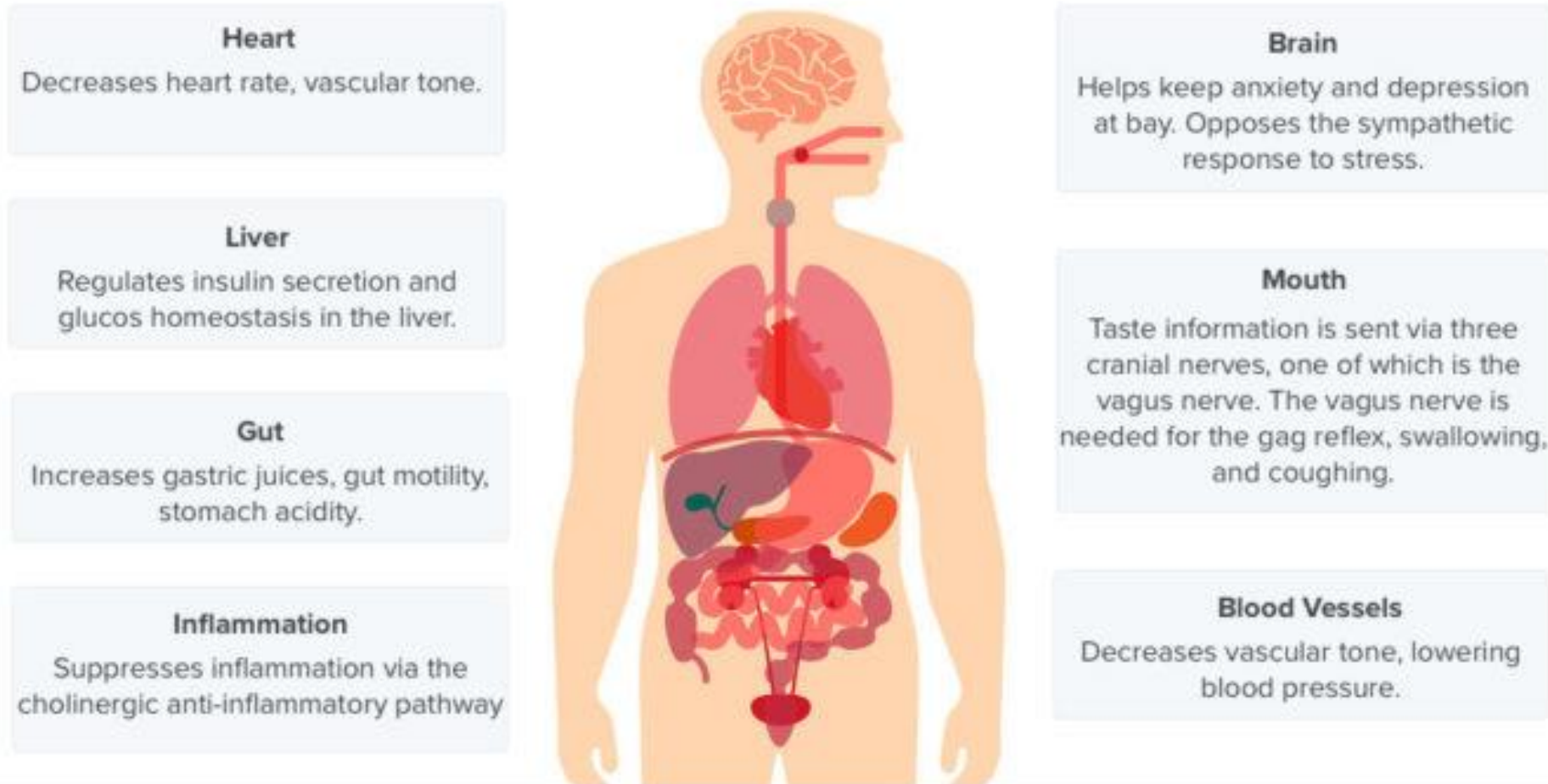
- The vagus nerve is the 10th cranial nerve and is the **longest nerve in the body**, running from the medulla in the brain to the colon.
 - There is some debate amongst anatomists as to whether it stops at the splenic flexure or continues the full length of the GI tract.
- **Innervates almost all organs** accounting for its far reaching effects and nickname **“the great wandering protector”**.
- It contains **80% afferent (sensory)** nerve fibres and **20% efferent (motor)** nerve fibres, relays information from our organs to the central nervous system for processing, before efferent fibres take the signal for the required “action” to the target organ.
 - As it is part of the autonomic nervous system this is an unconscious process.

