

DISCONTINUOUS AEROBIC TRAINING IS AN EFFECTIVE ALTERNATIVE TO CONTINUOUS AEROBIC TRAINING FOR IMPROVING FLOW-MEDIATED DILATION

Abstract

Introduction: Cardiovascular disease is a deleterious condition characterized by decreases in blood flow. Exercise has been shown to be an effective measure against endothelial dysfunction by improving the substrate ability for vasodilatation; however many aging adults have difficulty meeting the recommended levels of aerobic activity when performed continuously. Recently, discontinuous exercise has shown decreases in arterial resistance comparable to continuous exercise, yet a paucity of literature exists for direct mode comparisons.

Purpose: The purpose of this study was to examine the oxygen uptake and forearm flow-mediated dilation (FMD) differences in continuous (CON) versus discontinuous (DIS) exercise in healthy adults.

Methods: Forty-seven low-risk men and women between the ages of 18 and 57 were recruited (CON 36.7±2.9 years, 8M, 15 F; DIS 37.2±2.8 years, 9 M, 15 F) were randomly assigned to a group prior to baseline testing for VO_{2max} and forearm flow-mediated dilation. Following a one month, wait-list control period the subjects were supervised during a continuous (30 minutes at 70-75% HR_{max}) or discontinuous (3 bouts of 10 minutes of exercise at 70-75% HR_{max}) aerobic protocol. Following 4 weeks of exercise training, the subjects were reassessed according to the same protocol as visits 1 and 2.

Results: Neither group was significantly different from the other at baseline in any of our measures. Both CON and DIS groups demonstrated a significant improvement in VO_{2max} ($p < 0.001$), heart rate max ($p < 0.05$), and both groups showed significant improvements in FMD ($p < 0.001$) and peak FMD ($p = 0.001$).

Conclusion: Discontinuous aerobic training is an effective alternative to traditional continuous aerobic training for cardiovascular health in recreationally trained individuals.

Introduction

Cardiovascular disease (CVD) is the leading cause of global mortality and morbidity and is associated with significant disability and economic costs in excess of \$500 billion (Tarride, 2009).

The progression of CVD is often predicated by endothelial dysfunction, the occurrence of which can be due to aging or sedentary lifestyle.

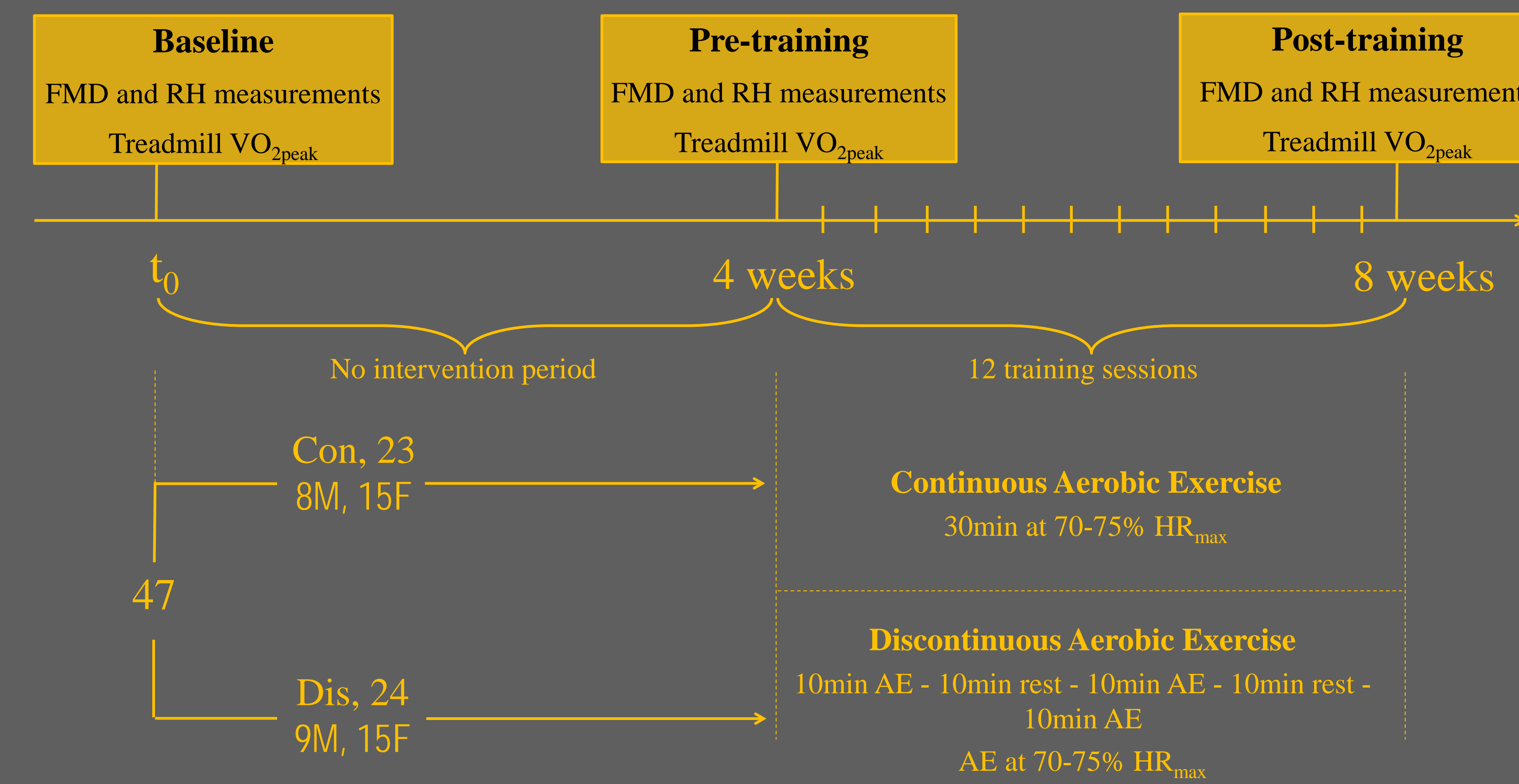
Endothelial-associated vascular dysfunction is an independent predictor of future CVD related events in adults with and without existing CVD (Pierce, 2011).

