What Happens In Vagus

July 2, 2018 By Mike Barr

Actually, what happens in this particular vagus decidedly does not stay there. The very etymology of its name gives it away: from the Latin vagus which, they tell me, means* “wanderer.” And this very wandering-- roughly from the medulla down through the chest cavity, lightly grazing the esophagus before delving down into the abdomen-- multi-branched, broadband like cable is believed to be largely responsible for the celebrated “gut-brain connection.”

Much attention has been given of late to this key connector in treating gastrointestinal and psychiatric disorders, and, in a recent review article, Breit and colleagues share promising evidence that vagus nerve stimulation (VNS) (and, surprise, meditation) could be adjunct therapies to support a number of conditions, such as treatment-refractory depression, stress disorders, inflammatory diseases, as well as mood and anxiety issues.

The vagus nerve, cranial nerve #10 of twelve, represents the main component of the parasympathetic nervous system, which is responsible for a number of bodily functions including mood, immune response, digestion and heart rate. This long meandering bundle of motor and sensory fibers links the brain stem to most of the body’s organs.

Because of its influence on the parasympathetic nervous system, it assists in the regulation of blood pressure and blood glucose balance, promotes general kidney function, helps release bile (and testosterone), stimulates salivary secretion, assists in controlling taste and releasing tears, and plays a key role in women’s fertility.

When the vagus nerve is stimulated, it leads to the release of acetylcholine (Ach). Acetylcholine helps mediate parasympathetic effects and also stimulates muscle contractions in the parasympathetic nervous system. So in addition to being the gut-brain connector, it is also a major player in the neuroendocrine-immune axis, which is the first line of defense against inflammation.

Chronic exposure to elevated inflammatory markers, such as cytokines, may lead to depression. Therefore, vagus nerve stimulation therapy has been shown to have a positive effect on depressive symptoms.

Vagus nerve stiumulation leads to an enhancement of firing activity of norepinephrine neurons, and because of the dopamine-serotonin-norepinephrine inter-relationship, an increase in the firing activity of serotonin neurons.

As with the modulation of neurotransmitters, vagus nerve stimulation has been reported to effect

chemical changes in monoamine metabolism, resulting in dynamic changes of monoamine metabolites in the hippocampus. VNS has also been reported to influence hippocampal neurogenesis, a process necessary for the maintenance of “normal mood.”

Another recent and exciting study showed that VNS helped with stroke recovery by doubling the benefits of rehabilitative training, and enhancing structural plasticity in motor networks.

Not surprisingly, nutritional support that helps to cultivate and maintain healthy bowel flora can have a significant impact on vagus nerve activity. (Will share two exciting papers from Italy in HIV+’s about this over next few days.) The gut microbiotia’s communication with the brain involves the vagus nerve, and this interaction may lead to mediating effects on the brain and, subsequently, behavior.

Currently approved by the FDA for depression and seizure preventions, VNS is also being studied for its affect on anxiety disorders and even pain tolerance.

* Last I looked, the Latin verb for “to wander” actually seems to be erraverunt, but I only had a year, I think, of Latin in high school, and everyone else seems content with the vagus/wander story, so I’m not going to make a big stink over it.