The Autonomic Nervous System

- The autonomic nervous system has 2 commonly known parts, the **sympathetic nervous system** and the **parasympathetic nervous system**. The **enteric nervous system** that surrounds our gut is also part of the autonomic nervous system, but is less talked about.
- The **sympathetic nervous system** is responsible for our stress or “**fight or flight**” response.
 - Increased heart rate, blood pressure, stimulates the immediate availability of energy.
 - Decreases “irrelevant” homeostatic processes.
- The **parasympathetic nervous system** is responsible for the opposite reaction, our “**rest and digest**” response.
 - Decreases heart and breathing rate.
 - Increases digestion.
- **The vagus nerve is the main component of the parasympathetic nervous system!**

Function of the vagus nerve

How The Vagus Nerve Affects Organ Systems



Function of the vagus nerve continued

- The vagus nerve helps **maintain homeostasis** (optimum internal conditions for health) across many body systems, **interlinking cardiovascular, hormonal, gastrointestinal and immune pathways**.
 - Influences regulation of **mood, inflammation and even pain**.
- **Vagus nerve activity** is referred to as **vagal tone**, for example, high vagus nerve activity = high vagal tone, and low vagus nerve activity = low vagal tone.

Low vagal tone is associated with:

Increased fasting glucose
Increased cortisol
Increased inflammation
Increased allostatic load
Increased food intake
Weight gain

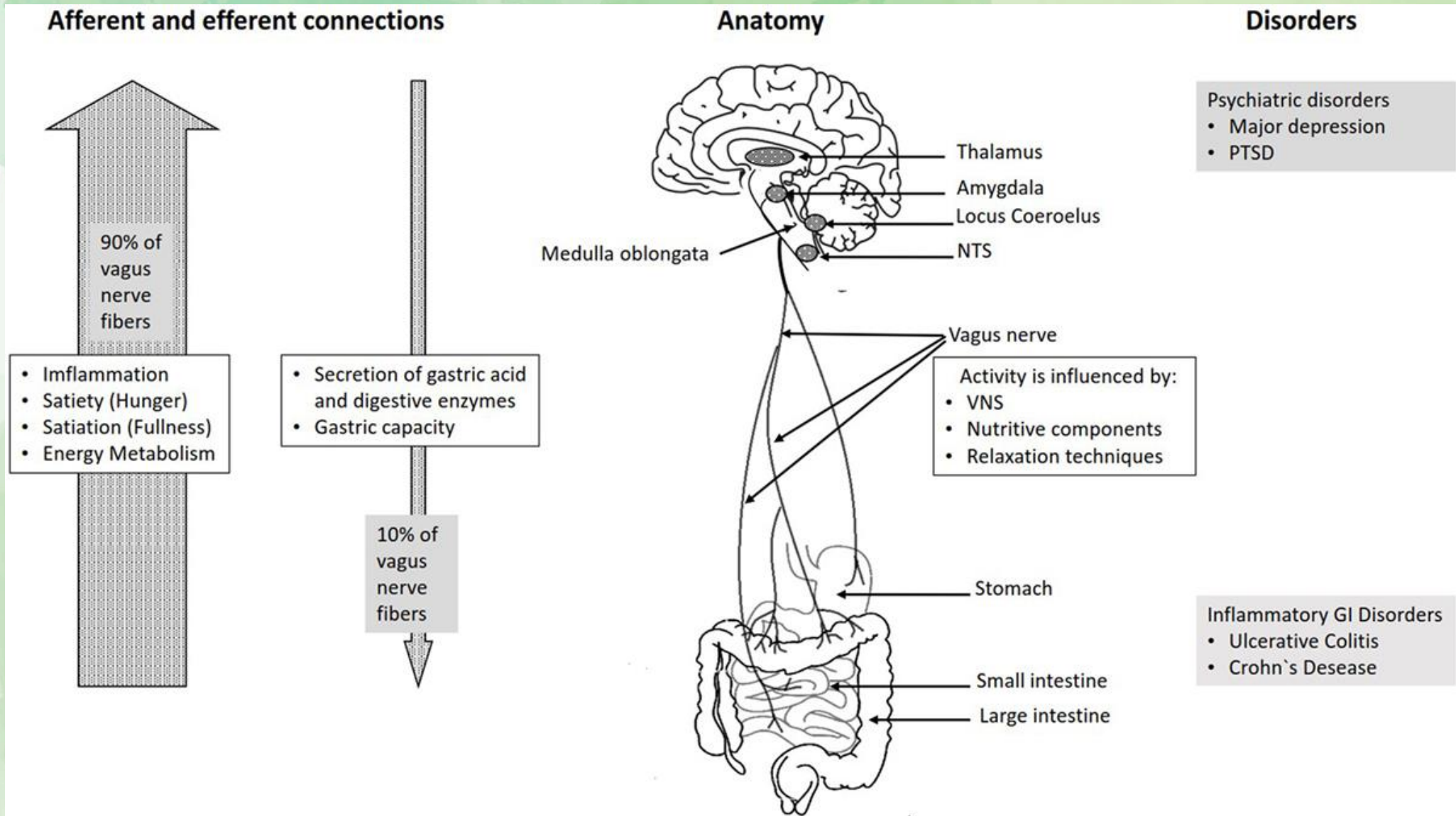
High vagal tone is associated with:

