

## The Impact of Metabolic Stress on Hormonal Responses and Muscular Adaptations

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### Abstract

**Purpose:** The purpose of this study was to examine the impact of exercise-induced metabolic stress on hormonal responses and chronic muscular adaptations.

**Methods:** We compared the acute and long-term effects of an NR regimen (no-rest regimen) and those of a WR regimen (regimen with rest period within a set). Twenty-six male subjects were assigned to either the NR ( $N = 9$ ), WR ( $N = 9$ ), or control (CON,  $N = 8$ ) groups. The NR regimen consisted of 3-5 sets of 10 repetitions at 10-repetition maximum (RM) with an intersets rest period of 1 min (lat pulldown, shoulder press, and bilateral knee extension). In the WR regimen, subjects completed the same protocol as the NR regimen, but took a 30-s rest period at the midpoint of each set of exercises in order to reduce exercise-induced metabolic stress. Acute hormonal responses to both regimens were measured followed by a 12-wk period of resistance training.

**Results:** Measurements of blood lactate and serum hormone concentrations after the NR and WR regimens showed that the NR regimen induced strong lactate, growth hormone (GH), epinephrine (E), and norepinephrine (NE) responses, whereas the WR regimen did not. Both regimens failed to cause significant changes in testosterone. After 12 wk of resistance training, the NR regimen caused greater increases in 1RM ( $P < 0.01$ ), maximal isometric strength ( $P < 0.05$ ), and muscular endurance ( $P < 0.05$ ) with knee extension than the WR regimen. The NR group showed a marked increase ( $P < 0.01$ ) in muscle cross-sectional area, whereas the WR and CON groups did not.

**Conclusion:** These results suggest that exercise-induced metabolic stress is associated with acute GH, E, and NE responses and chronic muscular adaptations following resistance training.

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