



# USING A TENS DEVICE TO STIMULATE YOUR VAGUS NERVE

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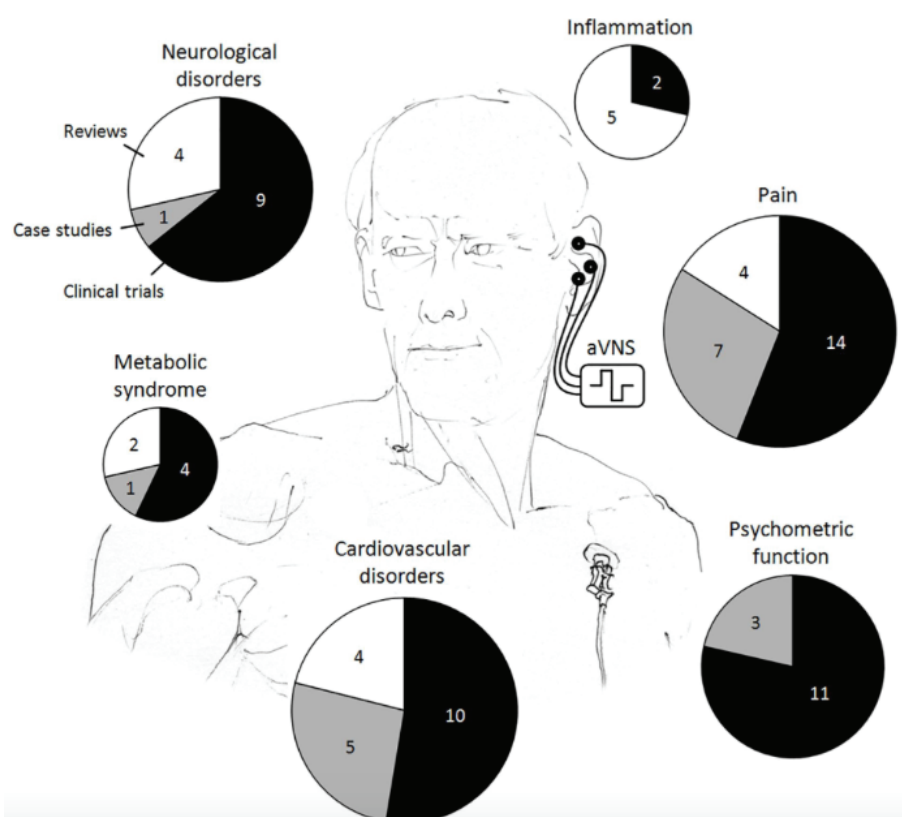
The 10th Cranial Nerve, or Vagus Nerve, is the longest cranial nerve and is directly related to nearly every function in the body. Called “The Relaxation Nerve” as well as “The Wandering Nerve”, it exits from the brainstem and “wanders” throughout the body, establishing a **two-way connection** between the brain and major organs like the heart, lungs, liver, pancreas, spleen, and the entire digestive tract (gut-brain axis).

**Surprisingly, the external ear is the only place the vagus nerve “wanders” on the outside of the body, making it an easy location for VNS, or Vagal Nerve Stimulation.**

The vagus nerve is involved in many critical functions of the body’s Autonomic Nervous System (ANS) including digestion, breathing, hormone release, and heart rate control. The vagus is part of the body’s Parasympathetic Nervous System (PNS), also known as the “Rest-and-Digest” Nervous System, which is the opposite of your Sympathetic Nervous System (SNS) or “Fight-or-Flight” response. You can think of the SNS as your body’s “stress response gas pedal”, while the PNS is your body’s “stress response brake pedal”, **so stimulating the vagus nerve is like pushing the brake pedal on your body’s stress response.** When you consider today’s epidemic levels of stress and stress-related chronic diseases, it’s not surprising that the **activity of the vagus nerve is proportionally associated with health, wellbeing, relaxation, and even emotions like empathy, while it is negatively associated with poor markers of overall health including morbidity, mortality, and stress.**<sup>1</sup>



The 'brain-body connection' goes both ways, so stimulating vagal activity can not only impact vital bodily functions but can impact our brain function drastically as well. Vagal nerve stimulation has been shown to affect many different areas of the brain as viewed by functional MRI (fMRI) and Electroencephalogram (EEG), and is known to increase the release of neurotransmitters like serotonin, norepinephrine, and endogenous opioids, which modulates brain functions such as pain processing, mood control including anxiety and depression, and even impacts neurogenesis, brain plasticity, memory, learning, and cognitive processes.<sup>1</sup>



