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Elevated heart rate over time linked to significant risk of death

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An elevated resting heart rate that develops or persists during follow-up is associated with a significantly increased risk of death, whether from heart disease or other causes, researchers from the Ronald O. Perelman Heart Institute at NewYork-Presbyterian Hospital/Weill Cornell Medical Center found studying outcomes in more than 9,000 patients.

The findings, published July 2 online in the *European Heart Journal*, suggest that tracking heart rate over time can provide a profoundly simple and important marker of health issues that could become lethal but which also might be prevented with diagnosis and treatment.

"It is easy and inexpensive to determine heart rate, and in fact is done routinely in a doctor's office. But this study suggests that physicians need to track the pattern over a number of years, not just consider single readings," says the study's lead investigator, Dr. Peter Okin, a noted cardiologist at the Ronald O. Perelman Heart Institute of NewYork-Presbyterian/Weill Cornell and professor of medicine in the Division of Cardiology at Weill Cornell Medical College.

"Based on this study, we believe that an elevated heart rate seen over a number of years is worrisome, signifying that these patients need further evaluation to see what might be causing the high heart rate," he says.

In their study, researchers discovered that development of a heart rate of 84 beats per minute or greater that either developed or persisted in patients during the study's average five-year time span was linked to a 55

percent greater risk of cardiovascular death and a 79 percent greater risk of death from all causes. Although the participants had hypertension, the scientists adjusted for this fact as well as for other cardiovascular risk factors. A healthy heart rate is between 60 and 80 beats per minute.

Even incremental increases in heart rate were associated with increased risk of death. For example, every extra 10 beats per minute higher than a normal resting pulse was associated with a 16 percent increased risk of death from cardiovascular disease and a 25 percent greater risk of all-cause death.

This is one of the few studies that has looked at changes in heart rate over time, says Dr. Okin. The notion is that because heart rates may increase or decrease over time in response to changes in a person's condition or response to a treatment, the predictive value of a single heart rate measurement is less valuable than measurements over time.

"Heart rates can change day to day and year to year," he says. "It's like having a higher body temperature one day that goes away the next. Something caused the fever, but it has resolved, perhaps with treatment. Heart rate is the same over a longer time span. If it goes up and remains elevated, some disorder is likely to blame."

For example, high heart rate, among other things, is a marker of increased sympathetic nervous system activity, which itself is linked to increased heart ischemia, and is also associated with promoting atherosclerosis and susceptibility to arrhythmia.

This study is a sub-analysis of the LIFE (Losartan Intervention For Endpoint) study, which has been completed. It enrolled 9,193 patients from Scandinavia and the United States to test two different treatments (losartan versus atenolol) for hypertension. Among other variables, heart rate was routinely measured in these patients.

In this study, researchers divided 9,190 patients into two groups — those that had a persistent heartbeat rate of 84 or greater per minute, and those that had less. That figure was selected because other studies had suggested it was linked to mortality risk.

After a mean of almost five years, 814 patients (8.9%) died — 438 (4.8%) of which from cardiovascular disease. After adjusting for possible effects of randomized treatment, and for every other risk factor (such as age, gender, race, diabetes, history of heart disease, and so on), the researchers found a strong association between persistent elevated heart rate and risk of death.

The patients died from a variety of causes, but considering all factors, "heart rate remains a significant predictor of increased mortality," Dr. Okin says. "In addition to high blood pressure, this study demonstrated that changing heart rate over time is a highly significant predictor of mortality."

To date, no medication has been approved in the United States that can reduce heart rate without side effects, although a drug (ivabradine) is being tested, he says. Exercise and diet have also been shown to lower heart rate.

Provided by New York- Presbyterian Hospital/Weill Cornell Medical Center/Weill Cornell Medical College