Regular aerobic exercise (AE) is an effective intervention for improving endothelium dependent vasodilation in the systemic circulation. Continuous (CON) bouts of AE have decreased central hemodynamics, increased endothelial function and vasodilatory capacity in hypertensive, chronic heart failure patients, and healthy individuals (Collier, 2008; Goto, 2003). However, it remains to be shown whether moderate-intensity discontinuous (DIS) AE provides similar enhancements as CON AE at similar intensities and durations.

Methods

Forty-seven subjects were randomly assigned to a CON or DIS group and all subjects were evaluated at baseline for heart rate maximum (HR_{max}), VO_{2peak} , flow-mediated dilation (FMD) and reactive hyperemia (RH). Subjects returned to the lab after a four week control period and were re-evaluated before beginning one month of either CON (30 minutes at 70-75% HR_{max}) or DIS (3 bouts of 10 minutes of exercise at 70-75% HR_{max}) aerobic exercise.

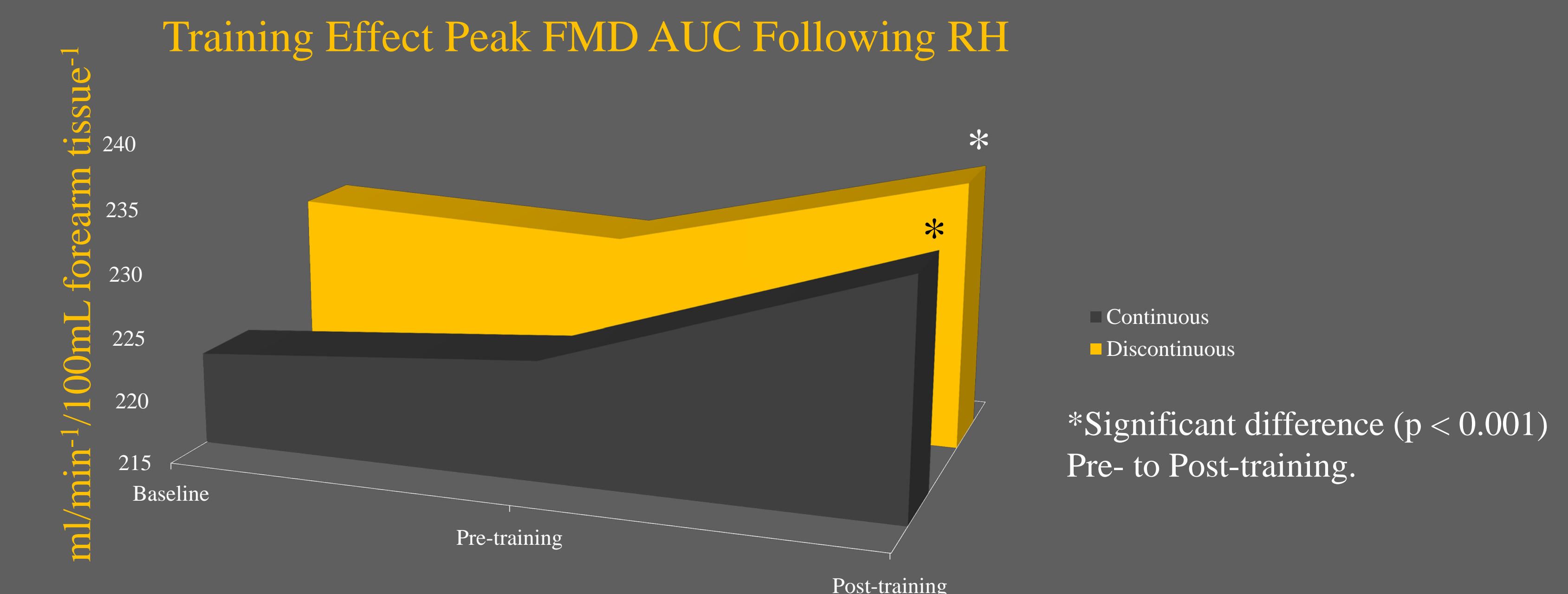
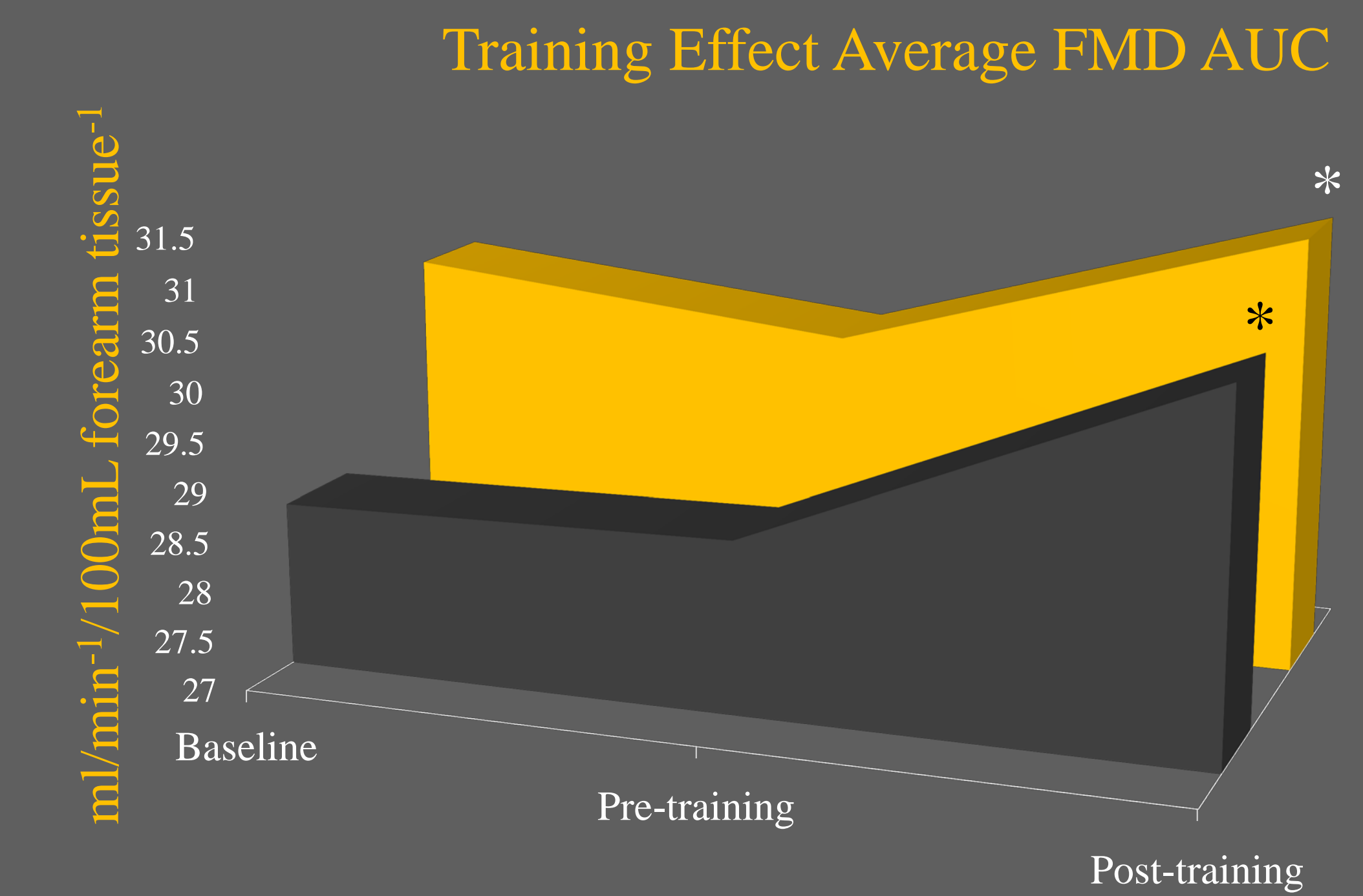
