

Documenting Resilience and Results Heart Rate Variability (HRV) Analysis in the Acupuncture Clinic

Objectives:

Project: To explore the feasibility of using HRV in the clinic comparing published needling strategies and adjunctive measures (TAVNS) shown to improve autonomic tone.

Poster: To show HRV data in a sample series of patients illustrating the use of HRV protocol in comparing needling and related autonomic strategies and HRV results over time.

Background:

HRV, a noninvasive measure of autonomic balance, correlates with an improvement in mood, immunity, pain and inflammation, all of which are affected by acupuncture. There is evidence that acupuncture affects HRV and that improvement in HRV may correlate with clinical responseⁱ. Furthermore, HRV is well suited to capturing subtle physiological response to needling/treatment in the clinic over seconds, minutes, or days and months.

Resilience, or the ability of an organism to withstand illness, environmental pollutants, or daily stressors, remains difficult to quantitate, but complexity science may help. *"Complexity-based tools may present a revolutionary bridge between qualitative and quantitative measures. Terms such as adaptability, robustness, or health were previously considered qualitative terms and thus were quantitatively intractable. Yet, complexity science has identified analytical methods that can help assess these features."*ⁱⁱ HRV is one of those analytical methods.

Materials and Methods:

Patient Selection: Patients selected for presentation had profound and decisive clinical improvement determined by chart review. Patients chosen for monitoring are those treated in supine position and free of cardiac arrhythmias.

HRV Monitoring: Nonin pulse oximeter for heart rate capture, with 5 minute baseline, during needling and 20 min supine, 3 minute segments tabulated and charted. Vivosense software for HRV analysis, all artifact corrected.

Acupuncture Treatment: Needling protocols were based on TCM principles. Additional needles placed per strategies listed below.

Transcutaneous Auricular vagal stimulation (TAVNS) or Estim consisted of modified TENS unit and ear electrode clip applied to the right or left ear with 2 to 30Hz stimulation in

the cymba concha region.

Data Presentation: Individual patients' data are presented on a session by session basis.

Parasympathetic, Sympathetic activity, or DFA α (a nonlinear complexity measure shown

Published Acupuncture Strategies to Improve Autonomic Tone used in study

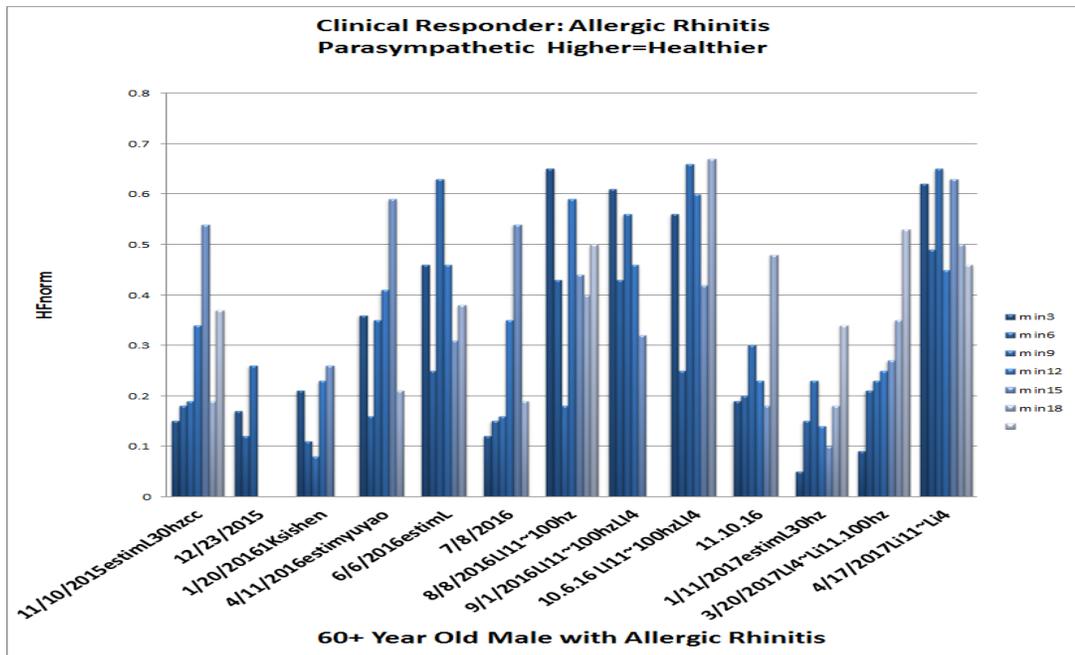
- Electroacupuncture at Large Intestine 4 \rightarrow Large Intestine 11 100Hzⁱⁱⁱ
- Estim or Transcutaneous Auricular Vagal Nerve Stimulation (TAVNS)^{iv}
- Electroacupuncture at Stomach 36^v
- Electroacupuncture at Stomach 36 and Spleen 6^{vi}

