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Editorial

Aerobic exercise effect on the elderly functional capacity

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Aging is a natural process affecting all biological systems. The aging process is viewed as a progressive decline in health with an increased likelihood of morbidity. Successful aging is a function of both genetic and environmental factors (1). The primary aging process, itself genetically associated, occurs both independently of life style and in the absence of disease (2). Accordingly, one may expect maximal cardiac output to decrease with aging irrespective of lifestyle because of genetic factors. Reduced arteriovenous oxygen difference at maximal effort (3) is the second factor associated with decrease with aging of maximal oxygen uptake.

Apart from genetic endowment, an individual must also interact with environmental factors associated with longevity. One of these factors includes maintaining high level of physical activity (4), whereby an individual increases the level of physical activity above what is required for normal daily activity.

There is growing evidence from longitudinal and cross-sectional studies that chronic endurance training will attenuate the decline in maximal oxygen uptake associated with age (2). In addition, the importance of aerobic exercise as a tool to reduce the risk of various chronic degenerative diseases has been conclusive established in the last 30 years. Moreover, fitness level can be a true marker of regular physical activity.

Physical fitness is composed of various components such as: cardio-pulmonary capacity, body composition, flexibility, muscular strength and endurance. With increasing age, at the sixth or seventh decades of life, muscle mass of humans is decreased significantly (5).

This reduction in muscle mass is a major factor in the decline of maximal oxygen uptake, indicating the cardiopulmonary fitness of the individual (6), bringing about a reduction in physical performance (7). Such myocardial and peripheral functional changes include a decline in the maximum heart rate, stroke volume, and contractility, and an increase in peripheral vascular resistance. Consequently, the maximal oxygen uptake decreases.

Incremental exercise is characterized by exposing the subjects to a high degree of load which may alter the left ventricular contractility and function (8). This has the effect of placing a large load on the left ventricular which might have significant effects on oxygen delivery to the working muscles.

Untrained and trained elderly can increase the response of the cardio-pulmonary without a significant reduction in peripheral ability to extract oxygen at the muscle level. It was found that in elderly subjects, skeletal muscle mitochondrial capacity, tissue blood flow capacity, and oxygen exchange capacity appear to be well matched. It seems that intrinsic mitochondrial function and regulation are not altered significantly. Therefore, the higher aerobic capacity in the trained elderly is related to increases in the abilities of cardiovascular factors following training and to the lesser extent to increases in muscle mitochondria concentration and capillarity (9).

The fundamental question is whether older subjects need to undertake high intensity exercise to show significant endurance training adaptations and health benefits. Unfortunately, some elderly subjects are not able to exercise at high intensity due to disease. Since exercise intensity and exercise duration are related, the right strategy for the above mentioned individuals to benefit from exercise is to reduce the exercise intensity and compensate by increasing exercise duration.

To date, little information is available on the effect of the reduced exercise intensity and the increased exercise duration during endurance training has on the health and fitness of the elderly. It is possible that elderly subjects may not need to and undertake high risk, high intensity endurance exercise training, if health and fitness benefits can be achieved by increasing exercise duration.

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