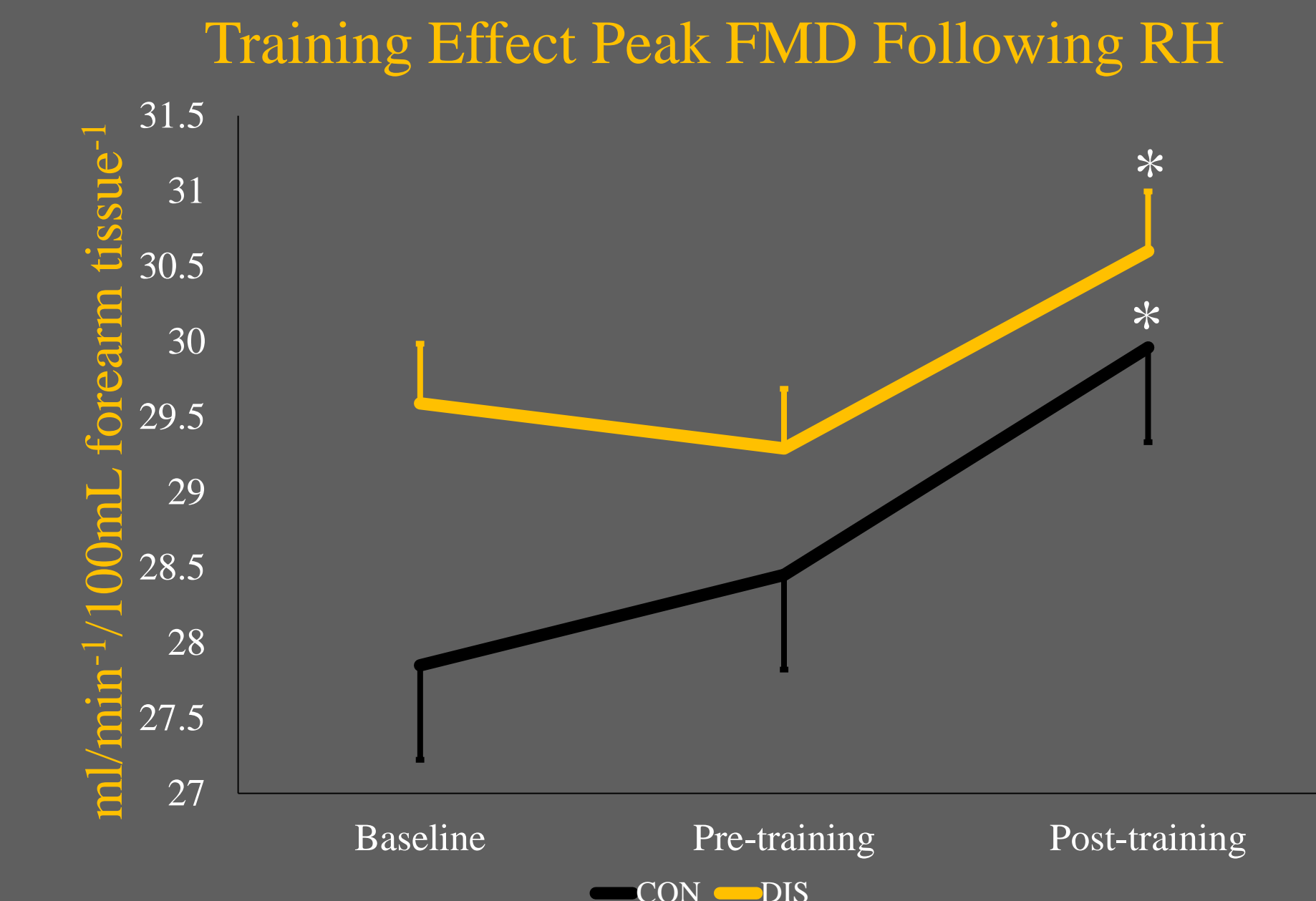
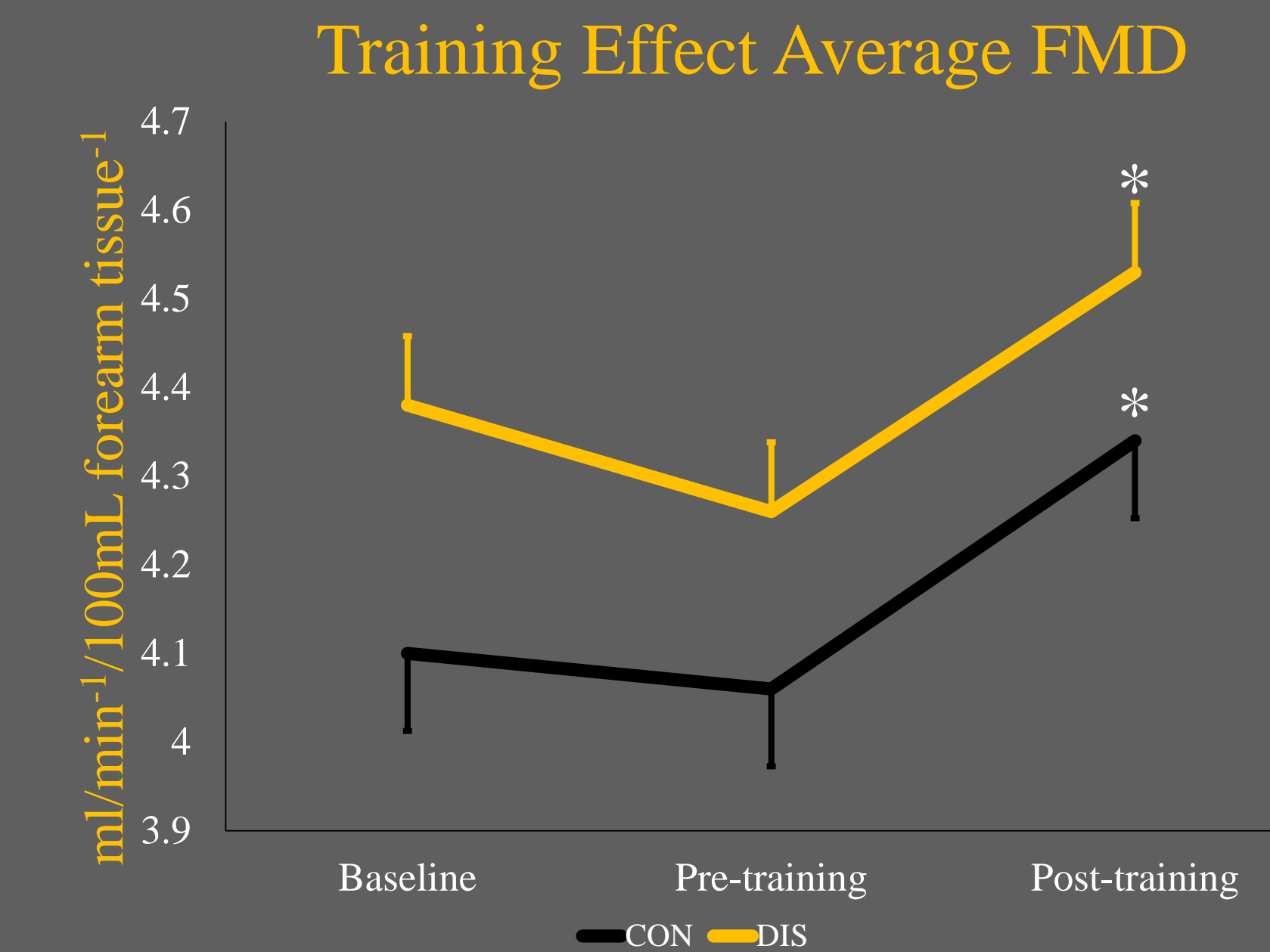
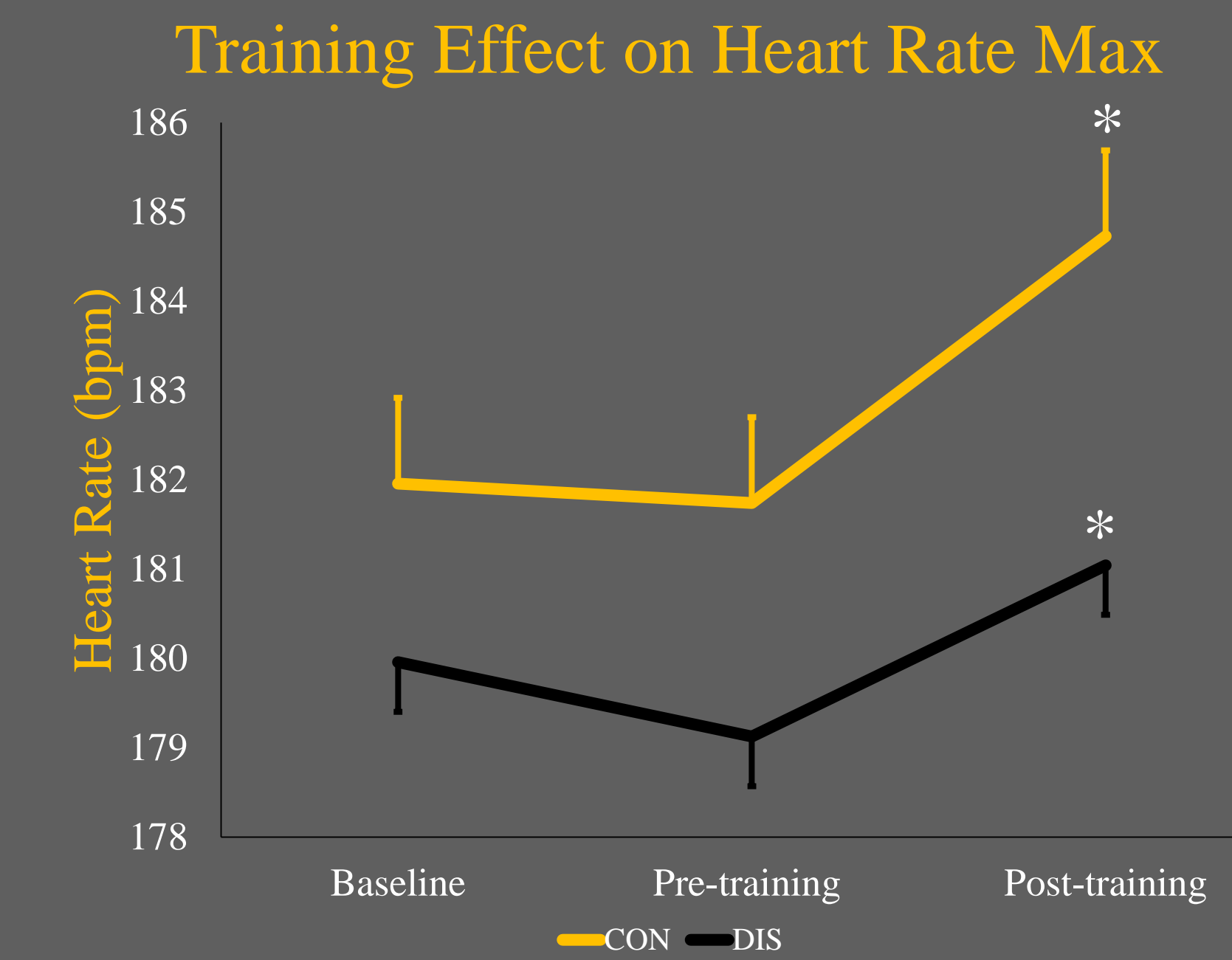
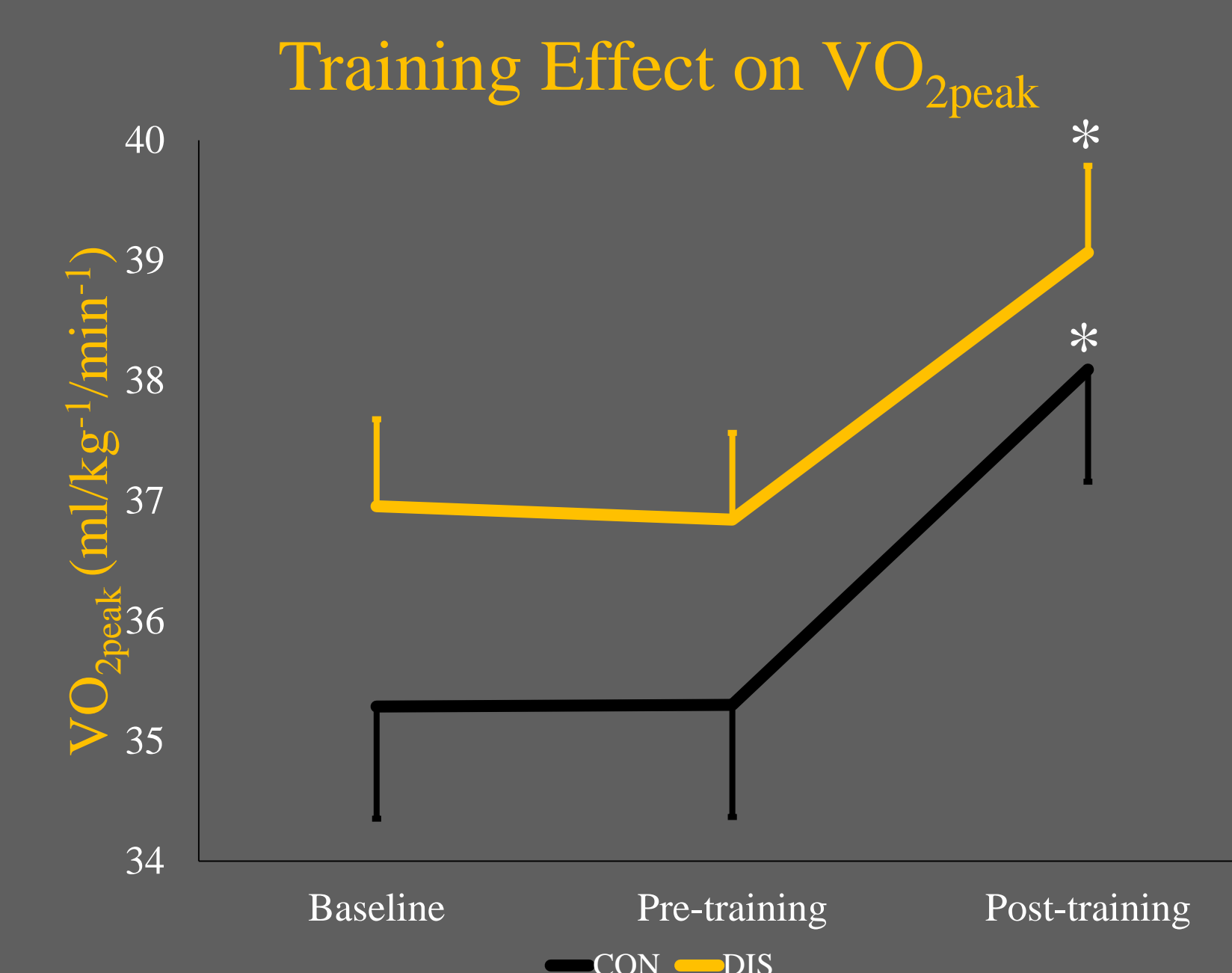
Paired T-tests were used to determine if a significant difference existed between the baseline and pre-training test days (control period), none were found. The pre-testing and post-testing differences were analyzed using a 2-way (group x time) repeated measures ANOVA with a Bonferroni correction.



Results

	Continuous AE (n = 23)	Discontinuous AE (n = 24)
Age (years)	36.74 ± 2.86	37.16 ± 2.76
Height (cm)	171.4 ± 2.89	169.1 ± 3.1
Weight (kg)	71.6 ± 2.63	73.1 ± 2.57
Body fat (%) (pre/post)	26.62 ± 2.27 / 25.88 ± 2.22	22.6 ± 1.7 / 22.47 ± 1.72

Values ± SEM



Conclusion

These data suggest that moderate-intensity discontinuous aerobic training is an effective alternative to continuous aerobic training. Improvements were observed in VO_{2peak} , HR_{max} , flow-mediated vasodilation at rest and following reactive hyperemia in healthy individuals without concomitant fat loss.