Leaders

Exercise in old age: time to unwrap the cotton wool

To some the concept of promoting exercise and other lifestyle changes in old age is bizarre. Skeptics argue that, as many of the chronic degenerative diseases have their origins much earlier in life, realistic opportunities have been comprehensively missed. Furthermore, although it is well known that people with lower health risks tend to live longer, some contend that promoting healthier lifestyles in old age may result in an expanding population of frail dependent old people. The fear is that healthier habits in later life may actually increase morbidity (and health care costs) by increasing the number of years survived with chronic illness and disability. However, this view has been challenged by the results of an extraordinary longitudinal follow up study of people graduating from the University of Pennsylvania in 1939 and 1940.[1] It showed that smoking, body mass index, and exercise patterns in midlife and late adulthood are predictors of subsequent disability. Not only did people with better health habits survive for longer, but the age at onset of disability was postponed and compressed into fewer years at the end of life.

Demonstrating that exercise can be beneficial in old age is, however, less difficult than persuading people to be physically active. Two major obstacles exist. The first is the common misconception that, to reap health benefits, vigorous continuous exercise is necessary. This misunderstanding can be traced to recommendations derived from studies of the effects of endurance exercise training in younger adults. These recommendations were disseminated in terms so complex, scientific, and prescriptive that for many sedentary and elderly people the notion of exercise and physical fitness became meaningless. However, a reassessment of this evidence has shown that most health benefits could be gained at lower doses of physical activity.[2] It is regrettable that, despite this recognition, public health advice has failed to shake off the "high-tech" lycra clad image of aerobic exercise and physical fitness, and embrace the concept of health and physical activity—walking, dancing, gardening, or playing with the grandchildren. The effectiveness and acceptability of this approach has been shown in a clinical trial in sedentary adults in which a physical activity intervention proved as effective as a structured exercise programme in improving activity levels, cardiorespiratory fitness, and blood pressure.[3] The main attraction of the physical activity approach is that, although to adopt and maintain a moderate level of physical activity is within the reach of many elderly people, the prospect of vigorous exercise is a major turn off.[4] Old people are more likely to be motivated to be active when they appreciate that the benefits are likely to be reflected in their health and in preserving their functional capacity.

The second major obstacle is the exaggerated fear, mainly in the minds of the medical profession, of the risks of physical activity in old age. The sedentary state has become so all pervasive that we have lost sight of the fact that physical activity is part of normal, reasonable, health enhancing behaviour across the age spectrum. Inactivity in old age is reinforced by stereotypical views on the inevitability of decline with aging and on a lack of understanding of the trainability of even very elderly muscles. The dangers of the sedentary state in old age were highlighted by a study of institutionalised elderly people in which the functional capacity of a control group of sedentary residents deteriorated measurably in just six months, while a seated exercise programme for 30 minutes twice a week resulted not just in preservation of function, but in some restoration of lost function.[5] An extensive literature on exercise studies in elderly people now exists and is notable for its absence of reports of serious adverse events. Although safety is of paramount importance, several exercise studies in institutionalised frail elderly people have been conducted safely, applying no exclusions on pre-morbid medical condition, medication, or any other basis.[5,6] In addition, the University of Dundee's over 60s exercise class, for example, attracts 1000 pensioners each week, and also operates on a no screening, no disclaimer, all comers accepted basis.[7] Twenty years of experience accounting for more than 500 000 hours of pensioner exercise time has been accrued without incurring a serious adverse event. This inclusive approach contrasts with other workers whose screening procedures and criteria for exclusion were such that 43% of old people wishing to join an exercise research programme were excluded.[8] Unfortunately the medical profession has so far devoted too much of its energy to finding reasons why older people should not exercise, and too little to why they should. If an activity is not provoking symptoms, it is very unlikely to be doing harm. Elderly people should not be discouraged from continuing with, or adopting, activities that are enjoyable, as enjoyment is the single strongest predictor of adherence to an activity programme.

Compelling evidence exists of the benefits of regular physical activity in old age. Despite this, many health professionals lack the skills, knowledge, inclination, and reimbursement to routinely counsel old patients about physical activity, although this has been shown to be effective.[9] Elderly people must be informed that regular physical activity is both appropriate and desirable in old age, and the older community should be involved in developing a range of services and facilities to back this up. Imaginative partnerships between leisure and recreation facilities, parks departments, and town planners are required to make changes in our social and physical environment to ensure that it is a safe and attractive place in which to be active. It is of concern that some elderly people live in care settings in which physical activity is an unfamiliar or even a frightening concept, and initiatives are urgently required to change attitudes in hospitals, homes, sheltered housing complexes, and day care centres. A public health approach to an aging society is long overdue and should explore opportunities and incentives for healthy lifestyles.

Conflict of interest: METM is co-director of D D Developments, a University of Dundee company, the mission of which is to provide exercise classes for older people, and the profits of which support research into ageing and health.