Clinical Cases

Clinical Case #1 Allergic Rhinitis

Strategies tried

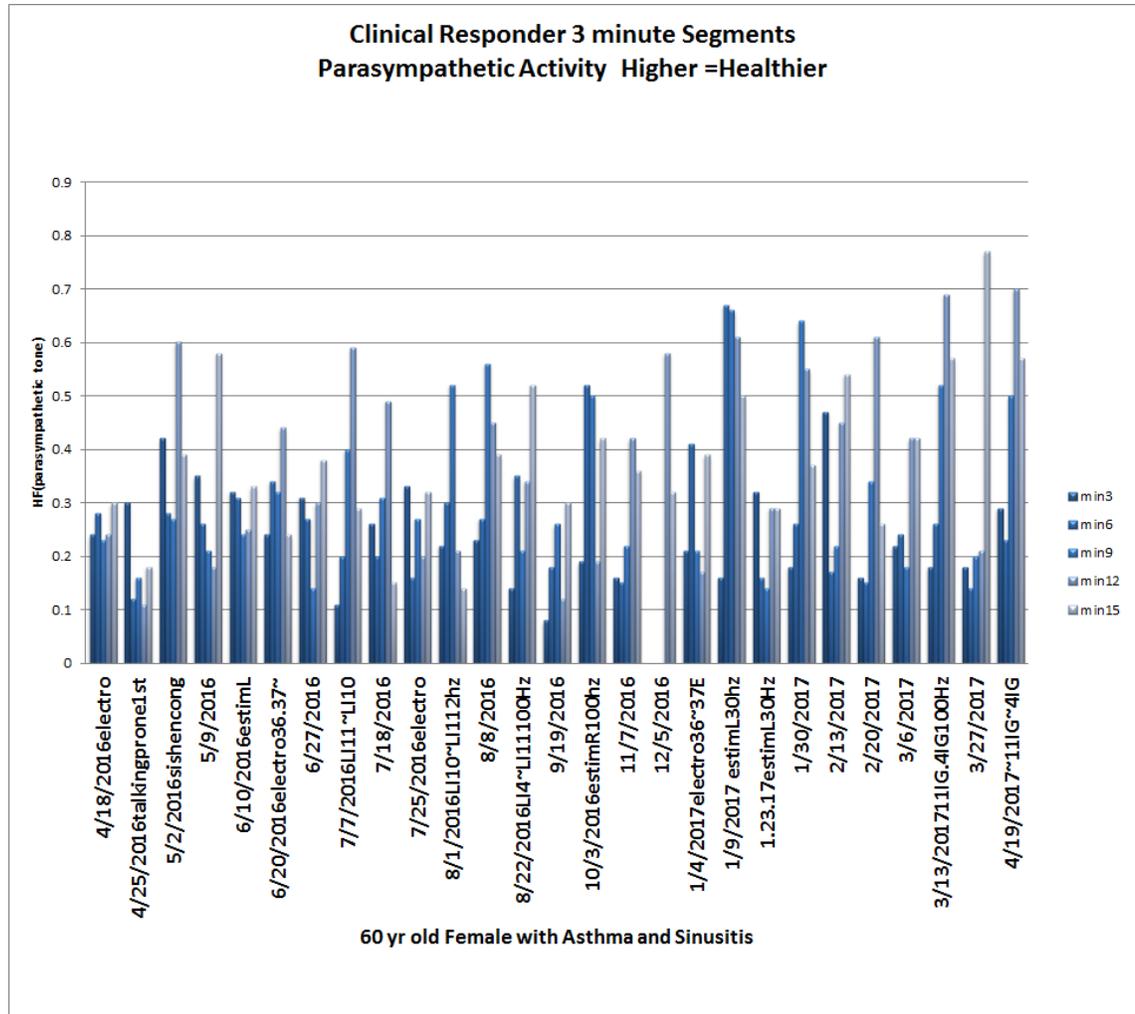
- Electroacupuncture at Large Intestine 4 \rightarrow Large Intestine 11 100Hz
- Estim (TAVNS)



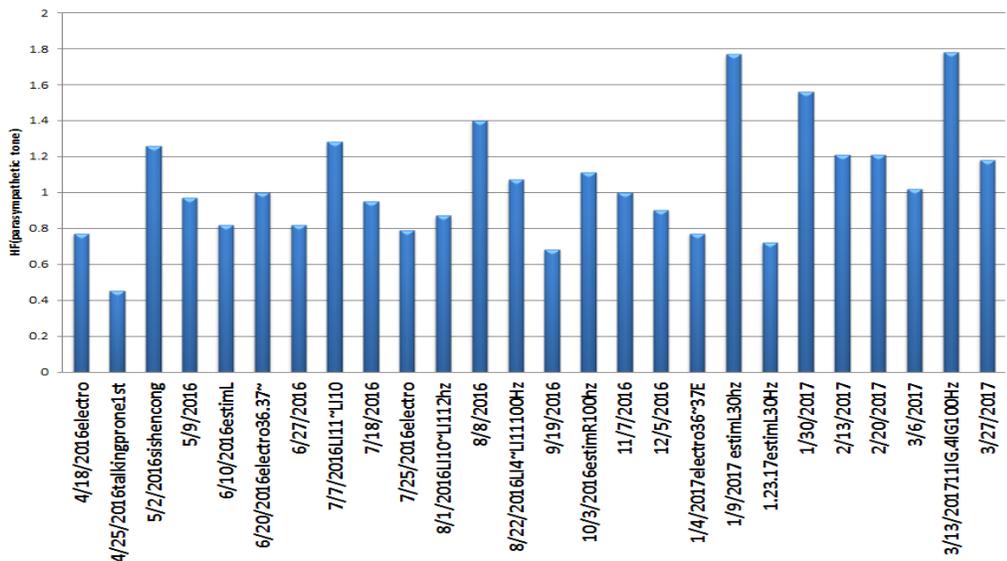
Clinical Case #2 Allergic Sinusitis and Asthma

Strategies Tried

- Electroacupuncture at Large Intestine 4 → Large Intestine 11 100Hz
- Estim (TAVNS)
- Electroacupuncture at Stomach 36



