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Session E-44 - Late-Breaking Abstracts

Different Adaptation Patterns To Aerobic Training Despite Similar Performance Improvements

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Disclosures

Y. Seo: None.

Abstract

PURPOSE: Aerobic training improves exercise performance through multiple physiological adaptations, including changes in maximal capacity and ventilatory thresholds (VT1). However, the relative contributions of submaximal efficiency versus threshold-related adaptations remain unclear. Therefore, this study examined inter-individual variability in VT1 responses after 8-week training and identified baseline predictors of training responsiveness.

METHODS: Eleven healthy young adults (age: 23.7 ± 2.6 yr; BMI: 25.0 ± 3.1 $kg \cdot m^{-2}$; body fat: 20.2 ± 5.9%; VO_2max: 49.2 ± 6.2 $mL \cdot kg^{-1} \cdot min^{-1}$) completed an 8-week aerobic training intervention.

VT1 was determined using the ventilatory equivalent method (VE/VO_2). Participants were classified as Responders (R, n

= 5) or Non-Responders (NR, n = 6) based on changes in VT1 (ΔVT1). A logistic regression model was constructed using baseline BMI, age, and initial VT1 to predict training responsiveness.
RESULTS: VT1 significantly improved across participants, with substantial inter-individual variability. The logistic regression model identified BMI as a strong negative predictor of responsiveness (β = −0.459). Although both groups significantly increased exercise duration after training (p = 0.030), the underlying physiological adaptation patterns differed according to baseline status. NR increased from 709 ± 52.7 s to 795 ± 111 s (Δ86.3 ± 109 s), while R improved from 729 ± 50.1 s to 771 ± 30.4 s (Δ42.2 ± 50.9 s). At baseline, NR exhibited higher BMI and lower metabolic efficiency, reflected by a higher baseline energy expenditure (EE) slope (0.1949 ± 0.02) compared with R (0.1602 ± 0.01; p = 0.082). Following training, NR showed greater improvements in EE slope (Δ0.0115 ± 0.02), whereas R showed minimal change (Δ0.0001 ± 0.01).
CONCLUSIONS: Aerobic training adaptations differ according to baseline physiological status. Individuals with lower BMI and lower baseline VT1 demonstrated a significant VT1 improvement. In contrast, individuals with higher BMI and higher baseline VT1 exhibited an exhibited improvements in energy efficiency without significant changes in VT1. These findings suggest that the logistic equation may serve as a preliminary screening tool for identifying individuals who are more likely to benefit from similar training programs.