The Heart Rate Variability Test: A Valuable Chiropractic Tool

By Jarod Adlington, DC, CCIHS

When most chiropractors think of the word "heart" in diagnostic terms, they usually think of trying to read the squiggled lines that appear on the graph paper of an EKG. Instantly, terms like Bundle Branch Block and S-T separation may come to mind and from there most of us prefer to step back and let the cardiologists handle it. Nothing seems to raise apprehension in both chiropractors and patients more than issues dealing with the heart muscle.

However, the diagnostic test known as "Heart Rate Variability" (HRV) has very little to do with the heart itself! Instead HRV is a test that looks at the nervous system, not the heart.\(^1\) Hopefully, now the reader can instantly see the potential of such a test to the profession. At this point, you might be wondering why is a test that measures the nervous system called Heart Rate Variability? In order to answer that question, we first must look at a brief history of HRV, and then its beneficial role in chiropractic.

**History of HRV**

While only recently working its way into the common chiropractic lexicon, Heart Rate Variability has been used in various other professions for more than 46 years. Dating back to 1965,\(^2\) countless papers, articles and books have been published on HRV. Consequently, it has one of the largest bodies of research behind it of any of the modern diagnostic methods. As a result, the term "Heart Rate Variability" has stuck due to the fact that all of the published research uses that term. However, even with more than 46 years of research, its use in chiropractic is relatively new. HRV was first introduced to chiropractic in the late 1990s, when Eingorn et al\(^3\) focused on the possibility of including HRV as a standard test in chiropractic offices. However, it was not until the middle part of the last decade that saw publication of the first studies on the effects of chiropractic care on HRV.\(^4,5,6\) It was also during this time that commercial testing equipment became available to allow HRV to be used in a chiropractic office.

**What Can HRV Testing Tell Us**
Now that we’ve covered why we use the term HRV to describe a test that looks at the nervous system, I want to explain what HRV is commonly used for in a chiropractic setting. As previously stated, HRV is really used to measure the activity of nervous system, specifically the autonomic nervous system (ANS), not necessarily the heart. The autonomic nervous system is divided into two parts or branches, the sympathetic branch and the parasympathetic branch. Each branch is both controlled and coordinated by the area of the brain known as the hypothalamus. The parasympathetic nervous system is controlled by the anterior and medial portion of the hypothalamus, while the sympathetic nervous system is controlled by the posterior and lateral portions of the hypothalamus.

In both medical and chiropractic offices, HRV testing commonly looks at the following:

1. Overall activity of the ANS which is a direct measure of ANS health and adaptability.
2. Activity of the hypothalamus in its role of ANS coordinator.  
3. Activity of the sympathetic and parasympathetic branches of the SNS respectfully. 
4. Balance between the sympathetic and parasympathetic branches of the ANS. 
5. The neuroendocrine relationship of the ANS to the adrenal system.

There are of course more things that it can be used to evaluate, but these are some of the most common.

**How Does HRV Measure the ANS?**

This is a complicated process that involves some very advanced mathematical calculations and a detailed explanation is beyond the scope of this article. Having said that, the heart receives direct innervation from the Vagus nerve (parasympathetic) and from the sympathetic chain in the thoracic cavity. Therefore, changes in heart rate have a direct correlation to the activity of each ANS branch. But, isn’t the heart rate constant at rest? Simply put, no. Resting heart rate and pulse rate are given as averages within a one minute period as beats per minute (bpm). But during that 60 second period, the heart rate is actually speeding up and slowing down. You can measure this by taking someone’s pulse and then have them breathe deeply. You will notice that their pulse speeds up during inhalation and slows down during exhalation. This is an exaggerated form of the normal variability in heart rate.

HRV software measures the timing differences between beats and applies complex equations to derive multiple calculations. Some of the most common are:
• Standard deviation of heart rate which is a measure of overall ANS activity and health.