**Clinical Responder 3 minute Segments
Parasympathetic Activity Higher =Healthier**

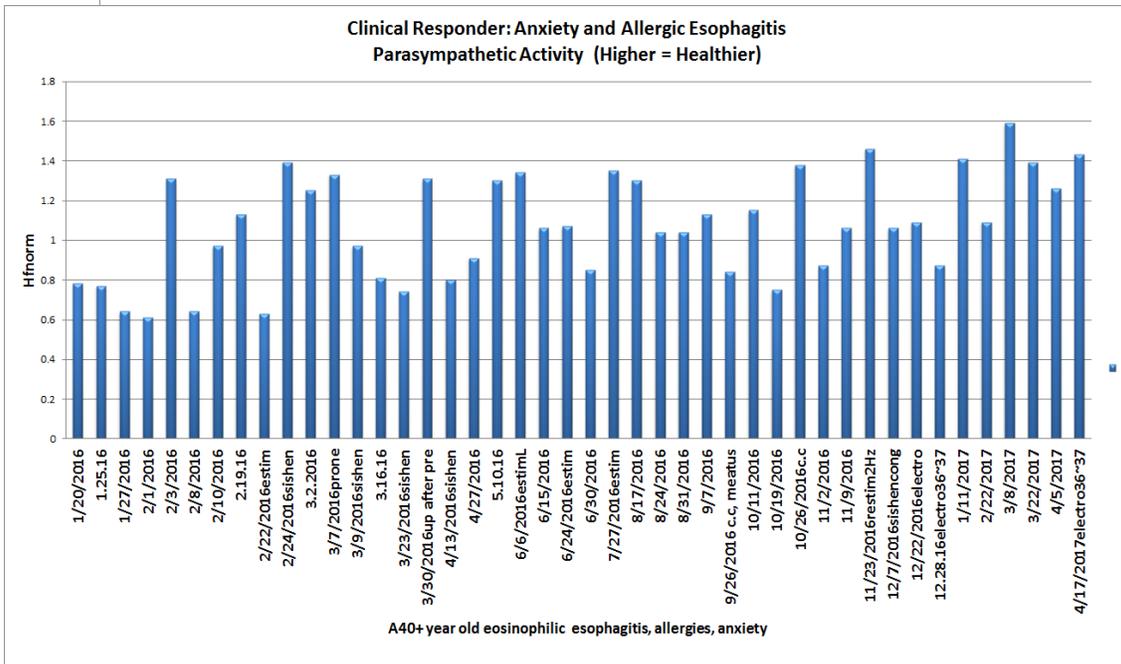
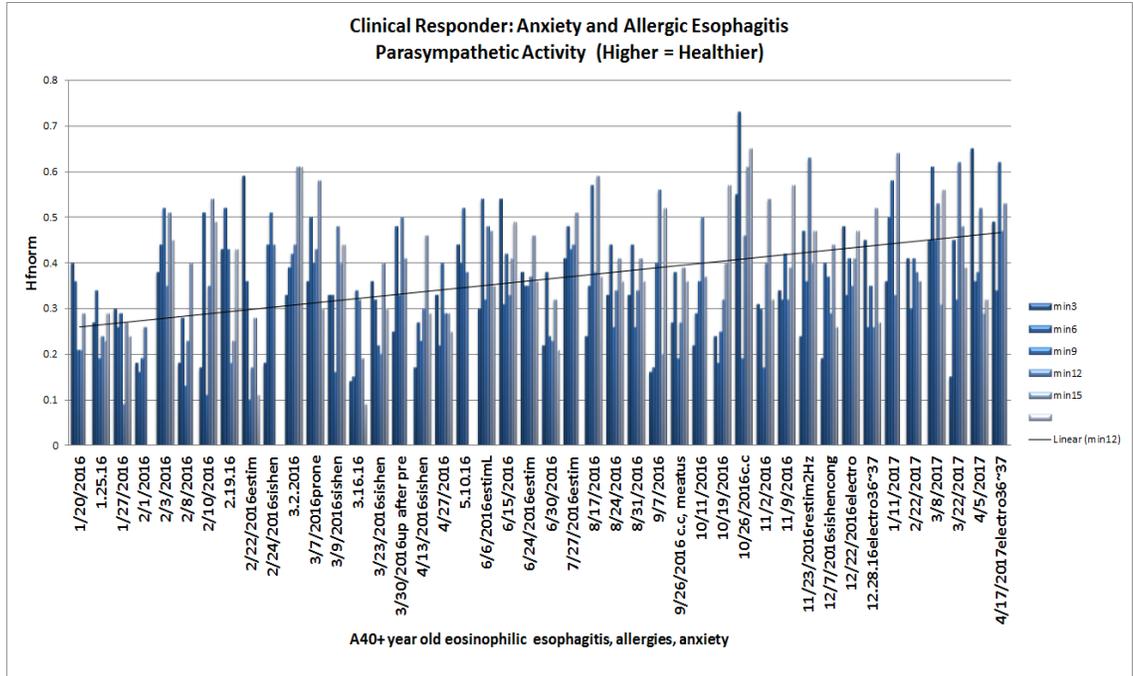