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Perpetuating ignorance: intravenous fluid therapy in sport

Intravenous fluid therapy is quite often advocated as the essential component in the management of athletes requiring medical care after prolonged exercise.[1–4] It is presumed that such fluids are essential for the rapid reversal of the dehydration that is the principal cause of their condition. The basis for this belief has been challenged elsewhere.[5–10] Two articles in a recent issue of this journal invite the renewal of that debate and specifically pose the question: what is the role of acute intravenous fluid therapy in sport?

In the first paper, Herfel *et al*[11] report the iatrogenic development of acute hyponatraemia in a college football player who had initially presented to a doctor complaining of leg cramps after a football practice. Presumably because he believed that dehydration, hypoglycaemia, or sodium depletion, or all three, cause exercise related muscle cramps, the doctor prescribed treatment with a total of 8 litres of intravenous and oral fluid, 3 litres by mouth and another 5 litres of 0.45% saline with 5% dextrose intravenously over a five hour period. The duration of the football practice, the player's weight and playing position, the nature of the day's practice, and the prevailing environmental conditions are not reported. This information would help in predicting the likely sweat rates and fluid losses and hence the probable level of dehydration incurred by the player.

If dehydration is indeed the main cause of exercise related muscle cramps, the first clinical question requiring attention is: what is the probability that this football player could have sustained an 8 kg weight loss during the football practice and hence require the relatively rapid replacement of 8 litres of fluid after exercise?

Sweat rates as high as 1000–1750 ml per hour have been measured in athletes involved in continuous exercise of moderate to high intensity,[12] with the higher values typically occurring in runners in the humid conditions prevalent in many Asian countries and in the summer in the Southern United States, where this football player trained. Conceivably, heavy players practising an intermittent sport like American football in hot humid conditions while wearing football uniforms may also achieve such high sweat rates. Hence, to have become dehydrated by 8 litres, this particular athlete would have had to have practiced for between four and a half and eight hours without ingesting any fluid. Doctors knowledgeable of that game would be better able to judge whether or not this is a common or likely occurrence in college football in the United States. It seems unlikely that a college football player would not drink during training, given the frequently asserted injunction that all athletes should ingest fluid frequently and in large volumes during exercise, especially in the heat.[13]

The point is that those who choose to give fluids intravenously to athletes should have at least some idea of the likely fluid losses that athletes involved in different sports will incur, so that the volumes prescribed are likely to be reasonable and appropriate.

For example, the highest levels of dehydration reported in marathon runners, competing in races in which fluids are not freely available, are usually of the order of 4% of body weight.[12] Accordingly, if intravenous fluid therapy is considered desirable, there would seldom be any justification for giving much more than 1–2 litres of fluid to endurance athletes, equivalent to 2–4% body weight in 50–70 kg athletes.

In fact the magnitude of the iatrogenic fluid overload in the football player described by Herfel *et al*[11] can probably be estimated from the data provided. Our study[14] found a linear relation between the serum sodium concentration and the degree of fluid overload in ultramarathon runners with severe symptomatic hyponatraemia. In that study a serum sodium concentration of 121 mmol/l, as measured in this football player, was associated with a minimum fluid excess of about 4 litres. This suggests that the football player with muscle cramps probably lost about 4 litres of fluid during his practice, suggesting a likely practice time of about two and a half hours, if no fluid was ingested during the practice. Oral fluid therapy of a maximum of 4 litres during recovery would therefore have been the more appropriate therapy for this player.

The most likely reason why iatrogenic hyponatraemia occurs under these circumstances is because the patient's response to treatment is monitored so that fluid continues to be administered until the primary condition resolves. Thus, if the condition fails to respond to treatment, the natural response is simply to give more of the same. However, the more astute clinician would be forced to ask whether a failure to respond to treatment may indicate that the prescribed treatment is inappropriate for the specific condition being treated. This then raises the next relevant question: what evidence is there that muscle cramps (or indeed any of the so called exercise related "heat disorders") are due solely and exclusively to dehydration so that fluid therapy is the sole reasonable form of treatment?

As reviewed in detail elsewhere,[7 8] there is no published evidence whatsoever that muscle cramps are due to dehydration, or that dehydration is an important causative factor in either "heat exhaustion"—an inappropriate term because athletes with this condition do not show any evidence of excessive heat retention,[7 8 15] but are more probably incapacitated by a posture related hypotension that develops on the cessation of exercise—or even in heat stroke. Thus weight loss during exercise is no greater in runners chronically prone to exercise induced muscle cramping and who develop cramps during ultramarathon races than it is in control runners who do not cramp.[16] Nor is there any published evidence that cramps are related exclusively to dehydration in any setting yet described.[8] Rather, muscle cramps are probably related to neurological changes that develop as a result of exercise related neuromuscular fatigue.[17 18]