

# *Clinical Applications*

## **Darwin Was Right: Only the Fittest Survive!**

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### **Learning Objective**

***To understand the important role of fitness in delaying early mortality.***

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If Darwin were alive today, he might have been intrigued by the recent study by Dr. Jonathan Myers and colleagues (1) at the Stanford University Medical Center that revealed that “Exercise capacity is a more powerful predictor of mortality among men than other established risk factors for cardiovascular disease”. While many of us in the health and fitness field have believed that this was probably true, we feel much more confident in making these claims when it is published by reputable researchers in a distinguished publication such as the *New England Journal of Medicine*. In his editorial that accompanied this study, Dr. Gary Balady (2) reaffirmed Darwin’s theory, published in 1859, of the “Survival of the Fittest” as it relates to a specific type of fitness, i.e., physical fitness. Balady said that “Now, nearly 150 years later, in the era of evidence-based medicine and rigorous scientific method, when fitness is measured and study subjects are followed for years, the data supporting the concept of survival of the fittest are strong and compelling”. There certainly is mounting evidence in the scientific literature that physical fitness, and physical activity, have a powerful influence upon survival as well as freedom from a host of chronic diseases, a fact confirmed by the recent Surgeon General Report in 1996 (3).

### **Heredity or Environment?**

Darwin’s contention was that species must adapt to a changing environment while those incapable of adapting will not survive. These adaptations, which allowed the genetically superior to survive, were made slowly over centuries of time – not in decades. The challenges facing Americans today require a more rapid response because our environment is changing rapidly – but there can be no short-term genetic solution to our survival – unless genetic engineering makes great strides in the very near future. Therefore, we will either have to change our environment, our interaction with the environment, or both. It has been often said that we live in a toxic environment – and while air, water, and land pollution first come to mind, the toxic environment that is most dangerous to Americans today is related to our excess caloric consumption and our reduced physical activity. We are encouraged to eat large portions of palatable yet cheap foods that have a high caloric density and low nutrient value – at the same time that we are encouraged to reduce our moderate and vigorous physical activity through the use of transportation, labor-saving devices, and attractive sedentary pursuits. There are experts who study these trends in order to provide solutions. They recognize that we must attack the environment by encouraging society to design and promote attractive yet accessible physical activity opportunities that fit into our daily lives while simultaneously offering palatable yet nutritious food options that are reasonably priced and easily accessible. However, these changes will take **years if not decades** to put into place and we need something now. If we cannot change our genes or our environment overnight, then the most reasonable option (which, by the way can be changed overnight) is to change our behavior.

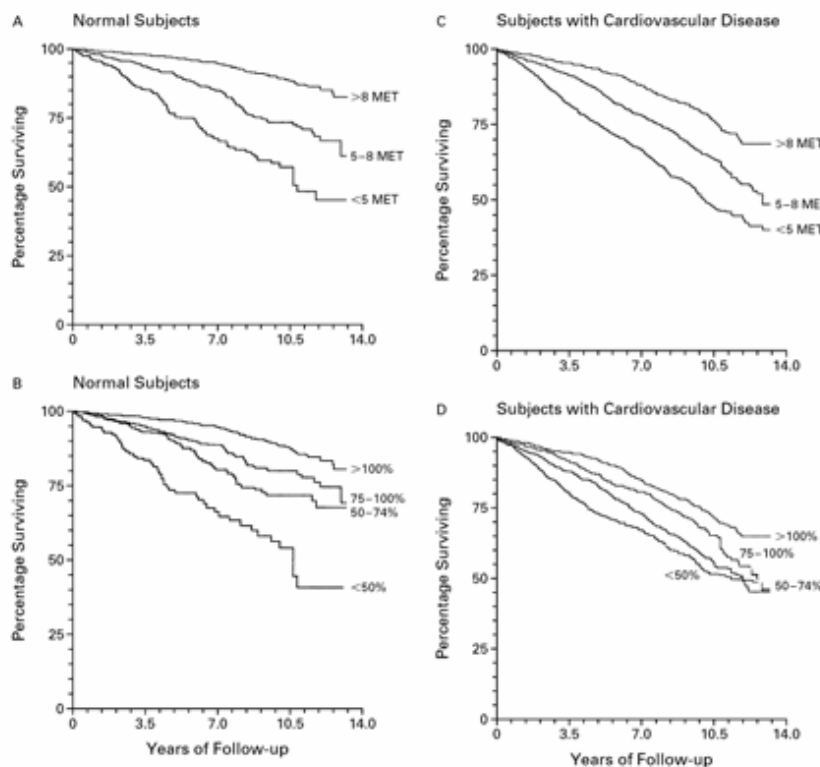
## The Evidence.

