­­Improving autonomic balance by decreasing sympathetic activity and increasing parasympathetic activity is of intense interest in the research community. Improved autonomic balance reduces inflammation implicated in medical conditions from cardiovascular disease to depression, to cancer, to aging. Efforts to “hack” the autonomic nervous system with implanted vagal nerve stimulators have had some success. Transcutaneous Auricular Vagal Nerve Stimulation has the promise of being a safe alternative since it relies on noninvasive afferent input to a peripheral branch of the vagus. Recent research[[1]](#endnote-1) has helped to define best parameters for TAVNS treatment, including frequency, intensity, electrode placement and timing. As with any treatment modality, however, individual patient variation can affect the efficacy of implanted vagal nerve stimulators and TAVNS. There are some exploratory investigations using heart rate variability (HRV) as feedback for implanted vagal nerve stimulation[[2]](#endnote-2)[[3]](#endnote-3) and for TAVNS also[[4]](#endnote-4) Acupuncture has been shown to improve autonomic balance[[5]](#endnote-5), so the hypothesis was that TAVNS added to it would further improve HRV and autonomic balance.

Materials and Methods:

 Protocol: Patients monitored (HRV) in supine position for 5 minute baseline and then for entire treatment including TAVNS application, needling and resting with needles in for additional 20 minutes. TAVNS applied using clip electrode on the cymba concha bilaterally, and in some instances unilaterally. Frequency of TAVNS varied between, 1 hz, 25Hz, or 100 hz. HRV analysis of 3 minute segments during treatment using several HRV parameters including time, frequency and nonlinear analysis. 1 minute segments for DFAα1 ( a nonlinear parameter) were also charted.

Results:

There was individual patient variation in HRV response with added TAVNS. Patients who showed the most improvement were those who had low HRV to start. Variables that might affect efficacy of TAVNS will be discussed.

Discussion:

The hypothesis that TAVNS would improve HRV did not hold up in all patients. Of the HRV parameters measured and recorded, DFAα1 over one minute segments had the strongest signal/noise ratio so was the most promising as a measure.Furthermore, HRV analysis might have the potential to determine best TAVNS parameters for treatment such as intensity, frequency, duration etc… Individual patients’ HRV data will be presented and discussed.

Conclusions:

TAVNS did not improve HRV in all patients so HRV may help to better define which patients would benefit most from TAVNS. DFAα1 was found to be the most reliable HRV measure.

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[*Eugenijus Kaniusas*](http://loop.frontiersin.org/people/626382/overview)*1\*,* [*Stefan Kampusch*](http://loop.frontiersin.org/people/540374/overview)*1,2 et al,* [*Marc Tittgemeyer*](http://loop.frontiersin.org/people/14347/overview)*3,4*  [↑](#endnote-ref-1)
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**The influence of respiration on brainstem and cardiovagal response to auricular vagus nerve stimulation: A multimodal ultrahigh-field (7T) fMRI study.**

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**Nerve Stimulation: Immunomodulation and Control of Inflammation.**

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