But of course, exercise wouldn't help me!—physical conditioning for patients and normal subjects

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INTRODUCTION

The increased capacity for physical work and the feeling of well-being which result from regular exercise are not the prerogative of the young and healthy. Regular exercise offers potential health benefits for large numbers of people including many with chronic disease (Grimby and Höök, 1971; and Fentem Bassey, 1978).

I imagine that this will come as something of a surprise to many people since popular awareness of the relationship between exercise and health is limited to the debate on whether or not regular exercise affords protection from coronary heart disease. In fact, I propose to say very little about the influence of regular vigorous exercise on mortality and morbidity due to ischaemic heart disease. Instead, I propose to describe the mechanisms whereby training reverses the effects of immobility and to illustrate why this is beneficial. I shall often refer to the place of exercise in the rehabilitation of patients. This has the advantage that the patients show exaggerated versions of the same phenomena as occur with 'normal' people. It also emphasises the essential similarity between the 'trainability' of the normal person and of the patient with a stable, physical impairment, underlining the fact that regular exercise can help far more people than one might at first expect.

Coronary heart disease

There is a considerable amount of evidence which strongly suggests that regular, vigorous exercise of an aerobic or 'endurance' nature reduces the likelihood of death from a heart attack. Recent reviews of the evidence include those by (i) the Joint Working Party of the Royal College of Physicians of London and the British Cardiac Society (1976), (ii) Froelicher (1977), (iii) Morris (1979), and
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(iv) Clarke (1979). Nevertheless, it seems that the lack of exercise, considered alone, is a relatively weak risk factor for coronary heart disease and that other factors, such as obesity and smoking, are much more important. What this argument does not take into account, however, is the fact that the probable beneficial effect of exercise may well be enhanced by its various proven effects on several of the other risk factors. For example, exercise (especially in combination with diet) is helpful in weight reduction (e.g. Moody et al., 1969; Editorial, 1976; Sidney et al., 1977).

Despite the great weight of evidence in favour of a protective effect of exercise against coronary heart disease, it has to be admitted that the evidence is all imperfect. This is where we have to be prepared to be realistic and accept that the perfect controlled trial of exercise in the prevention of coronary heart disease (with all other potential risk factors kept constant and with a large enough number of subjects to ensure statistically significant results) will never be done. We must act on such evidence as we have. My judgement is that there is sufficient evidence in favour of a protective effect of exercise to justify advocating the adoption of a more vigorous lifestyle by most of the population.

Guaranteed benefits of exercise

Regular exercise reduces the likelihood of death from coronary heart disease; it in no way affords absolute protection. Merely reducing the likelihood of a disaster (which might not happen anyway) at some, unspecified time in the future is a poor way to motivate people to take more exercise. Health educators should ‘sell’ exercise much more positively. They should concentrate on the immediate benefits which can be guaranteed to accrue from regular vigorous exercise. These all derive from the fact that physical training reverses the physiological effects of immobility. This applies equally to patients immobilised by doctors, patients immobilised by their own reactions to their symptoms (figure 5.1), and to ‘normal’ people immobilised by their lifestyle.

Regular exercise of the appropriate type, can produce changes in a variety of different body systems. For example, as I shall discuss in more detail later, the capacity of the ‘oxygen transport system’ increases. One can also demonstrate increases in muscle strength, joint mobility, co-ordination, and the strength of bones, tendons and ligaments. These are all areas in which impairment of function is commonly associated with increasing age. Regular exercise cannot halt the march of time but it can do much to postpone disability. Even the control of maturity-onset diabetes mellitus may be simplified by an increased level of daily physical activity, so that hypoglycaemic drugs may be unnecessary.

IMMOBILITY, TRAINING AND THE PHYSIOLOGY OF THE OXYGEN TRANSPORT SYSTEM

The ‘oxygen transport system’ is the collective name given to all the processes