PEMF Prime Academy

Certified PEMF Expert

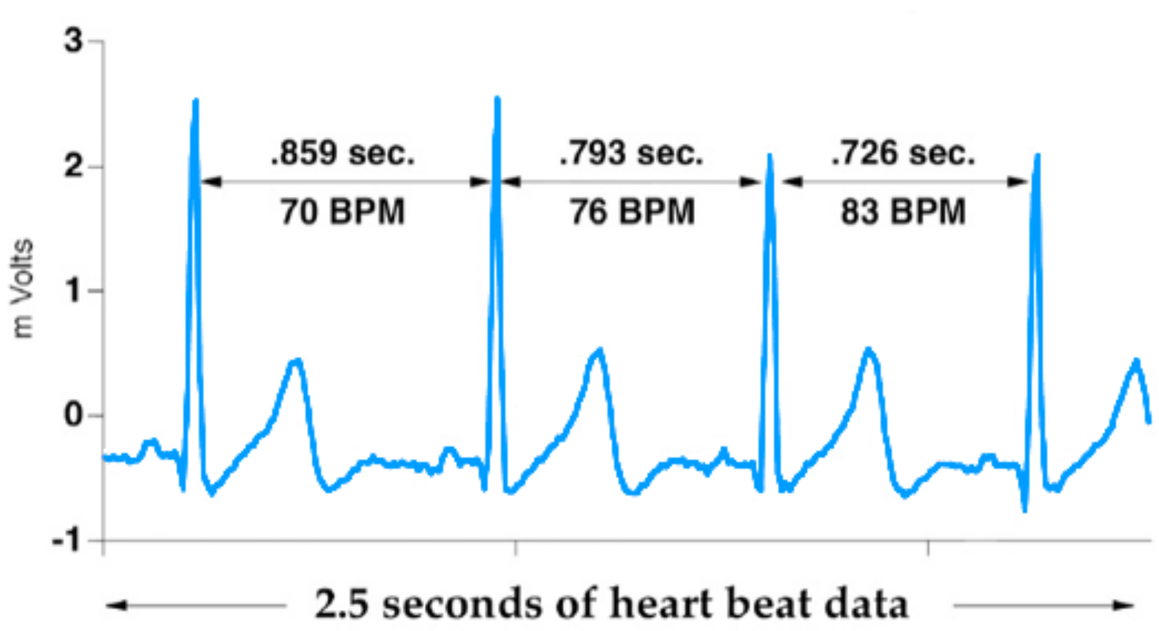
Module 4

Understanding and Implementing Heart Rate Variability (HRV)

PEMF Prime Academy

Heart Rate Variability

- Heart Rate (HR) is the number of heartbeats per minute
- Heart Rate Variability (HRV) is the fluctuation in the time intervals between adjacent heartbeats
- HRV is concerned with analyzing the intervals between heart beats, which are called inter-beat intervals (IBIs)



