



Gifts of the Resonant Heart

by Lori Loveland

Transformative Benefits of Optimizing Your Heart Rhythms Through Heart Rate Variability Biofeedback

For many centuries in many cultures, the heart has been considered to be the source of love and emotion, and the wellspring of courage and wisdom. From a more mechanical or engineering perspective, the heart can be viewed as a pump and a motor with control loops for electronic steering. Just as a driver can modify the RPMs of an automobile engine according to needs for speed and acceleration, our heart rate adapts to the basic needs of our body. If we engage in physical activity or endure mental stress, our heart rate will increase. Rest will slow it down.

Throughout our daily lives, homeostatic control mechanisms try to optimize heart rate as a balance between increasing and decreasing activity. This moment-to-moment fluctuation in heart rate is generally referred to as heart rate variability, or HRV. While we may not tend to pay much attention to our heart beat unless a cardiac crisis or exercise regimen dictates, it is actually in the nuances of heart vibrations and their patterns that we may find a gateway to self-understanding and new opportunities for health and well-being. Interestingly, it is modern science that is bringing us back to a deeper appreciation of the traditional view of the heart as profoundly influential in our emotions, perceptions, and actions.

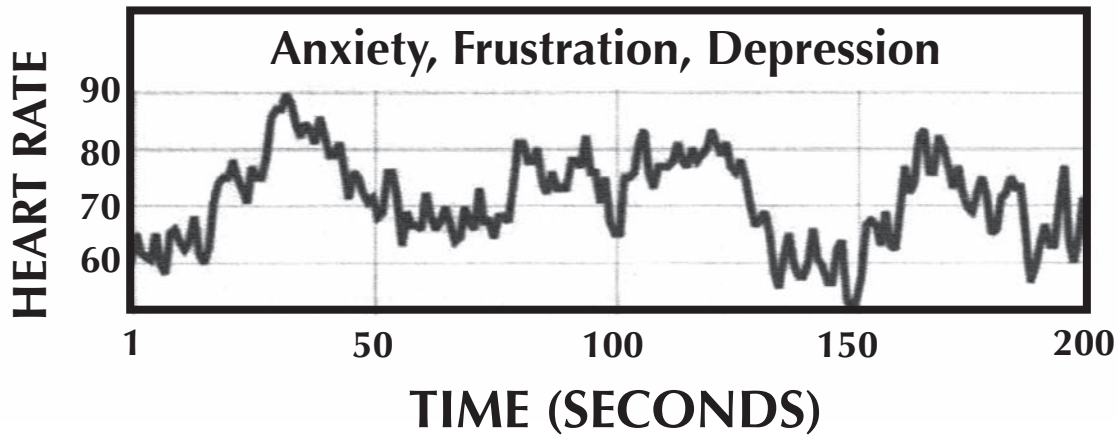
Uncovering the Hidden Mysteries of Our Heart Rhythm

For many years psychophysicologists have been studying various facets of the mind-body connection, but it has only been in recent decades that we have come to understand the influences that modulate the heart rhythm, and its interconnectedness with body function and mental-emotional processing.

The heart at rest was once thought to perform much like a metronome, monotonously beating out a regular steady rhythm. Scientists and physicians now know, however, that this is far from the case. Rather than being predictably regular, the rhythm of the heart—even under resting conditions—is actually surprisingly irregular, with the time interval between heart rates constantly changing. It is this variability in heart rate that provides a dynamic window through which to view the functioning of the autonomic nervous system (ANS)—that part of the nervous system that regulates most of the body's internal functions.

The normal variability in heart rate is due to the synergistic action of the two branches of the ANS: the sympathetic nervous system, which serves to increase heart rate, and the parasympathetic (including the vagus nerve), which tends to slow it down. The two branches are continually interacting to maintain cardiovascular activity in its optimal range and to permit appropriate reactions to changing external and internal conditions.