• Four frequency ranges, including: Very low frequency (VLF) = Hypothalamic activity of the ANS7,8; Low Frequency (LF) = Sympathetic activity of the ANS8,9; High Frequency (HF) = Parasympathetic activity of the ANS8.

Most modern HRV software will then display this information graphically and compare it to accepted normal values making interpretation easy.

Real-World Clinical Application

HRV testing in a chiropractic setting most commonly evaluates two things: ANS activity and sympathetic/parasympathetic balance. Let’s investigate the ANS balance issue first. In general, the sympathetic nervous system (SNS) speeds up bodily processes and is responsible for the “fight or flight” response that most of us are familiar with.11 The parasympathetic nervous system (PSNS) slows down most bodily process and is mostly responsible for producing states of rest, or the "rest and digest response."15 During the average waking day, these two systems should be fairly well balanced.8,9 However, if the balance shifts to being too SNS dominant, than we often will see signs and symptoms such as high blood pressure, muscle cramps, nervousness, indigestion, heart burn and insomnia. Factors that can shift the ANS into this state are: pain, mental/emotional stress, certain medications and trauma, to name a few.16 On the other hand, if the system shifts to being too PSNS dominant, then we will likely see conditions such as: acid reflux disease, fibromyalgia, chronic fatigue, and in severe cases, the inability to mount a healing response. In the average chiropractic office, knowing the resting balance of the ANS can be very useful in determining whether the patient is really in pain or is malingering, whether the pain is chronic/psychological in nature or acute from the suspected cause, and whether the treatment being given is actually improving the ANS balance or simply masking symptoms, the "chiropractic aspirin."

Now that we have looked ANS balance, let’s look at how ANS activity translates into real world practice. In HRV testing, ANS activity is commonly measured on a composite scale from 0 through 150. The scale is a composite of multiple studies that address the normal values for HRV in different age groups.17 HRV values tend to decrease with age. ANS activity is often used to assess the health of the nervous system. Low ANS activity relates to a less healthy nervous system and can be used a predictor for Type II diabetes, and heart disease.8 However, in a chiropractic practice, ANS activity is often used as a predictor of adaptability. In other words, it can tell the doctor how well is this patient going to respond to chiropractic care. For...
example, a low ANS activity tends to indicate less ability for the nervous system to adapt and can indicate the need to proceed slower in the beginning of care to prevent the patient from getting much worse before improvement occurs. It can also be a valuable indicator of improvement in the patient’s condition long before the symptoms have resolved.

Some of the other benefits of using HRV in chiropractic practice include:

1. Non-invasiveness of the test. HRV testing does not require needles, blood draws and produces no radiation.
2. Ease of use. HRV can be measured in as little as five minutes and does not require the use of an EKG.
3. Relatively low cost of equipment. Currently, the average price of an in-office HRV system is about $2,700.
4. Legal defensibility. HRV provides a truly objective measure of the effects of chiropractic care on conditions that can result from an out of balance ANS.
5. Ease of explaining the results to patients. Most modern HRV equipment produces reports that allow DC’s to easily explain the HRV results to their patients.
6. Reimbursable by insurance. A lot of insurance plans cover the costs of HRV testing when billed in the proper manner.

HRV testing in a chiropractic setting is new, and as such, it can be uncomfortable and difficult to explain its value to patients. And a detailed explanation of how to interpret HRV results and relate that to treatment is beyond the scope of this article. That said, adding HRV testing to a chiropractic office doesn’t have to be uncomfortable at all. In my practice, for example, I simply explain that chiropractic care focuses on neuromusculoskeletal conditions, and that the palpation and movement tests assess the muscular part, the x-rays assess the skeletal part, and that now we need to look at the neurological part. This is where HRV comes in. I then explain the benefits of the test and that it is noninvasive and very safe. After the test is done, I explain the results during the report of findings, and that I will perform follow-up tests to evaluate their progress. This then becomes a truly objective outcome measure of the patient’s progress.

References:


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