Heart Rate Variability

What is HRV? HRV stands for Heart Rate Variability. This is a measure of the variation in time between each heartbeat and it is a noninvasive way to identify imbalances in the Autonomic Nervous System (ANS). The ANS works to regulate unconscious bodily processes such as heart rate, blood pressure, breathing and digestion. It is comprised of two branches:

The Sympathetic Nervous System (SNS): The fight-or-flight mechanism in response to stress with symptoms including
- Increased blood flow to the heart, release of adrenaline, contraction of muscles, increased oxygen sent to the lungs, inhibition of activity of nonessential organs, and decreased saliva production.
- Variation in time between heartbeats is low.

The Parasympathetic Nervous System (PNS): The rest-and-digest mechanism; the relaxation response with symptoms including
- Decreased heart rate, relaxed muscles, stimulation activity of the digestive system, increased saliva production, and increased urinary output.
- Variation in time between heartbeats is high.

Why is it important? Research has shown a relationship between chronically low HRV and worsening depression or anxiety. It is also associated with an increased risk of cardiovascular disease. Individuals who have chronically high HRV may have greater cardiovascular fitness and be more resilient to stress. HRV may also provide personal feedback about your lifestyle and help motivate those who are considering taking steps toward a healthier lifestyle.

How to increase your HRV? To get the most out of heart rate variability, follow these four simple and effective tips:

1. **Train more frequently with less intensity.** This can be achieved by performing high-intensity exercises on one day and low-intensity exercises on another.

2. **Improve your aerobic fitness.** Endurance athletes, such as marathon runners, have the highest HRV scores. This occurs because aerobic training leads to an increase in the mitochondrial content within our body (powerhouse of the cell). As a result, the HRV score will increase because of a greater aerobic capacity.

3. **Break the inflammation cycle with nutrition.** The PNS regulates and reduces the inflammation that is produced by the SNS. When there is too much inflammation being produced by the SNS, the result is chronically low HRV. Reducing or eliminating any existing high fat, high sugar junk foods in your diet and replacing them with healthier options is a simple way to potentially increase your HRV.

4. **Improve your recovery.** Rest plays a key role in optimizing your performance. One of the biggest influences on your HRV is the quality and quantity of the sleep you get each night. Reduce potential disturbances by turning off the volume on your phone and computer. Training adaptations such as bigger muscles, less body fat, etc., don’t happen when you’re training, but rather when you’re resting. You should be paying as much attention to your recovery as to your training.

How do you check your HRV? The gold standard has been analyzing an electrocardiogram, a test frequently done in a medical clinic. But over the past few years, several companies have created heart rate monitors and apps that do something similar. The easiest and cheapest way to check HRV is to buy a chest strap heart monitor (Polar, Wahoo) and download a free app (Elite HRV) to analyze the data.

References:
Jamieson, Joel. “5 Tips to Increase Your HRV.” 8 Weeks Out, www.8weeksout.com/2016/02/19/5181/.

Hormones: Friend, Foe or Both?

Hormones are little messenger molecules that react to our environment and regulate our body by telling our cells what to do. They are a component of a complex system that is vital to the human body and each one has a specific role. When there is a hormone imbalance, it can cause complications and alter the body’s normal functions and even the smallest imbalance can potentially lead to negative outcomes, such as issues with weight. The following four hormones are important because of the impact each has on weight loss:

**Cortisol** is a steroid hormone that helps to control blood sugar levels, regulate metabolism and helps the body respond to stress.

During times of high stress -- emotional or physical -- large amounts of cortisol are released. This is a necessary response that increases glucose in the bloodstream. During times of chronic stress, the prolonged high levels of cortisol may lead to weight retention or gain, due to the constant increase in blood glucose. If exposure to chronic stress persists for an extended period of time, cortisol production may drop below baseline and this decrease may impair digestion and decrease energy levels due to malabsorption of nutrients from food. The resulting feeling of fatigue often leads to a decrease in physical activity and an increase in appetite. These two factors combined are a perfect recipe for weight gain or retention.

**Insulin**, produced in the pancreas, regulates the amount of glucose (sugar) circulating in the blood. Once released, insulin attaches to the cells and signals for the absorption of sugar. The sugar is then used as energy by the cells. Lower levels of insulin will cause a release of blood glucose, whereas higher levels of insulin will cause glucose to be stored in the liver. Insulin regulation is crucial for maintaining blood glucose levels, primarily due to the previously mentioned effect on liver storage and release. If there is a lack of insulin in the liver, it will cause the release of glucose into the blood at a rate which is faster than the body can metabolize. This may cause an imbalance in the sex hormones in both men and women. Men could develop an increase of estrogen and a decrease of testosterone in the blood. Women might experience an increase of testosterone which can lead to irregular periods, or even polycystic ovarian syndrome. Additional issues can arise if there are chronically high insulin levels, which can lead to insulin resistance and then to Type II Diabetes. Insulin resistance occurs when the body secretes too much insulin for an extended period of time. This leads to the body becoming unresponsive to it. To compensate, the body produces more insulin, resulting in an excess of stored glucose.

**Leptin and Cholecystokinin** are two hormones that are released independently of each other. However, each plays a role in controlling appetite.

Leptin is released from fat cells in our body when we eat. Its primary job is to tell the brain to stop eating because there is enough stored energy within the body. When body fat is low, leptin levels are low, which tells our brain, “I’m hungry.” Whereas when body fat is high and leptin is being secreted normally, it tells our brain, “I don’t need extra energy.” Similar to insulin, the body can experience leptin resistance. This can occur due to prolonged elevated leptin levels. When this happens, the signal to the brain saying, “Stop eating” becomes disrupted and instead, it is being told, “I’m hungry,” despite having plenty of stored energy in the form of body fat.

Cholecystokinin is released from the digestive tract when we eat fat or protein. It slows digestion and increases the sensation of fullness. Eating too quickly or not having adequate fat or protein in your diet may leave you feeling hungry and unsatisfied after eating a full meal.

There are several strategies to mitigate hormonal imbalances. These include eating a well-balanced diet, prioritizing quality sleep, and taking time to release stress through meditation or physical activity. To learn more about your hormonal profile, talk to your doctor to request a hormone panel test.

References: