

## TACSM Abstract

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### Relationships Between Lower Body Muscular Strength and Power After Downhill Running

DANIEL R. MACHIN, KEVIN M. CHRISTMAS, DOUGLAS VAN PELT, JUSTIN R. TROMBOLD, and EDWARD F. COYLE

Human Performance Laboratory; Department of Kinesiology and Health Education; The University of Texas at Austin; Austin, TX

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#### ABSTRACT

The purpose of this investigation was to assess relationships between maximal isometric lower body strength and three different measurements of maximal lower body neuromuscular power after a bout of eccentric lower body exercise. Forty-five recreationally active males performed 20 minutes of downhill running (7.5 mph, -10% grade). Isometric knee extensor strength (KE), maximal cycling power ( $P_{MAX}$ ), vertical jump height (VJ), and 10-meter sprint time (10m) were assessed immediately prior to exercise (baseline) and repeated 2, 24, 48, 72, and 96 h after exercise. Data are reported as mean $\pm$ SEM. There was a significant effect of time on all measurements throughout the 96 h period after exercise. Isometric KE strength was 129.0 $\pm$ 3.3, 113.2 $\pm$ 3.3, 115.8 $\pm$ 3.3, 119.0 $\pm$ 3.2, 118.1 $\pm$ 3.3 and 119.7 $\pm$ 3.4 kg at baseline, 2, 24, 48, 72, and 96 h post-exercise, respectively.  $P_{MAX}$  was 1086 $\pm$ 31, 1014 $\pm$ 28, 1024 $\pm$ 32, 1042 $\pm$ 31, 1042 $\pm$ 30, and 1044 $\pm$ 31 watts at baseline, 2, 24, 48, 72, and 96-hours post-exercise, respectively. VJ was 50.2 $\pm$ 1.2, 48.7 $\pm$ 1.2, 49.1 $\pm$ 1.3, 49.7 $\pm$ 1.3, 50.6 $\pm$ 1.3, and 50.5 $\pm$ 1.3 cm at baseline, 2, 24, 48, 72, and 96-hours post-exercise, respectively. 10m sprint time was 1.76 $\pm$ 0.02, 1.80 $\pm$ 0.03, 1.80 $\pm$ 0.02, 1.79 $\pm$ 0.02, 1.77 $\pm$ 0.02, and 1.77 $\pm$ 0.02 sec at baseline, 2, 24, 48, 72, and 96-hours post-exercise, respectively. There were significant relationships between isometric KE strength and both  $P_{MAX}$  ( $R^2=0.31$ ,  $p<0.05$ ) and VJ height ( $R^2=0.11$ ,  $p<0.05$ ). Additionally, there was a significant relationship between isometric KE strength and  $P_{max}$  at each time point ( $R^2=0.23-0.34$ ,  $p<0.05$ ). This was not true for VJ height or 10m sprint time. No relationship was present between isometric KE strength and 10m sprint time ( $R^2=0.01$ ). The primary finding of this study was a significant relationship between isometric KE strength and  $P_{MAX}$  and that this relationship was maintained at each time point after eccentric exercise. Therefore, we conclude that  $P_{MAX}$  is a reliable method to assess decrements in neuromuscular power and athletic performance after a bout of muscle damaging eccentric exercise.

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