

Heart Rate Variability (HRV)

Overall functioning of a living organism is controlled by the autonomic nervous system. It has two antagonistic branches – the sympathetic and parasympathetic nervous systems. Every organ is activated by one branch and inhibited by the other.

Generally, when the body is in a calm state (relaxation, sleep, etc.), organs such as the heart, lungs, and blood vessels are under parasympathetic control. When active (during physical activity, psycho-emotional arousal or stress) these organs are dominated by the sympathetic nervous system.

A healthy organism is capable of adjusting to any external influence by means of quick and adequate sympathetic response. Once that factor disappears, parasympathetic activity increases, which balances overall autonomic activity.

It is important to use specific tools to evaluate the level of balance between these 2 branches of the autonomic nervous system, their reaction to specific provocative test factors, and the overall condition of both branches. Such tools can help people learn how to cope with stress by achieving an autonomic balance.

The specific tools I employ are HRV (Heart Rate Variability) and Postural Hypotension.

HRV is a simple, 15 minute, non-invasive test performed in office. Infra-red light is emitted on the finger or ear and then a pulse wave signal is measured by means of a portable and convenient finger or ear-clip optical sensor.

HRV TEST DETAILS:

One of the most informative methods of evaluating the autonomic nervous system, including both branches, is heart rate variability (HRV) analysis. It measures the time intervals between each two consecutive heartbeats, which vary under control of the autonomic nervous system. When the parasympathetic system is dominant, the heart heartbeat intervals (RR intervals) oscillate at higher frequencies (0.15 – 0.40 Hz). When sympathetic arousal occurs, lower frequency oscillations take place.

To perform the HRV analysis, a pulse wave signal is usually measured by means of a portable and convenient finger or ear-clip optical sensor. It emits an IR light on the skin. The emitted light is partially consumed by the blood flow. The degree of light consumption/reflection is proportional to the changes in blood flow. The pulse wave signal has periodic peaks that represent blood vessel pulsation. It can be also used to derive the heartbeat intervals as the time between two pulse wave peaks.

The following heart rate variability parameters are calculated:

- Activity of vagal regulation
- Activity of sympathetic regulation
- Tension index
- Resting heart rate

Vagal Regulation is a measurement of the parasympathetic nervous system's current performance.

Ideal readings fall within a small band of -5.0 - +5.0.

Any reading below this indicates that the parasympathetic nervous system is under active, while any reading above this threshold may indicate a hyper functioning situation.

In physiological terms, the parasympathetic system is concerned with conservation and restoration of energy, as it causes a reduction in heart rate and blood pressure, and facilitates digestion and absorption of nutrients, and consequently the excretion of waste products.

Sympathetic Regulation is a measurement of the sympathetic nervous system's current performance.

Ideal readings fall within a small band of -5.0 - +5.0.

Any reading below this indicates that the parasympathetic nervous system is under active, while any reading above this threshold may indicate a hyper functioning situation.

The sympathetic nervous system enables the body to be prepared for fear, flight or fight. Sympathetic responses include an increase in heart rate, blood pressure and cardiac output, a diversion of blood flow from the skin those supplying skeletal muscle, increased pupil size, bronchiolar dilation, contraction of sphincters and metabolic changes such as the mobilization of fat and glycogen.

Resting Heart Rate: This is a person's heart rate at rest. The heart beats about 60 to 80 times a minute when we're at rest. Resting heart rate usually rises with age, and it's generally lower in physically fit people. Resting heart rate is used to determine one's training target heart rate. The heart rate adapts to changes in the body's need for oxygen, such as during exercise or sleep.

The Tension Index: (TI) indicates the level of activity of central mechanisms of sympathetic regulation of the autonomic nervous system. It is extremely sensitive to even minor increase in sympathetic function.