

Effects Of Acute Wildland Fire Suppression On Changes In Energy Balance And Body Composition Using Skinfold And Deuterium Dilution.

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Introduction: The occupation of wildland firefighting often involves intense work under extreme conditions. Ambient heat, altitude and extended work shifts combine with dietary limitations to subject men and women to remarkable environmental stress. The purpose of this study was to examine the acute effects of wildland fire suppression on changes in energy balance and body composition using skinfold and deuterium dilution.

Methods Seventeen wildland firefighters from three Hot Shot Crews (n=7 females, n=10 males) were selected for the study. Subjects were provided with approximately 2 grams of Deuterium Oxide (D₂O) at approximately 2200 after the collection of a background urine sample. First and second void urine samples were collected at 0430 and 0600 for isotopic analyses after an overnight fast. Samples were analyzed in duplicate as previously discussed (5) using isotope ratio mass spectrometry. Early AM (post first void) nude body weight was obtained using a digital scale accurate to 100 grams. Skinfold (SKF) measures were completed using the Jackson and Pollack gender specific formulas (1, 2). Body density was converted to percent body fat using the age specific formulas of Lohman (3). **Statistics** Apriori planned comparisons were used to evaluate changes in body weight and body composition (pre fire vs. post fire) in males and females. **Results** These data suggest that, subjects did not lose body weight, or alter FBM evaluated from SKF or D₂O dilution. However, the male subjects showed a significant reduction in FFM evaluated from SKF and D₂O dilution. Female subjects maintained similar body composition during wildfire suppression.

	Body Weight (kg)	D2O FFM (kg)	D2O FBM (kg)	SKF FFM (kg)	SKF FBM (kg)
Male					
	76.9±7.8	63.9±5.8	13.0±5.7	67.3±5.0	9.6±6.0
	77.0±8.4	62.3±5.3*	13.5±6.1	66.4±4.6*	9.4±5.9
Female					
	62.6±4.8	48.0±4.2	14.6±3.2	51.7±3.6	10.9±1.9
	62.1±4.7	48.3±4.6	14.0±2.9	51.6±3.3	10.4±2.2

* p<0.05 vs pre

Discussion Based on previous test results, we hypothesized that subjects generally have a difficult time maintaining energy balance during periods of fire suppression. High energy expenditure combined with inappropriate dietary intake patterns likely contribute to the decrease in FFM observed in the male subjects. Fire camp and field dietary strategies (increased carbohydrate) may need to be adjusted to better maintain dietary homeostasis in the wildland firefighter.

References: 1. Jackson AS, Pollock ML and Ward A. *Med Sci Sports and Exerc* 12:175-182, 1980. 2. Jackson AS, Pollock ML. *Brit J Nutr* 40:497-504, 1978 3. Lohman TG. Advances in Body Composition, 1992. 4. Ruby et. al *Med Sci Sports and Exerc* 31(5 suppl):s366, 1999. 5. Schoeller DA. et. al *Am J Clin Nutr.* 33:2686-93, 1980.