

Lifesaving Answers from Exercise Stress Testing

Virtually all heart attack survivors, as well as those with newly diagnosed heart disease, have been through the same ritual: They've been wired to a highly specialized machine and asked to exercise, usually on a treadmill. This rite of passage, known as an exercise stress test, produces a recording of the heart's electrical activity (an electrocardiogram, also known as an ECG or EKG). Analysis of this recording indicates how efficiently the heart is pumping, and whether a coronary artery is blocked. It can also be used to establish a safe level of exertion so that heart disease patients can reap the benefits of exercise without triggering angina (chest pain upon exertion) or a heart attack.

Based on recent research, it now appears that exercise stress testing can provide additional information to guide care. "Currently, most doctors focus on ECG changes," says Samia Mora, M.D., a cardiovascular Fellow at Johns Hopkins Hospital. But taking into account two other factors that are routinely included in exercise stress testing—metabolic equivalents (METs) and blood pressure—can help identify people at highest risk for death. Once identified, they can be aggressively monitored and treated.

AN OBJECTIVE MEASURE OF FITNESS

In addition to electrical activity, exercise stress testing measures units of energy known as METs. One MET equals the amount of oxygen a person uses at rest, which varies depending on body weight. People in good shape are able to exercise more vigorously than their less-fit counterparts, so they use more oxygen and accumulate more METs during peak exertion. Thus, METs are an excellent measure of exercise capacity, also referred to as aerobic capacity or fitness level.

A study published in *The New England Journal of Medicine* of more than 6,000 men referred for exercise stress testing found that METs were an excellent predictor of who would live the longest. Each increase of one MET corresponded to a 12% improvement in survival. In addition, men who expended less than 5 METs at peak exertion were twice as likely to die 6 years later than those who expended more than 8 METs.

Two studies recently presented at the annual meeting of the American College of Cardiology by Dr. Mora confirmed these findings in healthy men and women. In these studies, a good fitness level based on METs predicted longevity in adults without coronary heart disease (CHD) and in those with and without CHD risk factors.

A score of 8 METs is excellent after age 50. A low score (below 5) indicates that aggressive monitoring and management of heart disease or heart disease risk factors—including obesity, diabetes, high cholesterol, and high blood pressure—are advisable.

CLUES FROM BLOOD PRESSURE


Blood pressure changes also are routinely monitored during exercise stress testing. Although exertion usually prompts blood pressure to rise, this increase is exaggerated in some people whose systolic blood pressure (the top number in a blood pressure reading) can reach 250 mm Hg or higher, and diastolic blood pressure (the bottom number) can rise more than 5 to 10 mm Hg over the resting rate.

"Several studies have shown that this exaggerated response, which is evident during exercise stress testing, is a predictor of future hypertension—even if blood pressure is normal at rest," says Kerry J. Stewart,

Ed.D., an Associate Professor of Medicine and Director of Clinical Exercise Physiology at Johns Hopkins School of Medicine.

For example, a report from the Framingham Heart Study (an ongoing observational study designed to identify risk factors for cardiovascular disease) found that men with normal blood pressure who had an exaggerated blood pressure response to exercise stress testing were four times more likely to develop hypertension 8 years later; women were twice as likely.

A recently published study from Japan also found that an exaggerated blood pressure response to exercise in men correlated with a four times greater risk of developing hypertension about 5 years later. Once hypertension develops, the risk of heart disease and stroke increases. Conversely, a drop in blood pressure during exertion usually indicates extensive CHD and is associated with a high risk of future heart attacks.

The research on blood pressure response during exercise stress testing is still preliminary, but it is not too early to use this information to guide medical care. If your systolic blood pressure rises above 250 mm Hg or your diastolic blood pressure rises more than 5 or 10 mm Hg during testing, frequent blood pressure monitoring and aggressive steps to lower CHD risk factors are advisable. Similarly, drops in blood pressure warrant further evaluation and taking steps to reduce risk factors for CHD. 

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