The moment-to-moment variations in heart rate are generally overlooked when average heart rate is measured (for example, when a nurse takes your pulse over a certain period of time and calculates that your heart is beating at, say, 75 beats per minute). However, new biofeedback technology allows you to view your heart's changing rhythms in real time. As the name implies, biofeedback involves the monitoring of biological information and simultaneous feedback, typically in the form of readings and displays on a computer screen. In this instance, your pulse data can be used to gain insights into the functioning of your nervous system and the interplay of your thoughts, emotions, and physiology. While biofeedback can be explored on an independent basis, the service is often provided by a



healthcare professional who functions as a coach, helping you harness your new awarenesses to support your wellness goals.

The computerized data analysis that is applied to render your heart rate variability information (or HRV biofeedback) may be fairly complex in nature, but some of the main factors that influence your heart rate variability pattern can be easily understood. Yes, there is a confluence of multiple biological rhythms and oscillating waveforms that make up the “musical background” to the dance of life going on in your body, but the most powerful rhythm that influences HRV is one that is familiar to all of us, our breathing. When we inhale, our heart rate becomes faster; when we exhale, our heart rate tends to slow down. These changes in heart rate are called respiratory sinus arrhythmia, or RSA. RSA triggers very powerful reflexes in the body that help it control the whole autonomic nervous system. HRV biofeedback training facilitates an increase in the size of these heart rate changes, thereby strengthening the reflexes and helping them control our bodies in a more optimal way.

Respiratory efficiency appears to be maximized when people breathe at about 6 breaths per minute (one breath every 10 seconds). It is only at this frequency that RSA is completely in phase with breathing so that the heart rate rises simultaneously with inhalation and falls simultaneously with exhalation. It is interesting to note that yogic mantra meditation and rosary prayer have both been found to be associated with breathing at this rate with predictably large increases in HRV.

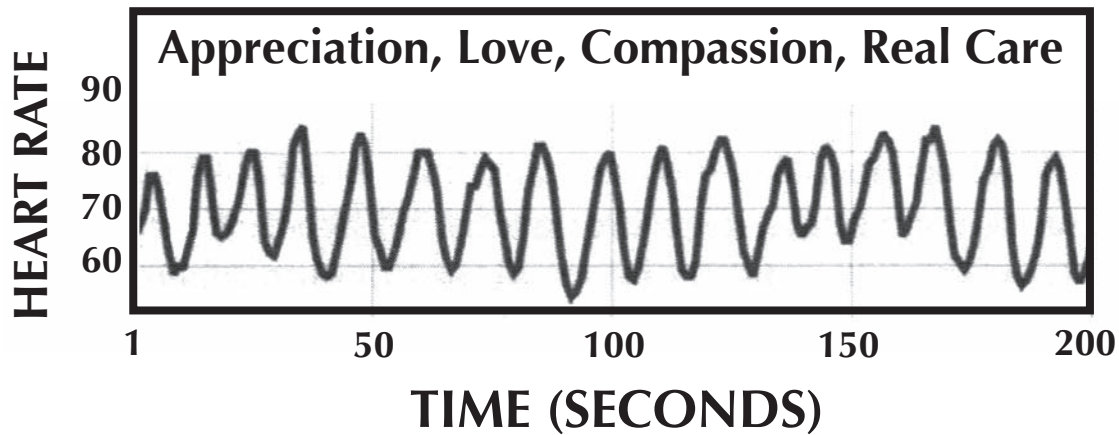
Another contribution to heart rate variability emanates from the baroreflexes. The baroreflexes are important mechanisms for control of blood pressure. Baroreceptors are stretch receptors located in the aortic arch and carotid sinus that are very responsive to change in blood pressure. As it turns out, there is also a periodicity or rhythm to the up and down regulation of blood pressure by these reflexes and receptors, which tends to fall near the .1 hz range (again, at 6 cycles per minute, or 1 cycle every 10 seconds). Thus, in an optimal scenario of homeostatic balance, it can be said that the autonomic nervous system performs in synchronous rhythms. Or more specifically, that the cardiovascular system has resonance characteristics that can be supported and enhanced through biofeedback training and regular practice. Although each individual has a slightly different resonant frequency, varying between 4.5 and 7 cycles per minute among healthy people, breathing at your resonant frequency allows the amplitude of HRV to be maximized. Conversely, when people try to maximize the amplitude of HRV using biofeedback they automatically breathe at their resonant frequency and thereby also stimulating the baroreflex.