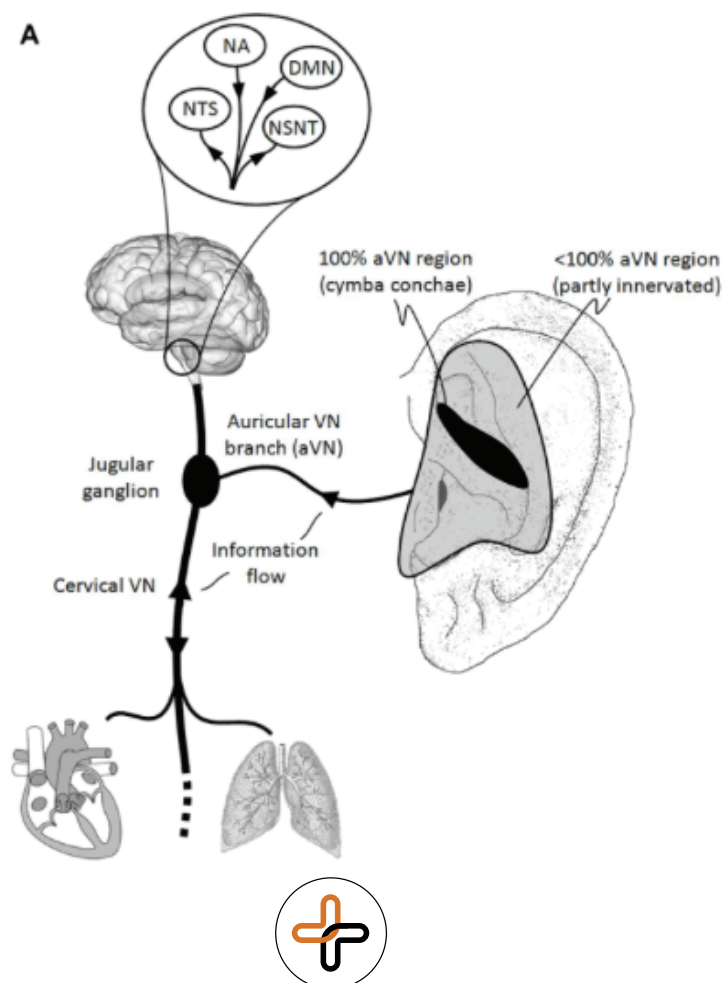
This diagram summarizes the current research on vagal nerve stimulation of the ear, shown as pie charts with the numbers of clinical trials (black), case studies (gray), and review papers (white). Note the researched topics such as pain, neurological disorders, cardiovascular disease, brain function, and inflammation. The research is nothing short of amazing!



Using a TENS (Transcutaneous Electrical Nerve Stimulator) Device, you can easily stimulate the vagus nerve on the outside of the ear and you don't need to be doing anything! You can do it while talking, doing dishes, meditating, watching TV, driving? (maybe not a good idea.) In fact, one study done in subjects over 55 years old using a TENS unit for only 15 minutes a day for two weeks showed impressive results including improved heart rate variability, decreased stress, and improved depression, sleep, and quality of life scores! <sup>2</sup>

When I first started using a TENS on my ear, I had been doing it for a couple of weeks and my wife, not really knowing what I was doing said "What is that, I want to try that." I got her set up and she sat there for about 10 minutes or so and then she said, "What exactly is this supposed to do, because I feel like I'm melting into the couch!"

The graphic below is from Kanius et al published in the journal Frontiers of Neuroscience August 2019 and shows the innervation of the vagus nerve on the auricle.



**In summary, Vagus Nerve Stimulation using a TENS device could potentially decrease your body's stress response and improve your 'brain-body connection', positively affecting BODILY FUNCTIONS through modulation of stress, hormone release, inflammation, digestion, detoxification and metabolism, while simultaneously impacting BRAIN ACTIVITY and affecting functions like mood and the perception of pain by altering the release of neurochemicals.**

## **HOW TO USE A TENS DEVICE TO STIMULATE YOUR VAGUS NERVE**

Safety Disclaimer: Use at your own risk. Follow all the cautions listed in your TENS device booklet, such as do NOT use a TENS if you use a cardiac device like a pacemaker. Only use TENS to your comfortable tolerance, and know that sensory stimulation to the brain could bring mental fatigue if you keep the stimulation going too long. Stop immediately if you feel any negative effects and consult your physician. In other words, be smart!



# SET-UP INSTRUCTIONS:

- Use the **TENS** unit on your **LEFT EAR ONLY** (\*I've recently seen it used on both sides, I'm not sure it matters which ear)
  - Place the **RED WIRE** in the **EAR CLIP** and the black wire into a **TENS** muscle pad
  - Place the sticky muscle pad on the back of the **LEFT SHOULDER**
  - There are 2 options for ear clip placement depending on the shape of your ear and where you feel the effect the strongest\*:
    - Place the **PADDED PART** of the ear clip inside the **CONCHA** of the ear and the plastic part of the clip around the back of the ear
    - Place the **PADDED PART** of the ear clip inside the **TRAGUS** of the ear
      - The tragus tends to be more comfortable and is more widely studied, the concha is 100% innervated by aVN
- \*(see photo of aVN innervation in article above and see photos)

# TENS DEVICE INSTRUCTIONS:

- Set the Mode to **NORMAL MODE**
- Set the Pulse Width to 200 milliseconds
- Set the Pulse Frequency to anywhere between 15-30 Hz per session and see how you feel. 30 Hz is studied in (2), I personally feel more effect at lower frequency
- Find your "intensity threshold". Turn the dial up to where you barely feel a sensation, then turn it down until you barely feel it (or barely don't feel it) and leave it there. **BE CAREFUL HERE**, sometimes a level 2 may be "sub-threshold" while a level 3 will make you jump out of your seat, and different frequencies (15 Hz versus 30 Hz) will have different intensity thresholds!
- Use the TENS to stimulate the vagus nerve for 10-20 minutes, 1-3 times a day, or as directed by a practitioner. Do not use your TENS unit for more than 30 minutes.



I personally use my TENS for around 20 minutes at least 1x/day, usually before bed while I'm sitting around with my wife reading or watching TV. I have experimented with many different applications, and I can feel more of an effect on different areas of the ear, with an intensity threshold level of 3-5 depending on the frequency (Hz) and location of the ear clip. I generally feel more of a "calming" effect at a lower frequency, but I change the frequency regularly to prevent adaptation.

1- **Kaniusas, et al.** Current Directions in the Auricular Vagus Nerve Stimulation I – A Physiological Perspective. Front. Neurosci., 09 August 2019 | <https://doi.org/10.3389/fnins.2019.00854>

2- Bretherton, et al. Effects of transcutaneous vagus nerve stimulation in individuals aged 55 years or above: potential benefits of daily stimulation. Aging 2019, Vol 11, No 14

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