



INTERVAL WALKING TRAINING TO PREVENT AGE-ASSOCIATED DECLINES IN PHYSICAL FITNESS AND LIFESTYLE-RELATED DISEASES

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Abstract

Exercise training over a life is important to prevent deterioration of physical fitness with aging and age-associated diseases; however, no exercise training regimen with high adherence and effectiveness in middle-aged and older people is broadly available in the field. Against these problems, we have recently developed an exercise training system composed of two formats: 1) interval walking training (IWT), repeating a set of fast and slow walking [$\geq 70\%$ and $\sim 40\%$ peak aerobic capacity for walking ($\dot{V}O_{2\text{peak}}$), respectively] for 3 min each, ≥ 5 sets/day, ≥ 4 days/week, and 2) an IT network system, tracing energy expenditure via the internet during IWT. We found that the 5-month IWT, with 95% adherence rate, increased physical fitness and improved the symptoms of lifestyle-related diseases (LSDs) by 10-20%, not less than the effects by the exercise training at a gym using machines, treadmill and cycle ergometer, that requires more personnel and financial supports. Next, we evaluated the adherence to and effects of the IWT program over a longer time frame. The adherence over 2 years averaged 70% and was highly correlated with a 13% reduction in the LSD score and with a 12% increase in $\dot{V}O_{2\text{peak}}$. Moreover, in subjects who continued the training over 10 years (20% of the initial subjects), the increased $\dot{V}O_{2\text{peak}}$ was maintained over 10 years, while $\dot{V}O_{2\text{peak}}$ decreased by 20% over 10 years in an age-matched, cross-sectional control group. Finally, since the IWT program is simple and constant intervention for a long period, we successfully evaluated factors affecting the adherence to and effects of the IWT program, such as gene polymorphisms and macronutrient supplementation. Thus, we have developed a training system comprising IWT and an IT network that can attenuate age-associated declines in physical fitness for a long period. Moreover, by incorporating the factors enhancing the adherence and effectiveness into the system, the regimen can be accepted by a larger population of people through their lives.

Key words: aging, exercise training, genetics, home-based training, protein supplementation

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Education & Professional Experience

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- 2003.10-2005.9: Postdoctoral Research Fellow, Dept of Anesthesiology, Mayo Clinic and Foundation, Rochester, MN, USA (*She worked with Prof. Michael Joyner*)
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Research Interests

- Exercise and cardiovascular physiology
- Central pressor responses mediated by vasopressin V1a receptors
- Exercise training to protect against age-associated diseases
- Genetic polymorphisms and adherence to and effects of the exercise training program
- Nutritional supplements to enhance exercise training effects

Recent Honors and Awards

In 2016, she was designated particularly outstanding young researcher, "Rising Star Researcher" at Shinshu University.