Heart Rate Variability

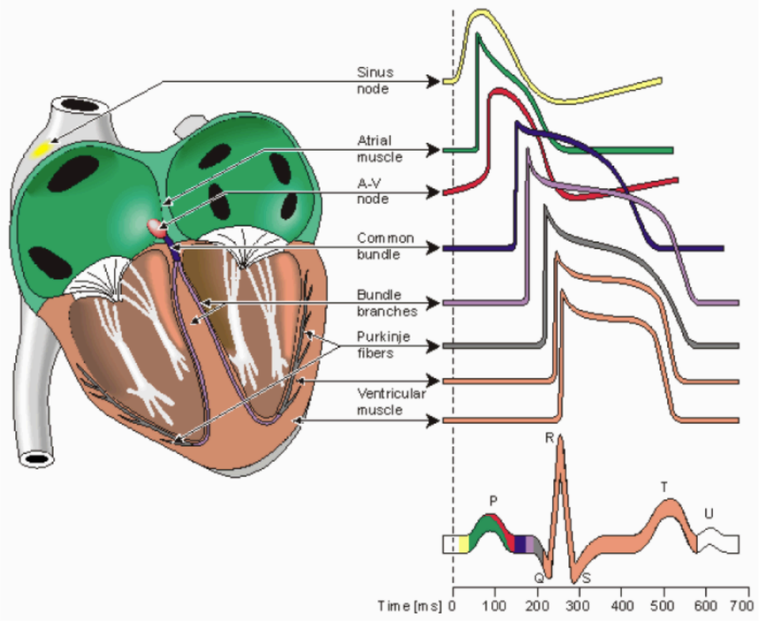
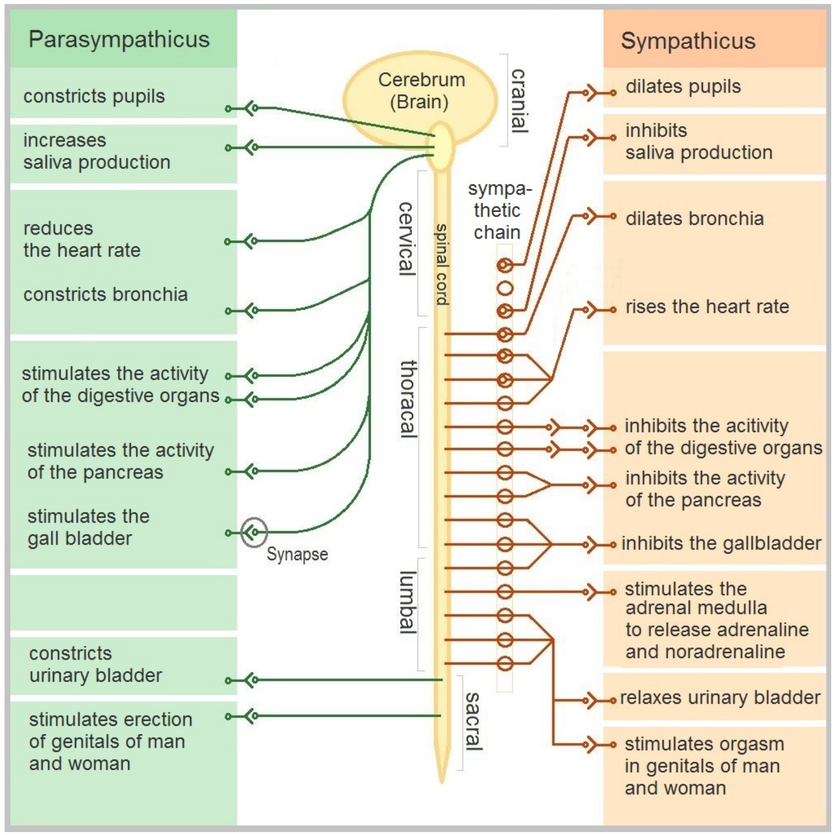


Figure 2: Electrophysiology of the heart (redrawn from Malmivuo & Plonsey 1995). The different waveforms for each of the specialized cells found in the heart are shown. The latency shown approximates that normally found in the healthy heart.

- HRV is a complex pattern of oscillates (vibrations/frequencies)
- Examples: Heart Rate, Blood Pressure, Body Temperature, Energy Level, Mood, Circadian Rhythms
- Healthy biological systems exhibit complex patterns of variability that can be described by mathematical chaos
- The variability of non-linear systems provides the flexibility to rapidly cope with an uncertain and changing environment
- The "oscillation source" of the HRV signal is the time between R-waves or QRS complex
- Oscillations in one cardiovascular function causes identical oscillations in others

