四　第 2 回北京国際運動医学会
—— 1993年11月　北京 ——

Heart Rate Response to Constant, Relative Submaximal Work Load in Middle-Aged Women

Takeshi Matsui, Toshihiro Ishiko*, Yoshio Kondo**

Abstract

The present study aimed at clarifying the effects of aging on responses of heart rate (HR) during adaptation and recovery periods to the standard exercise. Twenty active middle-aged women (50±4.4 years) participated as subjects. The data were compared with those of 9 active young women (22±3.5 years). The standard exercise consisted of pedaling at 50 rpm on a cycle ergometer for 6 min followed by 5 min-recovery. Two submaximal exercise tests were performed and the loads were set at 70% and 90% of maximal HR (HRmax). Heart rate was measured continuously every 10 sec through the test. From these HR recordings, HR curve of 80% HRmax was interpolated and the dynamics were calculated in the following indices: heart rate increase during exercise phase (ΔHRe), time constant of HR curve during exercise phase (τ_e), increasing speed of HR at τ_e (Acceleration Index: AI), heart rate decrease during recovery phase (ΔHRr), time constant of HR curve during recovery phase (τ_r), decreasing speed of HR at τ_r (Deceleration Index: DI).

As a result, τ_e was significantly longer in the middle-aged group than in the young one (74.45±16.64 sec vs 50.44±12.60 sec, $p<0.001$), but AI was significantly smaller in the former than in the latter (0.45±0.13 beats·min^{-1}·sec^{-1} vs 0.70±0.21 beats·min^{-1}·sec^{-1}, $p<0.001$). There was no significant difference in ΔHRe between the groups (50.53±8.51 beats·min^{-1} vs 52.36±6.45 beats·min^{-1}). Difference in τ_r was not significant (65.45±13.76 sec vs 56.27±12.31 sec), while DI was significantly smaller in the middle-aged group (0.56±0.11 beats·min^{-1}·sec^{-1} vs 0.78±0.17 beats·min^{-1}·sec^{-1}, $p<0.001$). Absolute value of ΔHRr was smaller in the middle-aged group (−56.65±7.90 beats·min^{-1} vs −67.22±8.64 beats·min^{-1}, $p<0.01$). These results showed that HR adaptation and recovery to an exercise load in the middle-aged women were delayed by approximately 36~48% and 16~28% respectively compared to those in the young women. It is concluded that these delayed HR responses should be well considered in exercise prescription to person over middle-aged and aged persons.

Key words : heart rate response, submaximal exercise, middle-aged women
キーワード：心拍応答，最大下運動，中年女性