60 yr old Female with Asthma and Sinusitis

Clinical Case #3 Allergic (Eosinphilic) Esophagitis and Anxiety

Strategies Tried

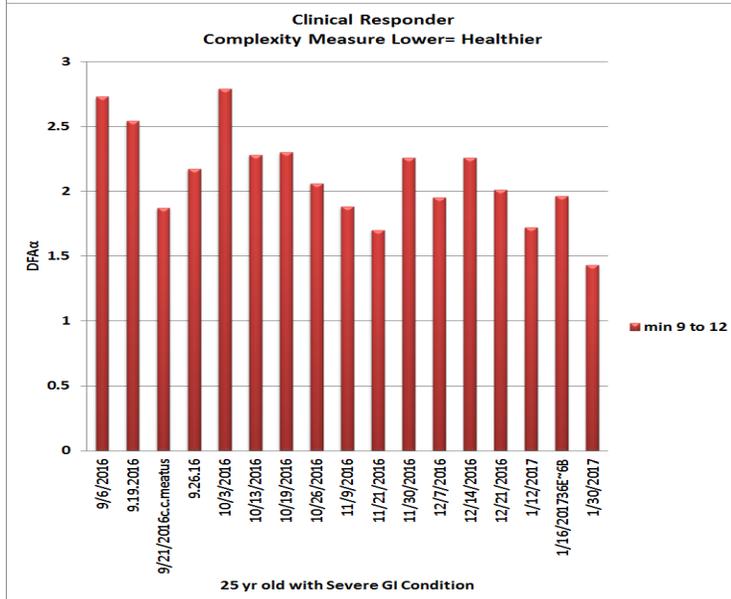
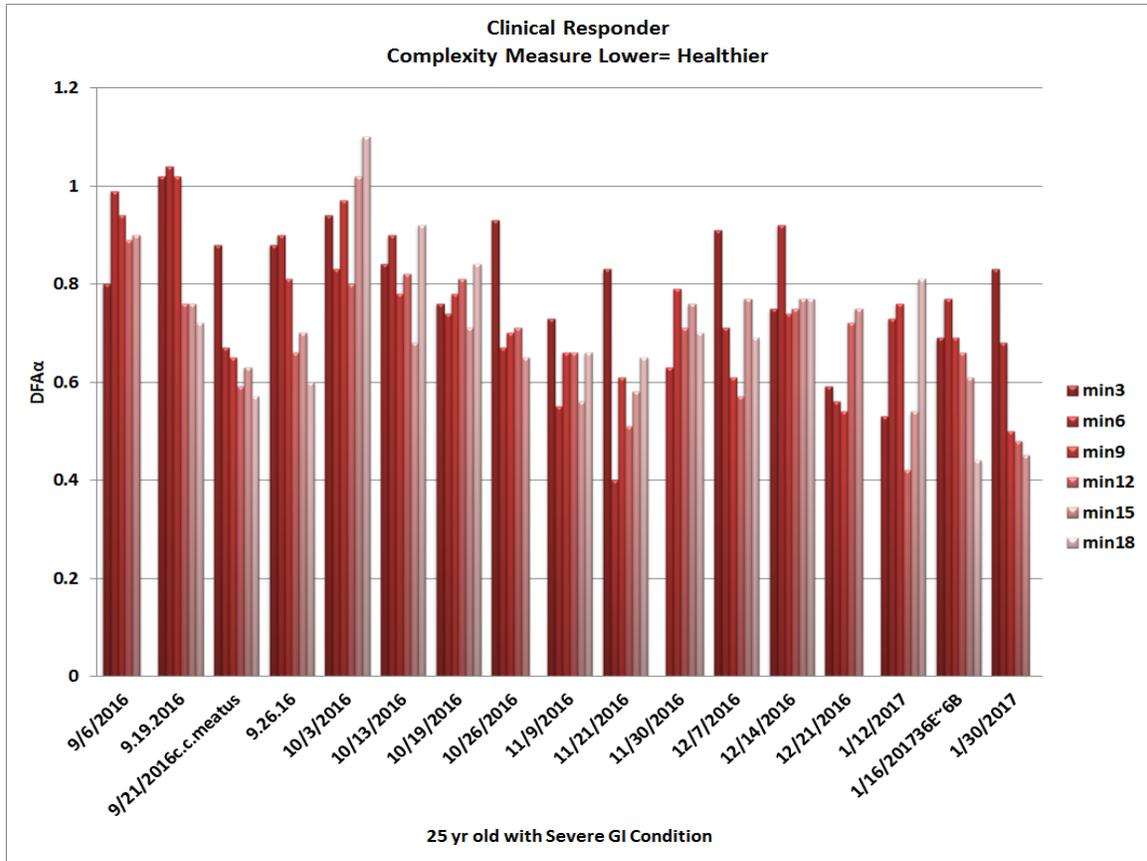
- Estim (TAVNS)
- Electroacupuncture at Stomach 36



Clinical Case #4 Irritable Bowel Syndrome

Strategies Tried

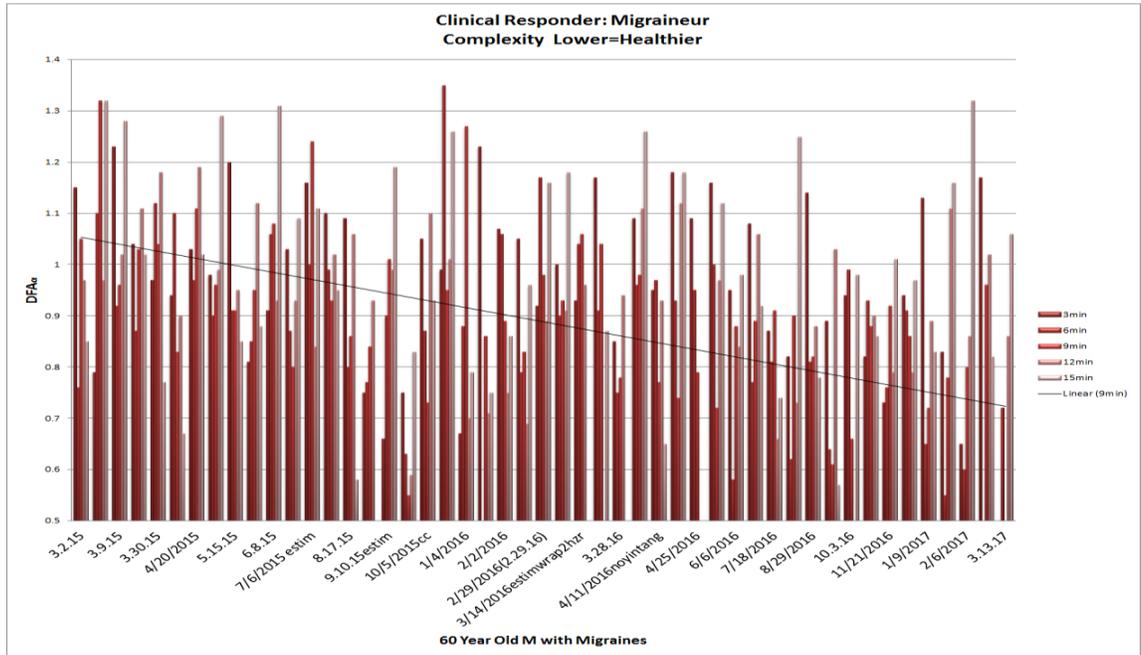
- Electroacupuncture at Stomach 36 and Spleen 6



