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How to Regulate the Acute Physiological Response to "Aerobic" High-Intensity Interval Exercise

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ABSTRACT

The acute physiological processes during "aerobic" high-intensity interval exercise (HIIE) and their regulation are inadequately studied. The main goal of this study was to investigate the acute metabolic and cardiorespiratory response to long and short HIIE compared to continuous exercise (CE) as well as its regulation and predictability. Six healthy well-trained sport students (5 males, 1 female; age: 25.7 ± 3.1 years; height: 1.80 ± 0.04 m; weight: 76.7 ± 6.4 kg; VO_{2max}: 4.33 ± 0.7 l·min⁻¹) performed a maximal incremental exercise test (IET) and subsequently three different exercise sessions matched for mean load (P_{mean}) and exercise duration (28 min): 1) long HIIE with submaximal peak workloads (P_{peak} = power output at 95 % of maximum heart rate), peak workload durations (t_{peak}) of 4 min, and recovery durations (t_{rec}) of 3 min, 2) short HIIE with P_{peak} according to the maximum power output (P_{max}) from IET, t_{peak} of 20 s, and individually calculated t_{rec} (26.7 ± 13.4 s), and 3) CE with a target workload (P_{target}) equating to P_{mean} of HIIE. In short HIIE, mean lactate (La_{mean}) (5.22 ± 1.41 mmol·l⁻¹), peak La (7.14 ± 2.48 mmol·l⁻¹), and peak heart rate (HR_{peak}) (181.00 ± 6.66 b·min⁻¹) were significantly lower compared to long HIIE (La_{mean}: 9.83 ± 2.78 mmol·l⁻¹; La_{peak}: 12.37 ± 4.17 mmol·l⁻¹, HR_{peak}: 187.67 ± 5.72 b·min⁻¹). No significant differences in any parameters were found between short HIIE and CE despite considerably higher peak workloads in short HIIE. The acute metabolic and peak cardiorespiratory demand during "aerobic" short HIIE was significantly lower compared to long HIIE and regulable via P_{mean}. Consequently, short HIIE allows a consciously aimed triggering of specific and desired or required acute physiological responses.

Key words: Intermittent exercise, exercise prescription, acute physiological demand, mean load, peak workload duration

Key Points

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