In the study by Myers and colleagues, 6213 men who were referred for treadmill exercise for clinical reasons, were followed for approximately 6 years to evaluate their risk of death. They were classified into two groups: those with an abnormal exercise test result and/or a history of cardiovascular disease, and those with a normal exercise test and no history of cardiovascular disease. In the follow-up period over 1200 subjects died, which resulted in an annual mortality of 2.6 percent. Those who died were older than those who survived and had a lower maximal heart rate, lower maximal systolic and diastolic pressure, and lower exercise capacity. After adjustment for age, the peak exercise capacity measured in metabolic equivalents (METs) was the strongest predictor of the risk of death – not only in those with cardiovascular disease, but also among the normal subjects. In other words, the ability to achieve a high level of exercise on the treadmill was the best single indicator of survival in individuals, regardless of whether they had a normal or abnormal exercise test or whether they had previous evidence of cardiovascular disease.

In this study the investigators also measured other risk factors such as history of hypertension, COPD, diabetes, smoking, hypercholesterolemia, and overweight/obesity. In each of these subgroups, the risk of death from any cause in subjects whose exercise capacity was 5 METs was roughly double that of subjects whose exercise capacity was more than 8 METs. The powerful influence of a low versus high exercise capacity is demonstrated in Figures 1 and 2 where the survival rates can be compared among the low, moderate, and high fitness groups.

Insert Figures 1 and 2 at this point in the manuscript

Over the 14 years of follow-up it can be seen that in those subjects with a MET capacity  $\geq 8$  METs survival exceeded 80% while those with  $\leq 5$  METs survival was less than 50%; a similar trend was seen in those with cardiovascular disease. The final conclusion from this study was that for each increase of 1 MET in exercise capacity, there was a 12% improvement in survival – regardless of cardiovascular disease status.



**Figure 1.** Survival Curves for normal subjects (A) or subjects with cardiovascular disease (C) stratified according to peak exercise capacity or percent of age-predicted exercise capacity (B,D). Myers J et al NEJM 2002; 346(11):799.

### **What do we tell our clients and what should doctors tell their patients?**

The study from Myers and colleagues is the most recent in a series of studies that have shown the protective influence of physical activity and physical fitness, not only against the most common chronic diseases that afflict Americans, but on survival as well (4). We have known for a long time, even without sophisticated research, that physical exercise puts “life into our years” and now we have solid evidence that it also puts “years into our lives”. One of the major messages to come from the Stanford study is this: Physical fitness plays a powerful role in survival even after adjustment for age and other risk factors. In other words, it was the fitness that gave the protection – not just the fact that the fitter people were simply younger. In addition, those with higher fitness levels of all ages had better survival even when these subjects smoked, were overweight/obese, or had high blood pressure.

Those of us who are in the health and fitness field are well-informed about the multiple benefits of physical activity and we know how to evaluate our clients, develop a safe and effective exercise prescription, and motivate them to initiate and maintain an exercise program. But we need support from other sources if we are going to make a significant impact upon the health of the nation. One important source of advice about health, for most Americans, is the family physician. Unfortunately, Glasgow and colleagues (5) contacted a diverse sample of 1818 U.S. adults about their physical activity level as well as the advice that they received from their physician after a routine office visit. Only 28% of these patients reported receiving advice from their physicians to engage in exercise while an ever smaller proportion, 11%, reported assistance from their physicians in planning an exercise routine or follow-up support regarding their exercise patterns. Similar results have been shown in other studies that reveal how seldom physicians inform their patients of the need for diet/weight loss (6, 7), exercise (8), or even quitting smoking (9). Clearly, much more work needs to be done and one of the first steps would be for physicians to make exercise the very first prescription that needs to be filled in all of their patients – regardless of age or risk factors (10).

### **References.**

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