Lower risk of cardiovascular disease and stroke
Lower levels of inflammation
Lower cortisol levels
Better blood sugar regulation
Improved mental health
Fewer gastrointestinal symptoms

Gut-brain-axis and the vagus nerve

- The vagus nerve is **highly connected with the gut**, with both **afferent and efferent nerve fibres** from the vagus nerve reaching the gastrointestinal tract.
- The vagus nerve **connects the gut to the central nervous system**, including the brain, forming part of the **gut-brain-axis**.
 - The gut-brain-axis is still not fully understood but appears to have many routes, including **neural (such as the vagus nerve), hormonal, immune, and metabolic pathways**.
 - Through the vagus nerve the brain receives information regarding **gastric volume/load, the pH and water content of the gut, as well as the chemical composition of our last meal**.
- Our **gut microbes** can also use the gut-brain-axis to communicate with the brain by influencing the vagus nerve.
 - Our gut microbes have been shown to **exert influence over health through the gut-brain-axis** affecting functions such as **mood and memory** and even disorders such as **chronic fatigue syndrome and fibromyalgia**.
 - Certain gut microbes can **produce the same neurotransmitters and hormones as humans**, some even produce **acetylcholine**, the main neurotransmitter of the vagus nerve, and are therefore able to influence its activity.

Vagus nerve and the gut



Influencing vagal tone

- Given the vagus nerve is the **main component of the parasympathetic nervous system** responsible for **reversing the stress response**, most investigations into influencing the vagus nerves' activity has been around what we see as **traditional stress-relieving lifestyle interventions**, for example:
 - Deep breathing
 - Meditation / Mindfulness
 - Exercise / Yoga
- All of these practices have been shown to help **increase vagus nerve activity** and therefore **raise vagal tone**.
- By **strengthening the parasympathetic pathways** using the vagus nerve we educate the body's stress feedback loop, **strengthening our ability to bring the body back into homeostasis** after stressful events and **building physiological resilience**.
- Not everyone is open to / able to include these activities in their day to day lives, so in my research I'm looking at influencing the vagus nerve with nutrition to hopefully bring about the benefits of raised vagal tone through its connection with the gut.

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