VITAL VAGUS: WHAT IS THE VAGUS NERVE AND WHAT DOES IT DO?

The vagus nerve starts in the brainstem, just behind the ears. It travels down each side of the neck, across the chest and down through the abdomen. 'Vagus' is Latin for 'wandering'. The vagus nerve can be thought of a superhighway that connects your body and your brain. It links the brain to the stomach and digestive tract, the lungs, heart, spleen, intestines, liver and kidneys, as well as other nerves that are involved in speech, eye contact and facial expressions. The messages zip along its five lanes of traffic with four lanes delivering information from the body to the brain and one lane moving information from the brain to the body. This is the most obvious physical representation of the mind-body connection. The vagus nerve both senses your internal environment (via its sensory neurons) and affects it (via its motor neurons).

Operating far below the level of our conscious minds, the vagus nerve is vital for keeping our bodies healthy. Here is what we know about the vagus nerve so far:

It is intimately involved in managing sympathetic/parasympathetic balance in the autonomic nervous system (ANS). The vagus nerve provides 75% of all parasympathetic outflow ("rest-and-digest" mode). When the brain triggers parasympathetic activation, the vagus nerve carries the messages to the heart (decreasing the heart rate and blood pressure), to the lungs (to constrict the respiratory passageways), to every organ in the digestive system (to increase motility and blood flow to the digestive tract, to promote defecation), to the kidneys and bladder (to promote urination) and to reproductive organs (to aid in sexual arousal).

It communicates messages between the gut and the brain. 80% of the vagus nerve's fibers (4 out of 5 traffic lanes) deliver information from the enteric nervous system (the *second brain* in the gut) to the brain.

It regulates the muscle movement necessary to keep you breathing. Your brain communicates with your diaphragm via the release of the neurotransmitter acetylcholine from the vagus nerve to keep you breathing. If the vagus nerve stops releasing acetylcholine, you will stop breathing.

It helps decrease inflammation. Vagal nerve stimulation reduces the over-production of TNF (an inflammatory protein, tumor necrosis factor) that causes chronic inflammation. This is very helpful in dealing with rheumatoid arthritis.

It helps improve your mood. Electrical stimulation of the vagus has been approved by the U.S. FDA as a therapy for patients with chronic depression.

It is essential in fear management. Research shows that healthy functioning of the vagus nerve helps us bounce back from stressful situations and overcome fear conditioning.

It plays a role in learning and memory. Stimulation of the vagus nerve might be able to speed up the process by which people with PTSD can learn to reassociate a non-threatening stimuli which triggers anxiety with a neutral and non-traumatic experience.

It can help relieve cluster headaches. A handheld device that can stimulate the vagus when placed on the throat has been shown to relieve headaches.

It has profound control over heart rate and blood pressure. Patients with heart failure tend to have less active vagus nerves. Currently multiple studies are underway investigating the effects of vagus stimulation on patients with heart failure and atrial fibrillation.