

Call for Advanced Training and Diet Programs Due to High Metabolic Demands of Firefighting

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ABSTRACT

Firefighters (FF) require high levels of muscular strength and cardiovascular fitness in order to meet the demands of firefighting. The National Fire Protection Association reported FF in the US are not meeting health and fitness recommendations, which results in poor simulated and on-duty occupational performance. **PURPOSE:** to examine the demands and stress placed on FF during a series of simulated FF specific physical tasks and identify potential strategies to improve FF specific performance variables. **METHODS:** Twenty apparently healthy male professional structural FF completed a battery of nine FF specific exercises/movements during a simulated fire ground test (FGT). The exercise included the following: dry hose carry, charged hose carry, low-room search, chainsaw roof walk, forced entry task, ladder carry, stair climb with hose pack, 10 full extension, and victim carry. A familiarization trial was completed prior to testing. Lactate, time to completion, air tank depletion (measured in PSI) and heart rate were recorded. **RESULTS:** Lactate levels were significantly higher during post-testing compared to resting levels ($p < 0.001$). Lactate levels were taken before and two-, four-, six, and eight-minutes after the FGT (1.4 ± 0.5 mmol/L, 13.2 ± 1.7 mmol/L, 13.3 ± 2.2 mmol/L, 12.8 ± 1.6 mmol/L, 12.2 ± 1.9 mmol/L, respectively). Additionally, heart rate (bpm) at timepoints two and three were significantly higher compared to timepoint one ($p < 0.001$). Heart rate increased significantly from pre FGT 91.2 ± 12.4 bpm to 179.2 ± 9.5 bpm during the FGT, which was higher than 95% age-predicted max heart rate. In terms of air tank depletion, the FGT resulted in a significant depletion in tank ($p < 0.001$). A 45-minute air tank depleted approximately 51% within seven minutes. The average FGT time-to-completion was 7.5-minutes. **CONCLUSION:** Firefighting requires high levels of physical fitness to carry out the job specific tasks. Standardized resistance training programs and dietary interventions are warranted to identify optimal strategies to improve FF specific performance during simulated testing and on-duty tasks. Tactical resistance programming and diet interventions may reduce the impact of physiological and psychological stressors while improving FF ability to meet metabolic and job-specific demands.