

### *Module 4, Lesson 3 Handout:*

## **The Vagus Nerve**

The vagus nerve is made up of an intricate neural network that is connected all over the body, from many organs from the stomach and intestines to the brain. It starts at the medulla of the brainstem, and travels down the neck past the thorax and the abdomen, then to the organs. All along this path, it branches out to connect to different muscles and nerves. Not surprisingly, the vagus nerve is a critical component of the parasympathetic nervous system and plays a huge role in communication throughout the body, regulating many muscular functions and sensations.

So what does this have to do with gut health? The brain and the gut communicate through many different pathways, all of them which make up the hot topic you learned about in this lesson - the gut-brain axis. Researchers are studying this to further uncover the relationship between gut health and brain health. The vagus nerve senses microbiota signals and sends this information to the central nervous system.

When the vagus nerve is stimulated, it activates M2 macrophages and deactivates M1 macrophages. M2 macrophages are anti-inflammatory and produce tissue-repairing factors that aid in gastrointestinal infection and inflammation. M1 macrophages are pro-inflammatory and studies have shown that the ability of the vagus nerve to inhibit these M1 macrophages may play a role in modifying intestinal permeability and gut microbiota.

It's known that people who have Crohn's disease and IBS have decreased vagus nerve tone and function. Stress is a big factor in Crohn's and IBS, and is associated with leaky gut and dysbiosis. When the body is stressed, signals are sent through the vagus nerve causing gastrointestinal issues such as increased intestinal permeability and changes to the gut microbiota. The vagus nerve is inhibited by this stress and not able to exert anti-inflammatory mechanisms to minimize gastrointestinal damage and inflammation.

Work with your clients to reduce stress to help repair gut damage and reverse the response of the vagus nerve, while improving communication between the gut and the brain. Encourage clients to eat foods that provide probiotics and contribute to the growth of good gut bacteria. These bacteria strains are outlined in a handout attached to this lesson. Helping your clients Stress Less and Eat Empowered will give them more control over their gut health and mental health, while repairing the communication of the gut-brain axis.