

## **CHAPTER 2**

### **WALKING AND HEART DISEASE**

If you have not been exercising regularly you usually should start by walking more. As we become older walking may be our main exercise. Proper walking can produce aerobic exercise and good health benefits. Sadly, much walking done today for health probably is producing inadequate health benefits. We have excellent direct research on the health benefits of walking that tells us what we need to do. But incredibly, no one seems to have studied this research comprehensively and provided their results to the public!

We've been told again and again that we should walk a half hour (The Institute of Medicine says a full hour) every day for our health. A person today may have 16 hours day awake. But subtract time for dressing, eating, commuting to and from work, time at work, and other time needed for essential tasks and the time left for things we most like to do may be only 2 to 3 hours each day. The demand for a full hour or even a half hour of this time is a considerable request. It is a request that can keep a sizeable part of our population from doing any exercise.

We need to practice good health habits for our entire life. These habits become increasingly important as we get older because our health risks move higher as age moves higher. Logical questions are "What benefit will I achieve from this? If I walk half as much time will I get benefits? If so, how much less? Does spending the considerable time that is recommend for exercise really pay off? Could I get better benefits from some other kind of exercise in lesser time spent?"

I find no useful published answer to any of these questions. It seems to have been assumed that moderate exercise from some research exercise did produce health benefits, and that walking was moderate exercise.

## Let Us See What the Research on Walking Really Shows

We now have good research on walking and risk of heart disease. A global analysis of this research that follows answers previously unanswered questions. Ten studies are found published on the risk of heart disease for different walking durations and walking paces.

Table 2-1 shows at right the approximate maximum benefits in reducing risk of heart disease obtained in each of these studies. The columns at left show the author, size and location of the studies.

The typical maximum high/low risk ratio for heart disease found from these studies of walking was about 2 times. This compares with a 5.7 times average benefit from the higher cardiofitness groups shown in Table 1-1. Although this benefit from highest amounts of actual walking researched is smaller than that from best cardiofitness, I will show later that a benefit of 2.0 times still is a very useful health benefit

The average reductions in risk in these research studies were well below the maximum benefit values from walking noted in Table 2-1. We need to know what kind and amount of walking produced the benefits. I thus organized all of the available research on walking to investigate how the pace of walking and duration of walking each week reduced the risk of heart disease.

The results showed a consistent and highly significant relationship between the pace and risk. Each increase in walking pace of one mile per hour up to 4.5 miles per hour reduced risk of heart disease by about 20 percent. This result was as expected and was similar to that concluded by the various researchers

## But the Effect of Walking Duration is Very Different!

Incredibly, most of the research showed only small and confusing effects of walking duration on risk of heart disease! The average benefit of walking duration in hours per week in reducing risk of heart disease from a meta analysis of all of the 62 measurements recorded in the above ten studies was small and of dubious significance. How could this be?

Researchers long have assumed that walking pace and walking dura-

tion had similar benefits on health and could be inter-changeable. That is, we could walk at a fast pace for a given time or a slower pace at a longer time and obtain the same benefit. I believe that every researcher, health expert, and others involved in health – including me – has assumed that more walking and more exercise each week is better

Yet two of the studies of walking involved research on mail carriers in the US and England that were estimated to walk about 30 hours each week. The carriers obtained a similar reduction in risk of heart disease as did those that walked only two hours each week. Long durations of walking in most studies produced little if any more benefit than did much shorter durations. How could this happen? An answer to this puzzle was finally found:

**Table 2-1**

| <b>Study Author<br/>Gender,<br/>(M) or (F)</b> | <b>Study Size</b>                                 | <b>Max Risk<br/>Ratio<br/>High / Low</b> |
|--|---|--|
| 1. Morris <sup>2</sup> ,<br>1953, (M)          | 61,000 postal<br>carriers, Britain                | 1.9                                      |
| 2. Kahn <sup>21</sup> ,<br>HA, (M)             | Mail Carriers,<br>US 62,000<br>person years       | 2.8                                      |
| 3. Morris <sup>5</sup> ,<br>1990, (M)          | 9,400 men in<br>Britain                           | 1.9                                      |
| 4. LaCroix <sup>22</sup> ,<br>1996, (M)        | 1645 in Canada,<br>Age 65+                        | 1.3                                      |
| Same (F)                                       | Age 65+   | 2.2                                      |
| 5. Hakim <sup>23</sup> ,<br>1998 (M)           | 700 non-smoking<br>Age 61-81 in<br>Hawaii         | 3.3                                      |
| 6. Manson <sup>24</sup><br>1999 (F)            | 72,500 Nurses in<br>US age 50+<br>fastest pace    | 1.6                                      |
| 7. Lee 2001 <sup>25</sup><br>(F)               | 39,000 Health<br>Professionals US                 | 1.9                                      |
| 8.<br>Tanasescu <sup>26</sup><br>2002 (M)      | 44,500 US<br>Health<br>Professionals<br>fast pace | 2.0                                      |
| 9. Manson <sup>27</sup> ,<br>2002 (F)          | 73,700 Women's<br>Health Initiative<br>US         | 2.0                                      |
| 10. Noda <sup>28</sup> ,<br>2005<br>(M & F)    | 31,000 men and<br>42,000 women in<br>Japan        | 1.8                                      |