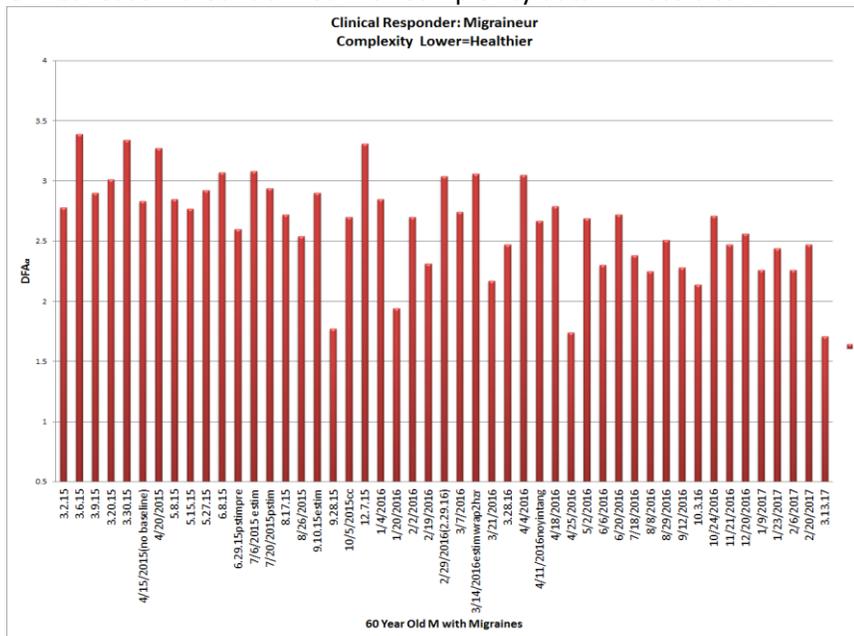
Clinical Case 5 Severe Migraines

Strategies Tried

- Estim (TAVNS)



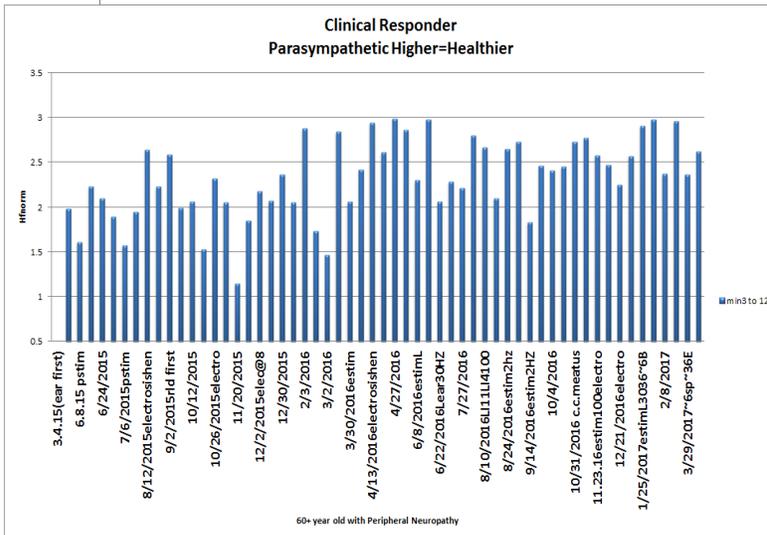
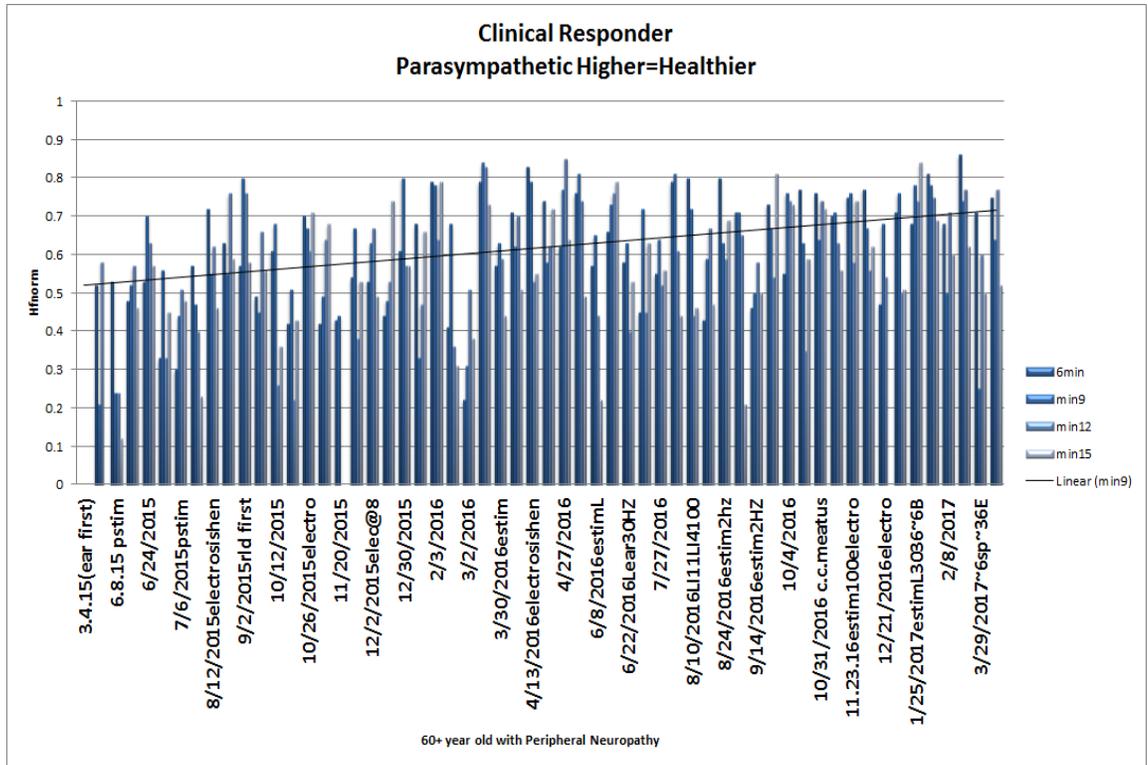
Clinical Case # 5 Cont'd Sum of Complexity data minute 6 to 12



