



September 11, 2010 – Kansas City, MO

Tone

Sometimes when researching a topic, I run through the gamut of emotions. Curiosity. Skepticism. Frustration. Cynicism. Understanding. Elation. Such was the case in reviewing the background research about how a high resting heart rate might affect our susceptibility to diseases like heart disease and kidney failure. And now you get the Cliffs Notes version without all the swearing that went into the reading and writing.

The Study

Science writers of *The Journal of the American Medical Association* (JAMA) review research published in other journals and interview the authors and other experts in the field. In the September 1st edition, writer Mike Mitka published an article with the title “High Heart Rate May Raise Health Risk” (1). That sparked my curiosity, so I read it. The article focused on resting heart rate being an often-ignored symptom that contributes to the development of degenerative disease such as heart disease, hypertension, diabetes, and inflammation. Based on the article he was reviewing, chronic kidney disease (CKD) and end-stage renal disease (ESRD) were also associated with high resting heart rate (2).

The study Mitka reviewed demonstrated that high resting heart rate doubled the risk of ESRD, and heart rate variability increased the risk of CKD hospitalization. The researchers used data collected from the Atherosclerosis Risk in Communities study, which follows over 13,000 men and women who were 45 to 64 years old when the study began over 16 years ago. It's strictly observational, meaning that researchers only monitor what's going on with this group rather than intervene. Over 16 years, 199 subjects developed ESRD, and 541 had been hospitalized for CKD. Based on the data, high resting heart rate and heart rate variability were the culprits.

What caused the problem for me was figuring out what heart rate variability meant. To me, it meant that the resting heart rate jumps around while at rest. That definition makes sense, but it really isn't what the researchers said in the study. They tested for low-frequency versus high-frequency stimulation of the heart. Those with lower frequencies had a higher risk of kidney disease.

Frequencies? What did that mean? Trying to figure that out led to the frustration I talked about along with much cursing. The answer was simple once I understood what they were talking about.

Tone

Heart Rate is controlled by the Autonomic Nervous System; you don't think about it—it happens automatically. But the way it happens is interesting. The sympathetic and parasympathetic nervous systems in tandem control heart rate. The sympathetic sends low-frequency signals and causes the heart rate to increase. The parasympathetic sends high-frequency signals and causes the heart rate to decrease. Tone is what we use to describe the balance between them.

Think of it as two electrodes attached your heart. Both are sending signals all the time at different frequencies; don't let the word frequency throw you—it's a measure of the type of signal like radio frequencies, not how often it happens. When the sympathetic sends more low-frequency signals, your heart rate is higher. If the parasympathetic sends more high-frequency signals, your heart rate is lower. You can see that when you start to exercise, the sympathetic naturally sends out more signals so your heart rate rises as it should to supply more oxygen to the body.

The authors of the paper suggested that based on prior work, the kidneys are controlled the same way. If there are more low-frequency signals, the kidneys are constantly stimulated and over time, that may cause damage.

I hope your eyes haven't glazed over, but for me that led to understanding. However, that didn't mean that the study provided any real usable information.

The Risk

What is the risk for you if you have a high resting heart rate stimulated by low-frequency signals? In order to find out, you multiply the number of subjects by the years of follow-up. That gives you over 210,000 person-years. Dividing the 199 cases of ESRD by 210,000 comes to 0.09% or 9 out of 10,000 cases per year. For CKD hospitalizations, it's a little higher at 0.3% or 3 out of a 1,000 cases per year. Doesn't seem like it's enough to get excited over, does it? Your risk is very low. But there are 26,000,000 people with CKD and many more millions at risk. So doing a little more math means that we could reduce hospitalizations for CKD by 78,000 per year and prevent 23,400 ESRD cases per year if we could lower everyone's resting heart rate from 80 to 100 bpm down to 60 to 80 bpm. How can we do that?

Here's how: exercise three days a week, getting our heart rate to 100 bpm or higher. No medications. No grueling exercise routine or fancy diet. Get your heart rate over 100 bpm at least three days a week and within seven days, your resting heart rate goes down. A brisk walk three days per week accomplishes that. Really, could it be any simpler?

The Bottom Line

Researchers and science writers often don't communicate effectively. But for me, the elation is that we can have a real impact on the healthcare costs for ourselves and America in general by taking a walk three days a week. That's all we have to do is reset the tone of our hearts. Sometimes the simplest solution is the correct one. It all depends on one thing:

What are you prepared to do today?

Dr. Chet

References:

1. JAMA. 2010 Sept; 304 (9): 949-50.
2. J Am Soc Nephrol. doi:10.1681/ASN.2009111112 [published online]

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