

Development of an HRV Protocol for Use in the Acupuncture Clinic : Perfecting Acupuncture Treatment using Stress Monitoring

*Variable heartbeat has been considered a sign of good health since the third century by oriental physicians and the scientist Wang-Shu Ho. Ho stated, "If the pattern of the heartbeat becomes regular as the tapping of woodpecker or the dripping of rain from the roof, the patient will be dead in four days."**

1. Why I became interested in HRV
 - a. Frustration with lack of predictability in clinical response lead to a search of a biomarker to help identify effective treatment for more predictable, quicker, effective clinical response
 - b. Stress affects mood, pain, immune function and aging; all affected by acupuncture, HRV measures relative stress levels
 - c. By better understanding of physiology involved we can improve treatment and better frame research questions
 - d. HRV can detect subtle, nonlinear changes in physiology
2. What is Heart Rate Variability Monitoring?
 - a. Noninvasive Method of measuring autonomic balance by computer analysis of the variability of heart rate with breathing by computing the relative inputs of sympathetic (fright/flight/fight) and parasympathetic (rest and digest)
3. Why HRV is relevant to Acupuncture Research
 - a. HRV correlates with more definitive physiological parameters which are more expensive but much less convenient and accessible eg
 - i. **Interleukin levels(inflammation)**
 - ii. **Cortisol (stress)**
 - iii. **Telomeres (Aging)**
 - iv. **Autonomic balance Brain (fMRI)**
 - b. If we can show a change in HRV/stress it would help **convince skeptical colleagues and patients** alike
 - c. By gathering this relatively easy to obtain data may help **frame research questions** to help target hard to get research funding
4. HRV and clinic use
 - a. Advantages
 - i. Noninvasive
 - ii. Minutes to hours time frame suitable for study and comparison
 - iii. Measures subtle physiological changes
 - b. Disadvantages
 - i. Patient should be supine
 - ii. Multifactorial inputs can alter results (coffee, injury, illness, exercise)
 - iii. Highly susceptible to artifact (arrhythmias) need to correct all artifact
5. Drawback of Clinical Studies and How Studies Structured to Mitigate
 - a. Unblinded and uncontrolled without sham.
 - b. Unable to control patient missed visits, coffee, exercise etc
 - c. Designed to look retrospectively at clinical results versus HRV results so that with enough data patterns may emerge to suggest further study in controlled settings
 - d. Only patients with definitive results included in studies
6. Previous Publications, Mine
 - a. **Analysis of heart Rate Variability in Acupuncture Practice: Can It improve outcomes** *Medical Acupuncture 2007* (<http://www.ksparrowmd.com/wp-content/uploads/sparrow-research1.pdf>) (Baeker et al showed [somewhat similar](#) results in migraine patients)

7. **Does Acupuncture Reduce Stress Over Time? A Clinical Heart Rate Variability Study in Hypertensive Patients** *Medical Acupuncture 2014 abstract* <http://www.ncbi.nlm.nih.gov/pubmed/25352944>
8. HRV and Acupuncture Research
 - a. Academic Studies: Animalsⁱⁱⁱ volunteers^{iv}, patients with various conditions^{vvi}
 - b. Individual Acupoints
 - c. HRV and acupuncture correlated with EEG, fMRI, skin resistance etc...
 - d. A few studies correlating clinical response with HRV during Rx
9. Clinical HRV protocols
 - a. Previously used J and J engineering ecg monitoring with Kubios software
 - b. Current Nonin pulse oximeter with Vivosense software
 - c. Compile data in 5 minutes increments including LF, HF, LF norm, HFnorm, SD1, SD2, DF α 1, RMSSD, LF/HF, pnn50. So far, LF/HF is the most reliable parameter for comparison
10. Testing various needling strategies Clinical examples
 - a. Examples of cross over versus symmetrical treatment
 - b. Scalp acupuncture in addition
11. Going Forward: Topics to Investigate
 - a. Electro acupuncture
 - b. Auricular acupuncture
 - c. Ear tacks
 - d. Intervals of treatment
 - e. Other indwelling needles



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In Summary, HRV may help to

- **Identify responders versus nonresponders**
- **May help to show that acupuncture can reduce stress over time in addition to clinical symptom improvement**
- **May help to optimize needling and treatment strategies**

All research available at <http://www.ksparrowmd.com/about-2-sanfrancisco-acupuncture/research/>

ⁱ 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.

ⁱⁱ [Evid Based Complement Alternat Med.](#) 2013;2013:169249.

Intravenous laser blood irradiation, interstitial laser acupuncture, and electroacupuncture in an animal experimental setting: preliminary results from heart rate variability and electrocorticographic recordings.

[He W¹](#), [Litscher G](#), [Wang X](#), et al

ⁱⁱⁱ Electroacupuncture Improves Imbalance of Autonomic Function under Restraint Stress in Conscious Rats. *Am J Chin Med.* 2009;37(1):45-55 Imai K, Ariga H, Takahashi T.

^{iv} ^{iv} Napadow V, Lee J, Kim J Brain correlates of phasic autonomic response to acupuncture stimulation: an event-related fMRI study. *Hum Brain Mapp.* 2013;34(10):2592-606

^v Fasmer OB, Liao H, Huang Y, et al A naturalistic study of the effect of acupuncture on heart-rate variability. *J Acupunct Meridian Stud.* 2012;5(1):15-20

^{vi} Litscher G, Liu CZ, Wang L Improvement of the Dynamic Responses of Heart Rate Variability Patterns after Needle and Laser Acupuncture Treatment in Patients with Burnout Syndrome: A Transcontinental Comparative Study *Evid Based Complement Alternat Med.* 2013; 2013:128721