Clinical Case #6 Severe Peripheral Neuropathy

Strategies Tried

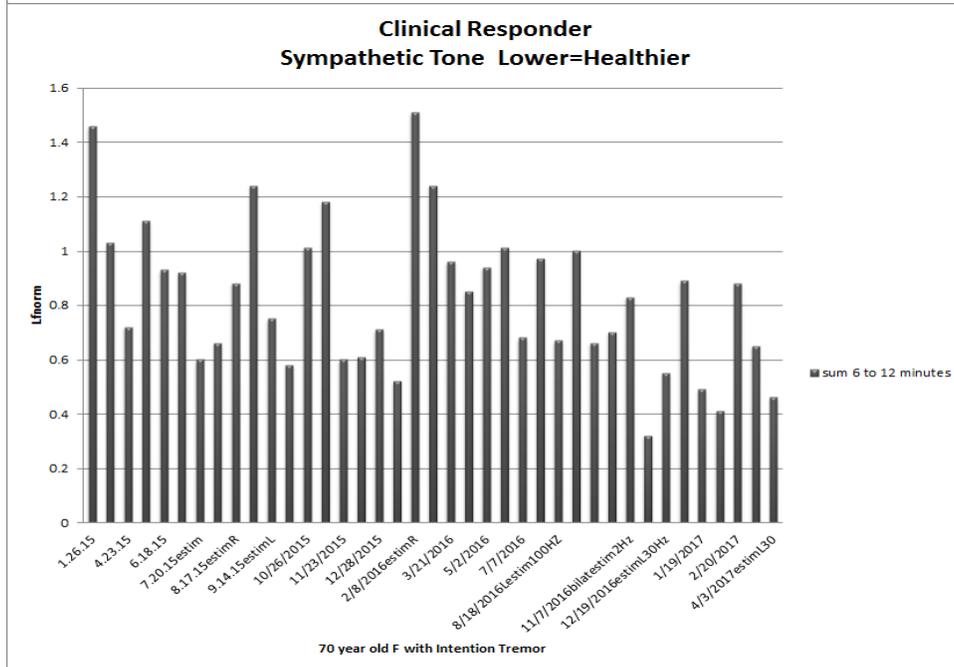
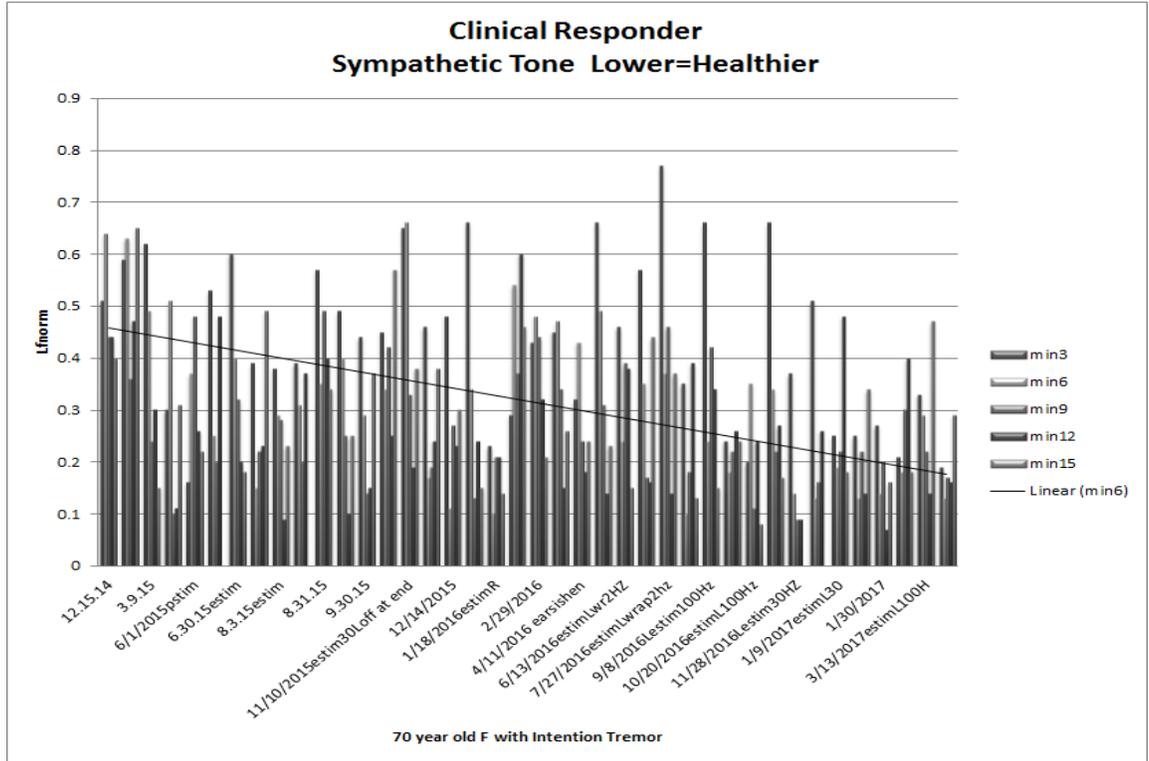
- Estim or Transcutaneous Auricular Vagal Nerve Stimulation (TAVNS)
- Electroacupuncture at Stomach 36
- Electroacupuncture at Stomach 36 and Spleen6



