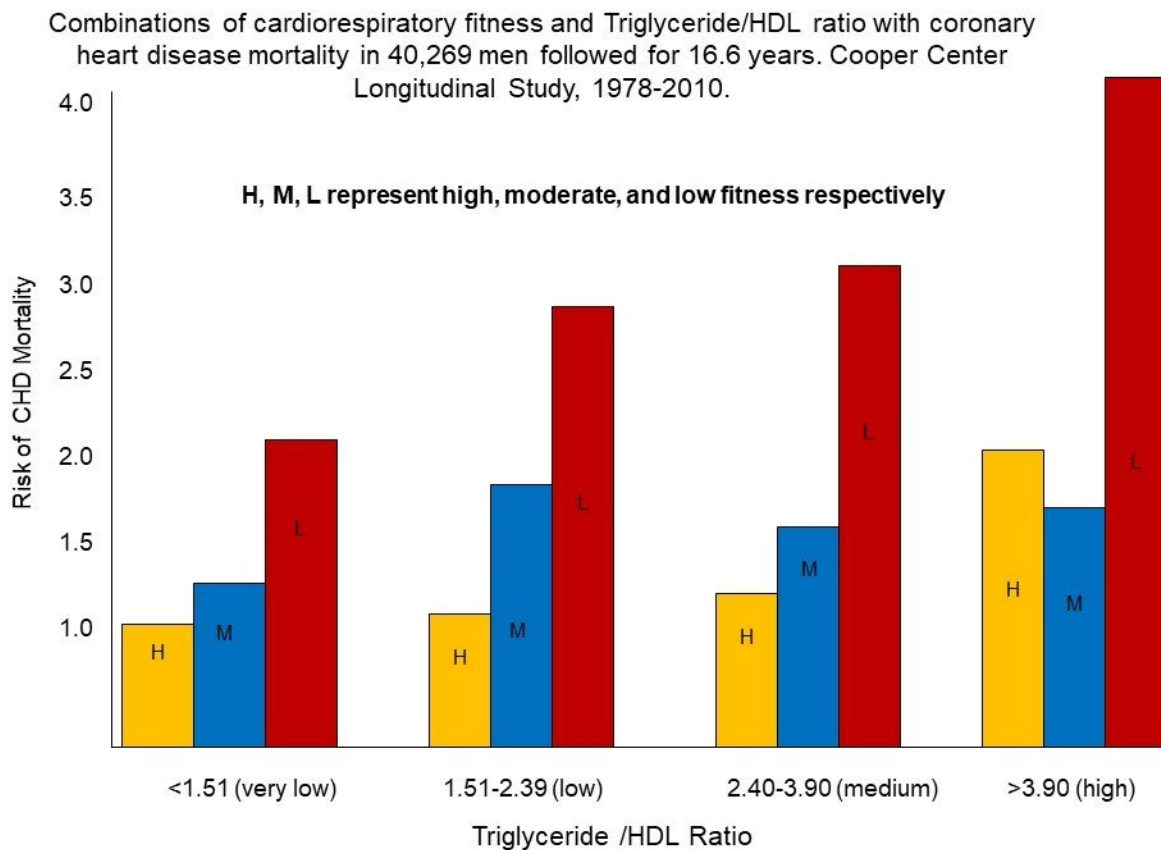


# Cardiorespiratory fitness is essential to reduce risk of coronary heart disease

November 17 2017



Combinations of cardiorespiratory fitness and triglyceride/HDL ratio with coronary heart disease mortality in 40,269 men followed for 16.6 years, Cooper Center Longitudinal Study, 1978-2010. The higher the bar, the higher the risk of dying from CHD. For example, in the first triglyceride/HDL ratio category, low fit men were a little more than twice as likely to die from CHD than high fit men in that same category. Within each of the four triglyceride/HDL categories, the

lowest fit men have the highest risk of dying from CHD, while moderately to highly fit men have a lower risk. Credit: The Cooper Institute

Coronary heart disease (CHD) is a leading cause of death for men in the U.S. Both cardiorespiratory fitness (CRF) and the blood triglyceride/high-density lipoprotein ratio (TG:HDL ratio) are strong predictors of death from CHD. In the current issue of *Mayo Clinic Proceedings*, two new studies highlight the importance of CRF on subsequent CVD and mortality risk. These articles contribute substantive evidence on the importance of achieving moderate to high levels of CRF in both adults and children.

In an investigation led by Stephen W. Farrell, PhD, of The Cooper Institute, Dallas, TX, researchers found strong evidence that moderate-to-high level of fitness counteracted some of the negative effects of a high TG:HDL ratio.

"While it is still extremely important to measure traditional risk factors such as resting blood pressure, blood cholesterol, triglyceride, and glucose levels, having a measure or estimate of the patient's cardiorespiratory fitness level gives us additional information regarding cardiovascular disease risk," explained Dr. Farrell. "The results of this study support this recommendation. Regardless of whether the blood TG:HDL ratio was low or high, having at least a moderate level of fitness provided some protection from CHD death when compared to having a low level of fitness."