Looking at it in another way, the resonant characteristics of HRV ensure that oscillations at the resonant frequency persist after initial stimulation. Imagine striking an object without resonance characteristics (e.g. a tree trunk). What happens? Think! An immediate auditory response that immediately disappears. Then imagine striking an object with resonance such as a bell. You then

produce a response with a long decay: bo-o-o-o-o-o-ng. When any resonant system is physically stimulated at its resonant frequency, the external stimulation magnifies the persistent oscillations, thus greatly increasing total variability. Imagine pushing a swing at its resonant frequency. If you push each time the swing starts going up, the oscillations in the swing do not just persist and decay; they grow in amplitude. Similarly, the repetitive “push” provided by rhythmical breathing at the resonant frequency allows for maximal amplitude of HRV and reinforcement of healthy functioning of the ANS.

Why is Heart Rate Variability Important?

Scientists and physicians consider HRV to be an important indicator of health and fitness. As a marker of physiological resilience and behavior flexibility, it reflects our ability to adapt effectively to stress and environmental demands. HRV is also a marker of biological age. Our heart rate variability is greatest when we are young, and as we age, the range of variations in our resting heart rate becomes smaller. Although the age related decline in HRV is a natural process, having abnormally low HRV for one’s age group is associated with increased risk of future health problems and premature mortality. Low HRV is also observed in individuals with a wide range of diseases and disorders. By reducing stress induced wear and tear on the nervous system and facilitating the body’s natural regenerative processes, regular practice with HRV feedback or other



resonance facilitating techniques can help restore low HRV to healthy values.

What's Love Got to Do With It? (HRV Patterns and Emotion)

Breathing patterns and physical exercise have a strong influence on the activity of the ANS and HRV, however, one of the most powerful factors that affect our heart's changing rhythm is our feelings and emotions. Recent research has shown that when we are experiencing positive emotions such as love, joy, and appreciation, our heart rhythm pattern becomes highly ordered, looking like a smooth harmonious wave. By contrast when we are under emotional stress, experiencing such feelings as anger, frustration, and anxiety, this gives rise to heart rhythm patterns that appear irregular and erratic; the HRV waveform looks like a series of uneven jagged peaks.

While there are many scientists around the world exploring the relationship of HRV and health, the greatest body of experimental and applied research has been performed by the Institute of HeartMath in California. HeartMath scientists refer to the irregular waveform that often accompanies stress and anxiety as incoherent. Physiologically, this pattern indicates that signals produced by the two branches of the ANS are out of sync with each other. This can be likened to driving a car with one foot on the gas pedal (the sympathetic nervous system) and the other on the break (the parasympathetic nervous system) at the same time—this creates a jerky ride, burns more gas and isn't great for your car, either! Likewise, the incoherent patterns of physiological

activity associated with stressful emotions can cause our body to operate inefficiently, deplete our energy, and produce extra wear and tear on our whole system. This is especially true if stress and negative emotions are prolonged or experienced often.

On the other hand, when we experience more peaceful emotions (such as compassion, caring, and love) or uplifting emotions (such as joy), our heart rhythm becomes what is referred to as coherent. When we generate a coherent heart rhythm, the activity in the two branches of the ANS is synchronized and the waveform generated looks somewhat like a sine wave with even peaks and valleys. This allows the body's systems to operate with increased efficiency and harmony and allows our mental processes and performance to be optimized. It's no wonder that positive emotions feel so good—they actually help our body's systems synchronize and work better.