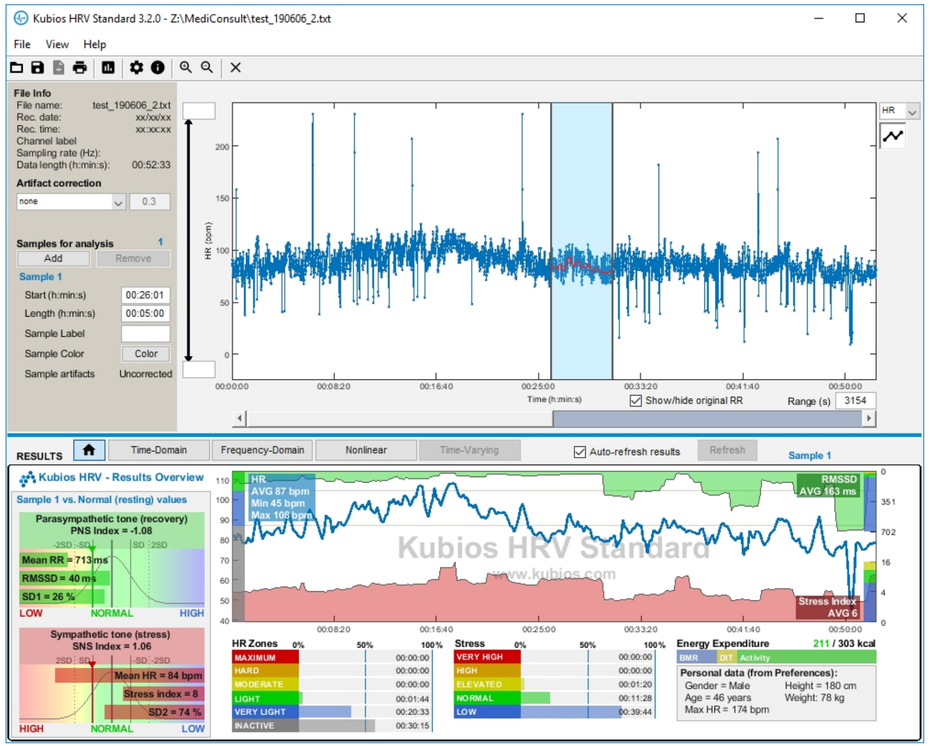
Heart Rate Variability



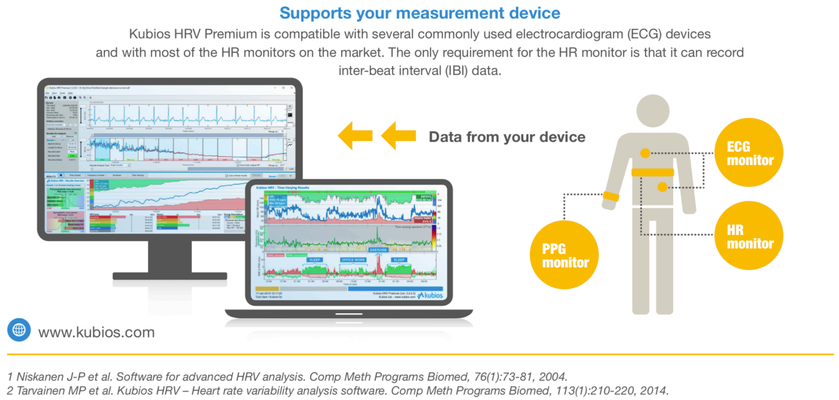
- HRV is conducting an ANS analysis through the portal of the heart
- HRV is a commonly used tool when trying to assess the function of cardiac autonomic regulation
- The ease at which an individual can transition between high and low arousal states is dependent on the ability of the ANS to rapidly vary heart rate
- More HRV implies more PNS activity (vagal tone) and better recovery or functional homeostatic capabilities
- And more homeostatic capacities implies better overall health and wellness

