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COMMENTARY

COMBO exercise training for JUMBO benefits

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With the rapid growth and popularity of fitness gyms and workout facilities in recent years, increasing numbers of people engage in exercise programs that incorporate various types of physical activity for health and fitness reasons. This trend is a deviation from the traditional routine of physical activity that emphasizes a single type of prolonged, rhythmic physical activity (for example, walking, running or cycling). This newly popularized 'hybrid' approach is consistent with the current exercise recommendations to include various elements of physical activity to enhance overall physical fitness and to reduce the risk of functional disability and degenerative disease.[1] Despite the popularity of this hybrid approach among exercise enthusiasts, research evaluating its effects on cardiovascular health is limited. The available research studies have focused on a single mode of exercise to evaluate the effect of one particular form of physical activity. From a research design and methodology standpoint, this is a reasonable investigational approach; exercise programs that include multiple modes of physical activity do not allow the beneficial effect to be teased out and attributed to a single mode of physical activity. However, this approach provides no insight into the effects of 'cross-training', which is becoming increasingly popular. A lack of research in this area may be attributed to the assumption that a combination of various exercise programs would produce additive or synergistic effects. However, such presumption may not be valid. For example, endurance training may attenuate the increase in muscle strength achieved by simultaneously performed resistance training.[2] In addition, some evidence indicates that long-term endurance training may be associated with reduced flexibility.[3]

In this issue of *Hypertension Research*, Kawasaki *et al.*[4] report on their investigation of the effects of a 6-month comprehensive exercise program on multiple risk factors for cardiovascular disease in 57 middle-aged and older adults. Exercise was performed twice a week and consisted of 5–10 min of stretching, 20 min of cycling, 10 min of strength exercise, 40 min of walking in the pool (that is, aquatic exercise) and 20 min of swimming. In some ways, the concentrated effort to cluster workouts on a given day resembles the exercise routine of weekend warriors and gym rats. Despite the long exercise duration in this program (>2 h per session), the exercise compliance/adherence rate was very high (~90%). This compliance rate is impressive considering that previous exercise intervention studies of a similar duration have typically reported subject dropout rates of ~50% from the supervised exercise programs.[5] The inclusion of various exercise programs may have overcome the boredom that subjects often experience and enhanced subjects' enjoyment of the exercise and thus increased adherence to the exercise routine.[6]

The comprehensive exercise program utilized in the study by Kawasaki *et al.*[4] produced a multitude of beneficial effects in middle-aged and older adults (Figure 1). Systolic and diastolic blood pressures were lowered by 10 and 4 mm Hg from the baseline levels of 138/87 mm Hg. The reductions in arterial blood pressure were strongly associated with corresponding decreases in brachial–ankle pulse wave velocity, an index of central arterial stiffness that is widely used in routine clinical settings in Japan.[7] Body weight and body fat decreased slightly but significantly. Both blood glucose and hemoglobin A1c levels decreased, and postural balance improved. These changes were not present in the control group, who remained sedentary throughout the study duration. One interesting finding of this study is the significant decrease in plasma total- and high-density lipoprotein-cholesterol concentrations. In contrast to the prevailing notion, exercise training, at least training involving land-based exercises, does not lower plasma cholesterol concentrations (although elevations in high-density lipoprotein-cholesterol are found fairly consistently in exercise intervention studies).[8] Interestingly, swimming exercise interventions appear to lower plasma cholesterol concentrations.[9] The reduction in plasma total- and low-density lipoprotein-cholesterol concentrations could result from the swimming and/or water-based exercises that were incorporated in the exercise program utilized in this study.

Swimming is a very attractive form of exercise. It is a non-weight-bearing activity and can alleviate the stress placed on joints. As such, it is a suitable activity for people with arthritis and joint problems, conditions that are highly prevalent in older and/or obese adults. Because the body is immersed and surrounded by water, which has high thermoconductivity, the incidence of heat exhaustion is extremely low. Indeed, in many countries, swimming is one of the most popular and most prevalent modes of physical activity. This is certainly the case in Japan, where the present study was conducted. Swimming pools are an integral part of most fitness gyms in Japanese urban areas, and swimming is part of the required physical education curriculum in most elementary and middle schools in their public education system. Although swimming was only one of the multiple physical activity components in this study, this study is one of the few exercise intervention studies to include swimming and/or aquatic exercise when evaluating the effects of long-term, habitual exercise on cardiovascular health.[9] Thus far, swimming has been widely promoted and prescribed

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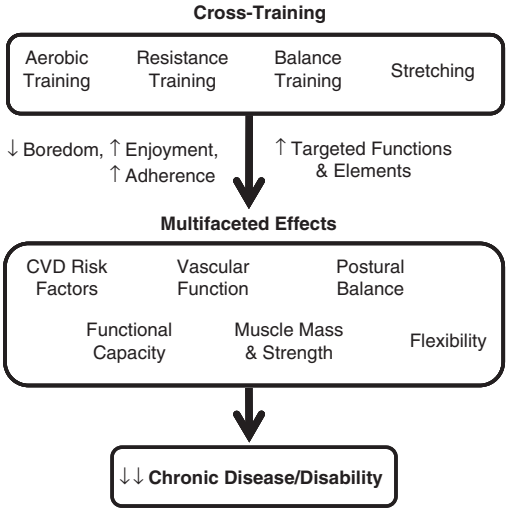

Figure 1 Multifaceted effects of cross-training on disease and disability risks. CVD, cardiovascular disease.

without a scientific basis in clinical studies. These recommendations have been generated primarily from unfounded extrapolation of the data on other modes of exercise (for example, walking and cycling). There is no question that additional research should focus on the effect of swimming and/or aquatic exercise on cardiovascular health.

Exercise prescription requires a careful selection of the appropriate modality and dosage of exercise for achievable goals. In the case of older adults, however, this targeted approach may be inappropriate and inefficient. Older adults demonstrate a variety of deficits and risk factors that may require multiple preventive and treatment modalities.[10] For example, regular aerobic exercise has no impact on muscle mass and strength in middle-aged and older adults, and only resistance training appears to be effective in reducing the incidence of sarcopenia. On the other hand, resistance training is not effective in improving maximal aerobic capacity.[2] Exercise programs for middle-aged and older adults should be multifaceted and constructed to improve overall physical fitness, including cardiovascular health, functional capacity, balance and flexibility. Clearly, additional exercise intervention studies like the one conducted by Kawasaki *et al.*[4] are needed to evaluate the efficacy of 'cross-training' for overall cardiovascular health.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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