Walking for durations up to about 2 hours per week at a given pace and exercise intensity reduces risk of heart disease as expected. Walking similarly for amounts beyond 2 hours per does not reduce this risk further

This discovery is both new and shocking. Nearly every 'expert' recommendation about exercise has told us that we should walk at least 30 minutes nearly every day and from 3 1/2 to 7 hours per week. Yet nearly every useful research study on walking shows no further reduction in risk of heart disease for walking in excess of two hours per week! This was not just ordinary research. It included multiple results from our largest and most respected studies of up to 70,000 persons. Have millions been mostly wasting time doing vast amounts of exercise that produce near zero health benefit?

It is rare that such consistent results for any health factor are found for 9 out of 10 different mostly major studies. To investigate this finding even more intensively I organized all 62 measurements of risk of heart disease included in the above available ten key studies of walking and heart disease in order of duration of walking. The first hour of average walking pace reduced risk 23%. The first two hours of average walking reduced risk 38%. This suggested that the 2<sup>nd</sup> hour produced a further average reduction of 15% in risk above that developed for the first hour of walking. The third hour produced no further gain. More hours up to 10 per week and the mail carriers 30 hours per week produced no further significant benefit. More evidence about this highly significant finding is in Appendix 3 and in the reference paper on my website.<sup>20</sup>

This confirmed two-hour limit throws another bombshell into present thinking about exercise: Most present and past concepts – including mine – about how exercise improves cardiofitness and reduces risk of heart disease must have been wrong. Physical or chemical processes nearly always proceed continuously and orderly in response to casual factors. It seems logical that more exercise should produce a further benefit. Benefits usually should not discontinue abruptly at some defined place, as for example at 2 hours per week of exercise. Yet the research tells us and tells us emphatically that doing more than 18-20 minutes per day of walking will produce little added benefit to our health. This contradicts nearly all public recommendations about exercise.

This finding puts another arrow into the heart of that calorie theory of exercise and health. It shows again that very large numbers of added calories of exercise will not necessarily produce more benefits to health. What process or mechanism could explain such an unexpected result?

This leads us directly to my new Heart Theory of Exercise and Cardiofitness that upsets much past thinking about what kinds of exercise are really useful. And the Heart Theory explains easily why a limit to cardiofitness benefits from exercise duration is not only likely but expectable. It seems to explain the results of nearly all of the research we have. More on this follows.

The key mechanism by which exercise protects from heart disease is improved cardiofitness. Thus an important question becomes, “Does cardiofitness also stop improving after two hours of exercise is done?” If so, then this explains why the risk of heart disease stops improving from walking after two hours a week. The following chapter shows that more than two hours of any exercise per week at a given intensity also does not im-

prove cardiofitness usefully. This is the core reason why risk of heart disease is not usefully reduced by exercise of more than two hours per week. I leave this here with what now appears to be a well-confirmed truth:

There is no useful research evidence now available that shows that aerobic exercise of more than 2 hours per week at a given intensity will usefully reduce further the risk of heart disease for healthy persons.

This does not mean that exercising more than this 2 hours will produce zero benefit. There should be some small benefits for reducing weight for the obese. Diabetics will obtain further benefit. There may be as discussed later a small further benefit to cholesterol and other factors. But I will show that the benefits of these other factors are small and contribute perhaps about one-sixth of the benefits of cardiofitness. Except for results on diabetics, these effects on risk of heart disease were too small to be measured even by the very largest research studies now done.

### **Why Didn't the Researchers Find This Two-Hour Limit?**

Most individual researchers did note that the effect of walking pace was larger and more significant than was the effect of walking duration. In fact, a recently-published meta-analysis found a much lesser and less significant effect on risk of heart disease for exercise duration than for intensity. But the idea that there is a time limiting benefit for exercise duration would have been considered improbable.

