Heart Rate Variability Test: New Way of Evaluating Physical Fitness and Predicting Sudden Death Syndrome

By Larisa Tereshchenko, MD, PhD and Simon Yu, MD

Every so often we witness some of the most physically fit people die from a sudden, unexpected heart attack. What happened to those people who seem so physically fit and can run 20 miles or lift 300 lbs of weight? Why do they suddenly drop dead without any warning signs that there might be something wrong with them? Are there any other tests besides a cardiac stress test to predict their true physical fitness and high risk for sudden death?

Presently, not well known to most physicians, the Heart Rate Variability (HRV) test is an established, non-invasive electrophysiology test for an assessment of the cardiac autonomic nervous system. It evaluates one's general physical fitness. The test predicts increased probability of sudden unexplained death by simply measuring minor variation in one's heart rate. In Russia, Cosmonauts and submarine crews have been routinely tested with the HRV test to screen for individuals who can handle the required job stress.

Heart rate is not fixed. In healthy individuals, heart rate varies constantly as a means to adapt to internal and external stress. Heart rate automatically adjusts for stress from emotional conflict, heavy metal toxicity, hidden dental distress, allergies, respiration, metabolic changes, thermoregulation, physical exertions and long-term diurnal and endocrine cycles.

The modulation of heart rate is primarily the result of alterations of the autonomic nervous system as represented by the parasympathetic system (for your ability to relax, repair, digest, eliminate and sleep) and the sympathetic system (for fight or flight). If you can't relax from stress or worry and your system is dominated by fear and tension, your autonomic nervous system is dominated by a suppressed parasympathetic system and overly stimulated sympathetic system. In this situation, you have an increase in overall risk for sudden death despite your physical ability to run 20 miles or lift 300 lbs of weight. In layperson's terms, your nervous system is "stressed out" to maximum or "maxed out."

Minor heart rate variation can be measured by computer and categorized for sympathetic and parasympathetic dominance. A low HRV score, which usually means high sympathetic score and negative parasympathetic score, is often associated with increased risk of all-cause mortality. Modern men and women are living in highly stressful conditions and often have low HRV scores. Low HRV has also been proposed as a marker for many chronic disease conditions (Task Force of the European Society of Cardiology and the North American Society of Pacing Electrophysiology, 1996).

HRV testing, in addition to a routine cardiac stress test, is a valuable screening tool for people over 40 years old who want to start exercising. It provides a quick measurement for one's general fitness and risk factors for sudden arrhythmia and sudden death. The HRV test can also play an important part in elucidating the role of the autonomic nervous system in diverse conditions such as dizziness, syncope (loss of consciousness associated with heart block, sudden drop in blood pressure, etc.), erectile dysfunction, cardiac arrhythmias, heart failure, sleep disorders, hypertension, and obesity.

As an example, HRV testing may help differentiate erectile dysfunction due to vascular causes as opposed to psychiatric causes. HRV testing is also used to monitor the therapeutic effects of massage, chiropractic therapy or a wide variety of medications or medical treatments. Decreased HRV is associated with immune dysfunction and inflammation which have been implicated in a wide range of conditions such as aging, declines in muscle strength, increased frailty and disability, diabetes, osteoporosis, arthritis, Alzheimer's disease, periodontal disease, and certain types of cancers. HRV, of

course, would not be a sole evaluator for these conditions but it is an important asset in an assessment of one's total body condition when combined with other complementary medical evaluation techniques.

In summary, the Heart Rate Variability (HRV) test is a quick electrophysiology study of the stress of your autonomic nervous system. It is a relatively unknown yet proven and effective test to check for your general physical fitness and as a screening tool for sudden death syndrome. Dr. Simon Yu has been using the HRV test for over 10 years. The potential applications of this test are only limited by the physician's imagination.

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