Transforming Anxiety, Depression, and Trauma

Most of us have been "stressed out" or had the "blues" at some point in time but when these feelings become unremitting, chronic anxiety or depression may seem like it is taking over our lives and compromising our health. One of the biggest problems with anxiety is that the more we experience it and its associated feelings or symptoms, the more these reactions become etched in our neural circuitry. It is similarly true for depression. These responses can become habitual. As stated by the law of facilitation, "Once a nerve impulse has passed through a cer-

tain set of neurons to the exclusion of others, it increases the likelihood that it will take the same pathway again."

While managing emotions takes self-awareness and motivation, we can also take comfort in knowing that the law of facilitation can help us cultivate positive feeling states as well. The beauty of working with HRV feedback is that it helps us find and reinforce those "good-vibrations" i.e., our resonance frequency. This physiological feedback combined with other "heart-felt" and mind-body practices provides us with new opportunities to embrace joy and well-being in our lives.

In recent years, HRV biofeedback has also been explored as a tool to help in the resolution of trauma. Re-patterning of nervous system responses that are associated with PTSD have been found to be helpful for many war veterans as well as other individuals suffering from incidences of trauma.

"Heart-healing" and Cardiovascular Disease

There are many types of heart disease, among them atherosclerosis, angina, arrhythmia and coronary artery disease. All are greatly exacerbated by the presence of hypertension (high blood pressure). The Institute of HeartMath has conducted scientific research and clinical studies in partnership with numerous universities including several in North Carolina. Many of these studies have involved the application of HRV biofeedback and coherence-building technologies to help reduce high blood pressure. Although studies from decades ago have

informed us of the detrimental effects of anger and stress on cardiovascular health, it is the new technologies that have provided the most efficient tools for learning how to transform emotion and its effects on the body.

Pain Management Support through Heart-Based Therapies

Many biofeedback therapists and rehabilitation professionals around the country are now utilizing HRV and coherence promoting techniques with chronic pain patients. Part of the rationale for this has to do with the chemical messengers known as endorphins that are created in the body and help manage pain naturally. One of the periods when endorphin levels fall is during times of stress, thereby causing aches and pains to increase. Utilizing HRV biofeedback techniques to help people learn to reduce stress and balance their ANS bolsters their pain management abilities. Recent research has also demonstrated that a large percentage of people who are diagnosed with the chronic pain condition, fibromyalgia, have significantly diminished heart rate variability. This suggests that there is

dysregulation of the autonomic nervous system and that individuals with fibromyalgia may be likely to benefit from heart resonance and ANS balancing techniques.

The Intelligent Heart: The Heart “Brain” and Energy Field

In recent years scientists have discovered that far from being a simple pump, the heart possesses its own intrinsic nervous system, so functionally sophisticated as to earn the description of “heart brain”. Containing thousands of neurological connections, this “little brain” gives the heart the ability to sense, process information, make decisions, and even to demonstrate a type of learning and memory independent of the brain’s cerebral cortex. Research has also revealed that the heart is a hormonal gland, manufacturing and secreting numerous hormones and neurotransmitters that profoundly affect brain and body function. Among the hormones the heart produces is oxytocin—well known as the “love” or “bonding hormone.”

In addition to the extensive neural network linking the heart with the brain

and the body, the heart also communicates information to the brain and throughout the body via electromagnetic field interactions. The heart’s magnetic component is thousands of times stronger than the brain’s magnetic field and can be detected several feet away from the body. We are beginning to understand that the heart’s field plays an important role in communicating physiological, psychological and social information between individuals and that it may even play a key role in intuition.

While there is so much yet to be learned about the ways of the heart, it is clear that cultivating a “resonant heart” along with love and compassion opens the door to receive the gifts of health and happiness for ourselves and others.

Lori Loveland holds a license in psychology and massage and is a Senior Fellow of the Biofeedback Certification Institute of America. As director of Integrative Therapies in Greensboro, she works with a team of rehabilitation and biofeedback professionals to support wellness for individuals dealing with pain and stress related disorders. For more information visit www.integrativetherapies.net