It was only when this first global analysis brought the results of all studies into similar view that the surprising effect was discovered. Global analysis frequently reveals findings from multiple research results that could not be observed from any individual study or from a usual statistical meta-analysis that develops only an average overall risk.

### **Benefits for Reducing Risk of Heart Disease by Walking Are Well Established.**

The above studies verify that walking reduces risk of heart disease. But the serious question is, "How and how long and how fast do we need to walk to substantially reduce this unwanted risk?"

We do have an accurate effect of walking pace from the results of most of the available studies. We also can derive a useful effect of walking duration for the first two hours per week of walking from most of the study results.

**Table 2-2**

| <b>Table 2-2 Risk Reductions in Heart Disease for Walking at Different Paces and Durations</b> |             |             |             |             |             |             |             |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Walking Pace Miles per Hour</b>   | <b>1.5</b>  | <b>2.0</b>  | <b>2.5</b>  | <b>3.0</b>  | <b>3.5</b>  | <b>4.0</b>  | <b>4.5</b>  |
| <b>Walking Duration Minutes per Week</b>   |             |             |             |             |             |             |             |
| 30 minutes   | 1.04        | 1.06        | 1.10        | 1.14        | 1.16        | 1.19        | 1.23        |
| 60 minutes   | 1.06        | 1.14        | 1.20        | 1.30        | 1.35        | 1.43        | 1.51        |
| 90 minutes   | 1.08        | 1.19        | 1.30        | 1.45        | 1.56        | 1.72        | 1.85        |
| <b>120 minutes or more</b>   | <b>1.11</b> | <b>1.25</b> | <b>1.41</b> | <b>1.61</b> | <b>1.79</b> | <b>2.04</b> | <b>2.27</b> |

Table 2-2 shows how walking pace and duration reduce risk of heart disease. Look first at the bottom row of values that show how increasing walking pace reduces the risk of heart disease for the maximum beneficial exercise time of two hours each week. As before, higher values are better. Reduction in risk is only 1.11 times for a stroll at 1.5 miles per hour. Reduction in risk from walking moves up to 1.41 times or to a 4 times more benefit for an average walking pace of 2.5 miles per hour, to 1.79 times for walking at a quite brisk 3.5 miles per hour, and to a much higher 2.27 times for walking at a fast 4.5 miles per hour. And benefits do increase as expected with duration of exercise done up to two hours each week.

This research clearly endorses the statement “Walking is good for health.” But this generality may not mean much. Walking at a slow speed produces so little benefit to normal healthy people that it is close to useless. Our health benefit from walking depends substantially on how fast we walk. It has been estimated that typical mall walking may be at a pace of 2.5 miles per hour. Brisk walking may be at rates of 3 and 3.5 miles per hour. Very few people walk at a regular pace of 4 miles per hour or higher.

Walking for health even at the now confirmed maximum of 2 hours per week still takes substantial time. As a walker you want to make that time spent as useful and possible to your health. A first question of interest is, “How fast do you now walk?” I discuss in Chapter 15 various ways for measuring your walking distance and pace. Without this knowledge about walking pace you probably would continue to walk at the usual pace.

A most practical approach will be to just keep trying to walk a bit faster than usual, and maintain this gradually faster pace. After time you almost certainly will become comfortable when walking faster.

People need to understand clearly the importance to their health of their walking pace. The word 'brisk' in a recommendation can mean very little. People need to actually measure how fast they walk. A potentially better alternative is to measure exercise heart rates during walking. The real key to cardiofitness is exercise of the heart. Much more on this follows later.

## How a Walking Program Can Be of Little Value for Health

The two hour per week maximum of exercise that the heart muscle can utilize creates another problem in designing an exercise program. Suppose you walk aerobically to or during a job for say a half hour each day. Done a usual 5 times a week, this develops more than the needed two hours of walking. Now if you add to this an exercise program of more walking around the neighborhood during your leisure time, you probably will be wasting a lot of time. You will be doing more than the two hours of exercise that is most useful for health.

This tells you that for obtaining further exercise benefits you must do your leisure time exercise at a significantly higher intensity than that obtained from your usual walking to or on a job. You will not gain more cardio benefit by doing any kind of cardio exercise at an intensity similar to that done in your usual walking.