Clinical Case #7 Intention Tremor

Strategies Tried

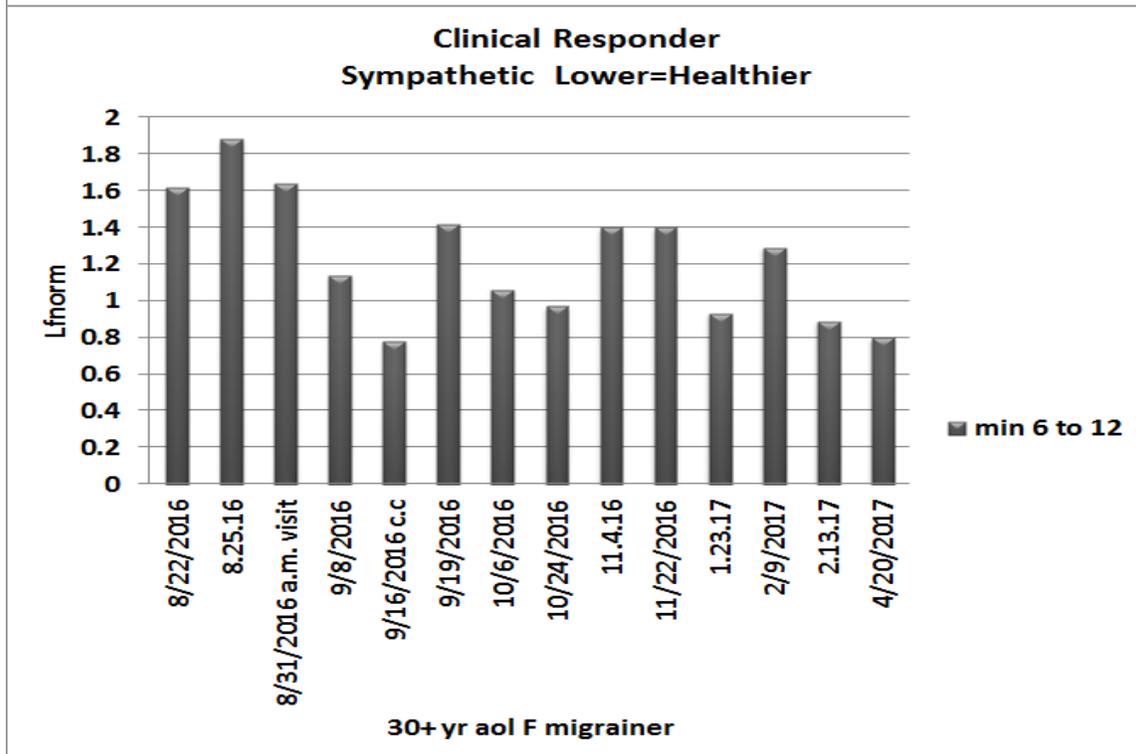
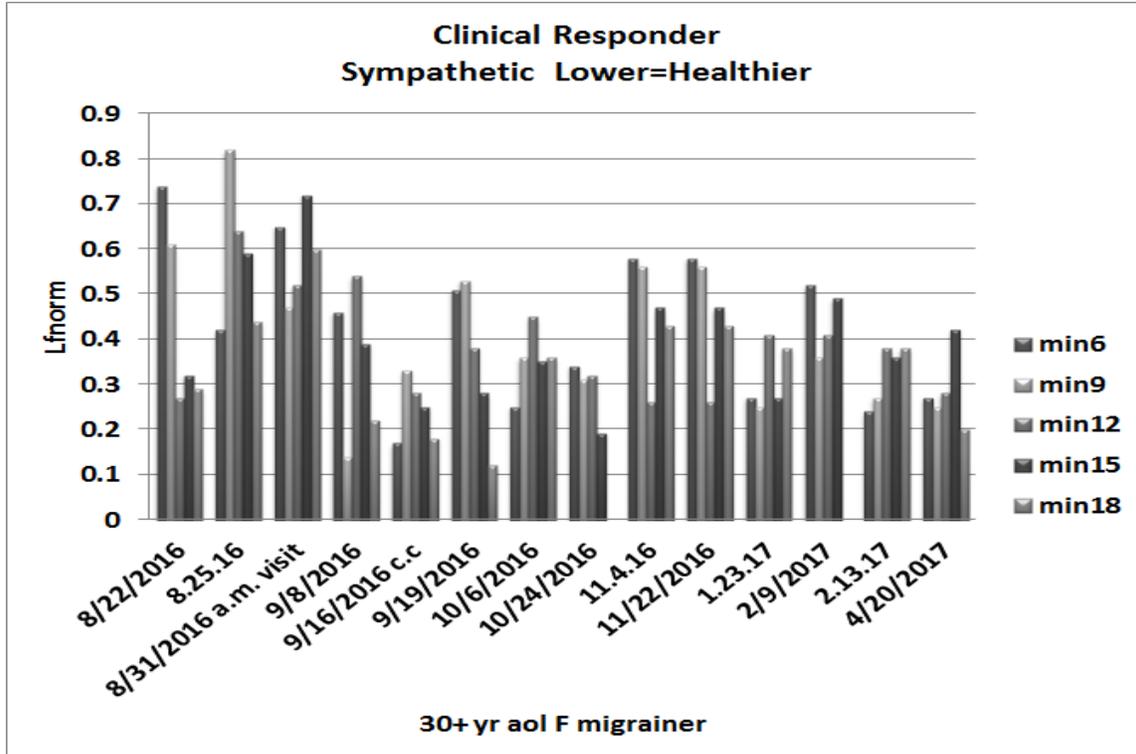
- Estim or Transcutaneous Auricular Vagal Nerve Stimulation (TAVNS)



