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The Effects of a 50k Ultramarathon on Plasma IL-6 and Rectus Femoris Muscle Thickness

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IL-6 is a cytokine that can act in an autocrine manner to facilitate many immunologic and metabolic processes. IL-6 may play a role in the inflammatory muscular response to prolonged running but studies attempting to link plasma IL-6 to in vivo measures of muscle inflammation are limited. **PURPOSE:** to assess plasma IL-6 concentrations and muscle thickness (MT) using ultrasound imaging throughout and after a 50-kilometer race and to determine the relationship between changes in IL-6 and changes in MT. **METHODS:** Men and women (n=11) age 39 ± 7 years participated in a 50k trail race consisting of five 10k laps. Ultrasound imaging was performed on the rectus femoris at rest (passive) and during isometric contraction before the race, within 60 minutes of completing the race, and 24-hrs post-race. To maintain consistent ultrasound probe placement, the probe was outlined at baseline testing. Images were analyzed using ImageJ, and the % change in MT from passive to isometric contraction was calculated. Blood was drawn 30 minutes following consumption of a pre-race meal, 10k into the race, within 60 minutes of completion of the race and 24 hrs post-race. Plasma IL-6 was assessed using an enzyme-linked immunosorbent assay (ELISA). **RESULTS:** Change in MT from passive to isometric contraction increased from a pre-race value of $9.1 \pm 2.7\%$ to $14.1 \pm 2.6\%$ post-race although this did not reach statistical significance ($P=0.256$). Compared to pre-race values, change in MT increased significantly 24 hrs post-race ($9.1 \pm 2.7\%$ vs. $17.8 \pm 1.7\%$; $P=0.021$). IL-6 concentrations increased from pre-race levels of 0.37 ± 0.25 pg/mL to 3.1 ± 0.86 pg/ml at 10k ($P=0.008$) and to 29 ± 3.3 pg/mL post-race ($P<0.001$). Twenty-four-hour follow-up testing revealed a return of IL-6 levels to pre-race values (0.59 ± 0.3 pg/mL; $P=0.488$). The mean change (post-pre) in IL-6 inversely correlated with the mean change in MT ($r= -0.685$, $P=0.02$). **CONCLUSIONS:** Ultramarathon running leads to an acute but substantial increase in plasma IL-6 which precedes changes in MT. The relationship between changes in IL-6 and MT pre- and post-race indicates a potential role for IL-6 in the delayed exercise-induced inflammatory response with prolonged running.

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