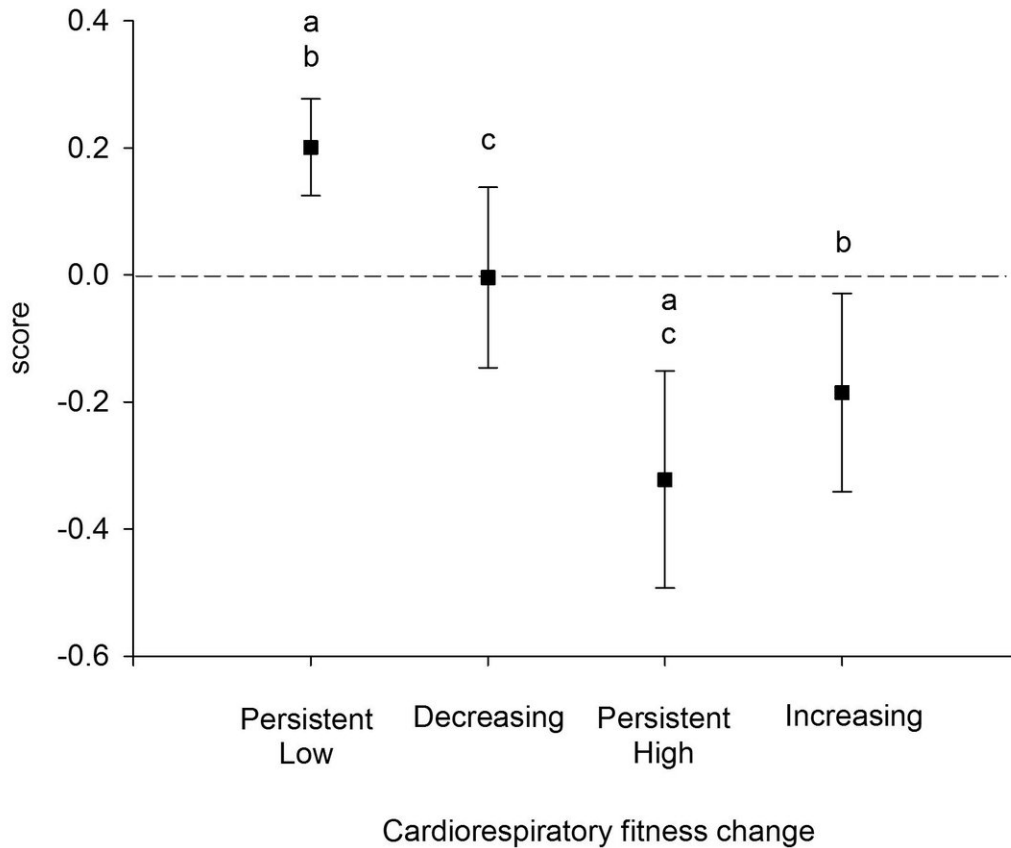
A total of 40,269 men received a comprehensive physical examination between January 1, 1978 and December 31, 2010. The exam included a maximal treadmill exercise test to measure cardiorespiratory fitness level, and also included measurement of the blood TG:HDL ratio. This

ratio is easily calculated by taking the fasting blood triglyceride level and dividing it by the blood HDL cholesterol level. A lower ratio is an indicator that insulin is working well, while a higher ratio indicates resistance to insulin. Higher ratios also indicate an increased risk of future prediabetes, type 2 diabetes, and cardiovascular disease.

The participants, categorized into low, moderate, and high CRF groups, were followed for an average period of 16.6 years, during which time 556 deaths due to [coronary heart disease](#) (CHD) occurred. Moderate to high levels of fitness provided significant protection from CHD death. Lower values for the TG:HDL ratio also provided significant protection. The lowest risk of CHD death was seen among high fit men in the lowest category of TG:HDL ratio, while the highest risk of CHD death was seen among low fit men in the highest category of TG:HDL ratio. Within each of the four categories of TG:HDL ratio, having a moderate to high level of fitness provided significant protection against CHD death when compared to having a low level of fitness. Therefore, knowing the patient's fitness level as well as their TG:HDL ratio provides much more information about CHD risk status than just knowing one or the other. When used in combination with other risk factors, such as the patient's blood pressure, bloodwork, family history, etc., measuring or estimating the patient's level of CRF can result in a much more accurate determination of their [cardiovascular disease risk](#) status.

There are also some studies that indicate that the TG:HDL ratio can be a proxy for LDL particle size, whereby small dense LDL particles are more likely to form plaques in blood vessels than large, less-dense particles.

### Cardiovascular risk at 2-year follow-up



Association between cardiorespiratory fitness change categories (baseline to two-year follow-up) and cardiovascular risk score at two-year follow-up. The analysis was adjusted for sex, age at two-year follow-up, and cardiovascular risk score at baseline. Common superscripts indicate significant differences between the groups with the same letter (all P

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