Clinical Case 8 Migraines

Strategies Tried

- Estim or Transcutaneous Auricular Vagal Nerve Stimulation (TAVNS)



Results and Discussion

The cases here are a small fraction of the many patients studied in the clinic in an ongoing effort to refine the protocol and establish best practices.

Of particular interest in this context are conditions characterized by episodic attacks, such as allergies, migraines, intention tremor, and other conditions presented where "resilience" will play a large role in prevention. Recent studies show that acupuncture can prevent a startle response in horses^{vii} and psychological distress in athletes^{viii} making them more resilient. To demonstrate improved HRV over time may help to account for the decrease in physical symptoms.

The difference between one treatment strategy and another is not usually dramatic and the prescription needs to be repeated again and again to determine whether the effect is relevant. The hope is with continued improvement in protocol design, these differences will become more decisive.

Though HRV has been studied in conjunction with acupuncture in academic settings, longer term data over months is rare, and hopefully of interest to other researchers and practitioners.

Going forward, the author is looking at baseline HRV levels as an additional measure to predict which particular treatment strategy will best suit a particular patient^{ix}. It is clear that even indwelling vagal stimulation is not uniformly effective^x, so it should come as no surprise that any particular needling strategy or TAVNS is not effective for every patient.

Also under investigation is whether the heart rate and HRV response over seconds to needling bears relevance to clinical outcomes and choice of treatment strategy.

Conclusion:

Using the current HRV protocol, the difference in HRV between different needling strategies and TAVNS and traditional treatment are not dramatic. And though "correlation does not imply causation" HRV does tend to improve over time with acupuncture treatment in many cases.

AUTHOR DISCLOSURE STATEMENT

No competing financial interests exist.



Kristen Sparrow, MD
2000 Van Ness, Ste 310
San Francisco, CA 94123
415.775.0117
www.ksparrond.com
Acupuncture and HRV references please go to
http://www.ksparrond.com/category/kristen-sparrow-md-blog/heart_rate_variability/

References

- ⁱ Mehta PK, Polk DM, Zhang X, et.al. A randomized controlled trial of acupuncture in stable ischemic heart disease patients. *Int J Cardiol.* 2014 Sep 20;176(2):367-74.
- ⁱⁱ Ahn AC, Nahin RL, Calabrese C, et al. Applying Principles from Complex Systems to Studying the Efficacy of CAM Therapies. *J Altern Complement Med.* 2010;16(9):1015–22.
- ⁱⁱⁱ Waki Hideaki, Hisajima Tatsuya, Miyazaki Shogo et al Effect of 100 Hz electroacupuncture on salivary immunoglobulin A and the autonomic nervous system *Acupunct Med* 2015 Dec; 33(6): 451–456.
- ^{iv} Clancy JA, Mary DA, Witte KK, et.al Non-invasive vagus nerve stimulation in healthy humans reduces sympathetic nerve activity. *Brain Stimul.* 2014 Nov-Dec;7(6):871-7.
- ^v Jin H1, Liu J2, Foreman RD3, et al Electrical neuromodulation at acupoint ST36 normalizes impaired colonic motility induced by rectal distension in dogs. *Am J Physiol Gastrointest Liver Physiol.* 2015 Sep 1;309(5):G368-76.
- ^{vi} Zhu J1, Chen Z1, Zhu L1, et al Arginine Vasopressin and Arginine Vasopressin Receptor 1b Involved in Electroacupuncture-Attenuated Hypothalamic-Pituitary-Adrenal Axis Hyperactivity in Hepatectomy Rats. *Neuromodulation.* 2016 Jul;19(5):498-506.

^{vii} Villas-Boas JD, Dias DP, Trigo PI et,al Acupuncture Affects Autonomic and Endocrine but Not Behavioural Responses Induced by Startle in Horses. *Evid Based Complement Alternat Med.* 2015;2015:219579

^{viii} Zarei S, Shayestehfar M, Memari AH,et al Acupuncture decreases competitive anxiety prior to a competition in young athletes: a randomized controlled trial pilot study. *Complement Integr Med.* 2017 Mar 1;14(1).

^{ix} Kung YY1,2, Yang CC3,4,5, Chiu JH1,2, Kuo TB6 The application of yin-yang concept on heart rate variability patterns in menopausal women with insomnia. *Chin J Integr Med.* 2016 Jun 29.

^x Jansen K, Vandeput S, Milosevic M, et al. Autonomic effects of refractory epilepsy on heart rate variability in children: influence of intermittent vagus nerve stimulation. *Dev Med Child Neurol.* 2011 Dec;53(12):1143-9.