Exagon Sense

- Photoplethysmographic sensor (2-way: HR and SPO2)
- Refined and very accurate algorithm (Histogram)
- Dynamic adjustment of applied magnetic field intensity (every 60-90 heart beats)
- Data Export, KUBIOS-compatible (www.kubios.com)
- Evaluation of HRV properties
- Exagon Sense in combination with KUBIOS can be utilized as a monitoring unit to observe and assess the autonomic nervous system over time



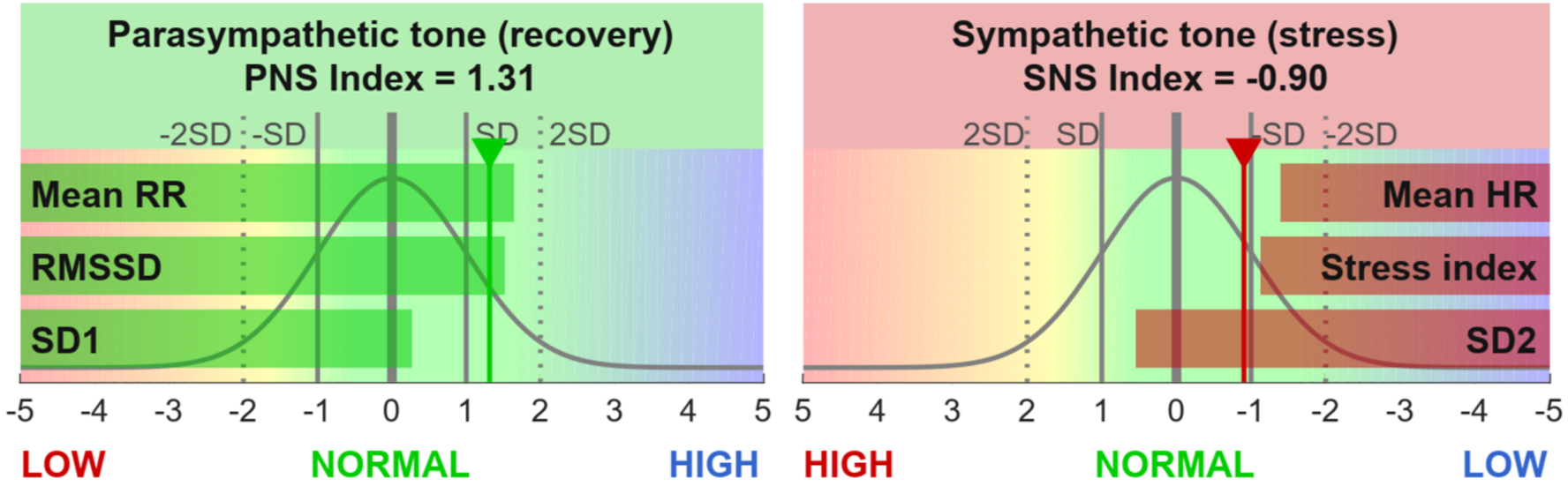
Heart Rate Variability



1 Niskanen J-P et al. Software for advanced HRV analysis. Comp Meth Programs Biomed, 76(1):73-81, 2004.
2 Tarvainen MP et al. Kubios HRV – Heart rate variability analysis software. Comp Meth Programs Biomed, 113(1):210-220, 2014.

- Kubios was founded in 1996, market leader in HRV analysis software for scientific research and professional use
- Kubios customers: Researchers, Well-being Therapists, Sports/Exercise Coaches, Athletes and Home Users for personal monitoring, etc.
- Applications of HRV include; Medical Research, Stress, Well-being, Fitness and Exercise
- Applications that relate to the iMRS Prime include; Stress Assessment, HRV Biofeedback, Resonant Frequencies, Physiotherapy and Yoga, etc.

Heart Rate Variability



- These graphs give a quick view about the level of HRV subjects with respect to normal values
- The interpretation of the PNS and SNS index is straightforward
- A PNS (or SNS) index value of zero means that the parameters reflecting parasympathetic (or sympathetic) activity are on average equal to normal population average