

## Reaffirmation Concerning “Fitness”

Nearly 150 years after Charles Darwin’s published his theory of evolution, a large meta-analysis published last month gives new meaning to “survival of the fittest”. The review of 33 trials, comprising more than 187,000 healthy men and women, demonstrated that a higher level of cardio-respiratory fitness is associated with a lower risk of all-cause mortality, coronary heart disease (CHD) and cardiovascular disease (CVD) events.<sup>1</sup>

Participants were categorized as:

- Low CRF: < 7.9 METs.
- Intermediate CRF: 7.9–10.8 METs.
- High CRF: ≥ 10.9 METs.

The investigators found that participants with the lowest level of CRF fitness had a 70% higher risk for all-cause mortality and a 56% higher risk for CHD/CVD events compared with participants with the highest level of cardiorespiratory fitness. Participants with intermediate levels of CRF had a 40% higher risk for all-cause mortality and a 47% higher risk for CHD/CVD events than participants with the highest CRF. According to the dose-response analysis every 1 MET higher level of MAC is associated with a 13% and 15% decrease in the risk of all-cause mortality and CHD in men and women respectively.



**“What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?”**

This *Heartbeat* will highlight important points from this meta-analysis that reaffirm what we really already know from ‘common sense’ and present some applications to everyday clinical practice.

Cardiorespiratory fitness (CRF) was estimated as maximal aerobic capacity (MAC) expressed in metabolic equivalent (MET) units, with one MET corresponding to 3.5 mL/min/kg of oxygen consumption.<sup>2</sup>

According to the results, the minimum CRF level that is associated with significantly lower event rates for men and women is approximately 9 and 7 METs (at 40 years old) and 8 and 6 METs (at 50 years), and 7 and 5 METs (at 60 years), respectively. Using our standard Bruce protocol exercise treadmill test (ETT), this means that men and women (age 60) would have to complete, at a minimum, Stage II (2.5 mph at a 12 % gradient) and Stage I (1.7 mph at a gradient of 10%) respectively to be considered low risk. If CRF is expressed in terms of continuous walking speed, men (around 50 years of age) should be able to walk at 4 mph and women 3 mph for the prevention of CHD.<sup>3</sup>

This analysis suggests that a minimal level for CRF of 7.9 METs may be important for significant prevention of mortality and CHD.

The minimal MAC for substantial risk reduction in men aged 50 was estimated to be 8 METs and 6 METs for women.

Based on this data, showing cardiorespiratory fitness to be such a strong predictor of mortality and CVD/CHD risk, the authors suggest that it be made a part of routine CVD/CHD risk assessment. "It is possible that prediction of CHD risk could be improved by including cardiorespiratory fitness with already established risk factors for CHD," they write.

The authors conclude, "We suggest that cardiorespiratory fitness, which can be readily assessed by an exercise stress test, could be useful for prediction of CHD/CVD and all-cause mortality risk in a primary-care medical practice." Unfortunately most labs don't report CRF and ETT is probably not cost-effective.

Weighing in with his comments on the study, **Dr Philip Ades** (University of Vermont [UVM] Medical College, Burlington) thinks that a much better alternative would be to use fitness testing selectively and spend increasingly limited healthcare dollars on a campaign to get people to adopt a healthy lifestyle. He said. "Over 65% of Americans are overweight, more than 50% don't exercise, and 20% smoke. So do we want to spend our money on stress tests, or do we want to spend our money on public policy that would encourage people to walk, eat well, stay thin, and not smoke? To me it's a no-brainer. That action should trump prediction."

## Conclusions:

The general concept of "survival of the fittest" is not new—it is based on common sense, Darwin and many ETT studies that have shown that exercise capacity predicts overall mortality and rate of future cardiac events. Previously a major reason for lack of consideration of CRF as a marker of CHD risk is that a quantitative association of CRF for CV risk had not been

well established. What is noteworthy are the very large numbers, which give it considerable statistical power. The meta-analysis was very well done. This study reaffirms, with a lot of statistical clout, the close relationship between CRF and CV outcomes and death. It also clarifies the degree of risk reduction associated with each incremental higher level of CRF.

Our recommendation is to use ETT selectively to assist in evaluation of CRF and CHD risk but to encourage *all* patients to exercise as outlined in the just-released **American Heart Association** scientific statement for reducing CV risk in people with type 2 Diabetes.<sup>4</sup>

- Explain the CRF benefits.
- Moderate-intensity exercise: At least two and half hours per week, spread out over at least three sessions.
- Vigorous-intensity exercise: Ninety minutes per week can be an alternative for some patients, but both options are considered minimums.

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<sup>1</sup> Kodama S, et al. Cardiorespiratory fitness as a quantitative predictor of all-cause mortality and cardiovascular events in healthy men and women. *JAMA* May 20 2009; 301: 2024-2035.

<sup>2</sup> American College of Sports Medicine. *ACSM's Metabolic Calculations Handbook*. Philadelphia, PA: Lippincott Williams & Wilkins; 2006.

<sup>3</sup> Fletcher GF, Balady G, Froelicher VF, Hartley LH, Haskell WL, Pollock ML. Exercise standards: a statement for health care professionals from the American Heart Association: Writing Group. *Circulation* 1995; 91(2): 580-615.

<sup>4</sup> Marwick TH, Hordern MD, Miller T, et al. Exercise training for type 2 diabetes mellitus. Impact on cardiovascular risk. A scientific statement from the American Heart Association. *Circulation* 2009; DOI: 10.1161/CIRCULATIONAHA.109.192521. Available at: <http://circ.ahajournals.org>.