## How Much Exercise Do We Need?

A key problem with much advice about exercise for health is a lack of any perspective about how much exercise is needed. Research studies really show mostly that exercise is "good to do." Any exercise is "good." This may have led to the absurd advice that "All we need to do is to do some walking. There is no purpose in doing that high intensity exercise."

This is wrong. There is no such thing as a single program for exercise that is best for everyone. I will show that we can develop far more health benefit by doing more intensive exercise. Your benefits can change from near zero to extremely high, depending on how intensively and consistently you exercise. But there must be some balance between time and energy spent and benefits to our health. This is a personal problem that requires a decision to be made by each of us.

I propose in this book two goals for improving health. A first goal is an improvement in cardiofitness of 10%. The second, or good goal, is an improvement in cardiofitness of 20%. These goals are for improvement above the cardiofitness level of those that do limited exercise now. Each

improvement of 1 unit or 1% in cardiofitness reduces risk of heart disease by 6.4%. As before, the first goal thus develops a reduction in risk of heart disease by 1.85 times. The second goal requires a reduction in risk of 3.5 times. If the first goal is maintained during life it will on average increase likely years of healthful days of life by 3 to 3½ years. Maintaining the second goal could add about 7 years of healthy days to an average life.

Why consider these specific goals? The first goal of 10% is one that I feel nearly every now healthy person should be able to develop as part of responsible personal self-care. It can be obtained by walking at a bit over 3.5 miles per hour for 2 hours each week, or from easy to do exercise programs I will discuss. If done at the national level, the number of US heart attacks by 1.85 times could provide a major contribution to the public health.

The second goal of 20% is more challenging, but should be obtainable from convenient monitored exercise of two hours each week. This should be a goal for any health-interested person. It usually will require somewhat more intensive exercise than walking, but it still usually can be developed from moderate exercise.

These goals are arbitrary, and you may wish to adopt lower or even much higher goals. But we need benchmarks like these to provide a perspective of the potential benefits. Most men and women who develop either of these 10% or 20% exercise goals at middle age should be able to maintain these goals as they move into older and even to oldest ages.

## **The Heart Theory of Exercise Suggests What Happens**

This Heart Theory, which is described in more detail in chapters following and in Appendix 5, explains much of what has been very puzzling about the research on exercise. As before, it also upsets many past ideas about how exercise develops health benefits.

Our cardiovascular system is in part of muscle. Cardiofitness is a measure of a physical capability that determines how effectively our heart can circulate blood and its nutrients throughout its extensive system of arteries, veins and capillaries. The Heart Theory holds that cardiofitness develops from the building of heart muscle by the same process that strengthens other body muscles such as those in arms and legs. This concept is not new. What is new is the specific way that cardiofitness develops – or will not develop usefully – from different kinds of exercise. A higher blood flow developed throughout the cardiovascular system provides a higher exercise intensity similar to that produced by the lifting of more weight in a weight-

lifting program. Muscle builds from the added blood flow in the cardio system and duration of this higher blood flow. Muscle builds similarly from the weight size and number of repetitions of lifting it in a resistance exercise program.

Physical strength develops from high-intensity exercise for some useful time each week. Cardiofitness tends to develop similarly from the highest intensity of heart and cardiovascular exercise maintained for two hours per week. Heart and cardiovascular exercise produced by higher than usual flows of blood both strengthens the heart muscle and enlarges cardio blood vessels and keeps them more open.

There are limits to the rate at which muscles can improve in capability. You can increase strength from weightlifting only gradually. More than 3 sessions of lifting a given weight a useful number of repetitions per week usually will accomplish no further benefit. In order to increase strength you have move steadily to larger weights.

Cardiovascular muscle acts in the same way. Doing more than about two hours of this cardiovascular exercise each week at the same intensity cannot improve the cardiovascular system any faster. More about this is in Appendix 3 and Appendix 5.

## Some Observations about Walking Pace

My wife and I have enjoyed many cruises. They provide a fascinating opportunity to watch people walk, either on the promenade deck that provides for general walking around the entire ship or on the smaller exercise track usual on a top deck. The number of laps per mile usually is shown. A dozen serious walkers on the top deck in the morning before breakfast on our most recent cruise were averaging 4.5 mph. I was doing my maximum rate of 4.7 mph (at two to three times the age of the others) and two fit younger women passed me probably going about 5 mph.

Later in the day many dozens of the ship population were walking around the wide promenade deck. At 4.7 mph I was racing past nearly all of the men and women walking there then. Many and probably most were not walking fast enough to improve their health very much. It seems unlikely that these people ever heard the message about the benefits of walking faster.