Firefighting is a physiologically stressful occupation. High fitness levels along with optimal body composition should enhance performance of firefighting tasks. Previous studies demonstrate that aerobic fitness has a positive influence on firefighting performance. However, limited data is available on the influence of anaerobic fitness, despite the fact that most firefighting tasks involve non-steady state activities. Moreover, the specific fitness and body composition components associated with optimal performance of firefighting tasks have not been fully identified.

PURPOSE: To determine the relative importance of fitness and body composition characteristics on the Candidate Physical Ability Test (CPAT), a nationally recognized firefighting simulation test used to estimate firefighting performance.

METHODS: Upper- and lower-body strength, muscle endurance, lower body muscle power, % fat, fat free mass, maximal oxygen uptake (VO₂max), anaerobic peak power, anaerobic fatigue index, and the heart rate and blood pressure response to stair climbing were assessed over a multi-day testing protocol to determine the physiological characteristics of male (N=26) and female (N=7) volunteer and career firefighters (age 18-37 yrs). On a separate day the CPAT was administered as a means of estimating firefighting task performance.

RESULTS: Anaerobic peak power and VO_2 max were significantly higher among successful CPAT performers than those who were unsuccessful (P < 0.01). Anaerobic peak power, anaerobic fatigue index, absolute VO_2 max, upper body strength, and grip strength were significantly related to CPAT performance time (P < 0.01). However, the combination of absolute VO_2 max and anaerobic fatigue index best predicted CPAT performance (Adj. R2 = 0.817; P < 0.001).

CONCLUSIONS: These data indicate that the combined influence of aerobic and anaerobic fitness explains a major portion of the variability observed within CPAT performance. Remedial programs aimed at improving firefighting performance and the screening of new firefighter recruits should target both anaerobic and aerobic fitness qualities.

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Is Job-related Stress the Link Between Cardiovascular Disease and the Law Enforcement Profession?

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(No disclosure reported)

Law enforcement officers (LEO) have an increased prevalence of cardiovascular disease (CVD) that is not entirely due to traditional CVD risk factors. CVD is increasingly recognized as an inflammatory disease and psychological stress can create a pro-inflammatory environment. However, it is unclear whether job-related stress in this profession contributes to CVD via this mechanism.

PURPOSE: To test whether law enforcement officers have a higher risk of CVD due to alterations in pro- and anti-atherogenic inflammatory mediators which are associated with job-related stress.

METHODS: Participants were 444 officers of the lowa Department of Public Safety and 166 demographically similar non-officers. The inflammatory mediators of C-reactive protein, fibrinogen, IL-1B, IL-4, IL-6, IL-10 and TNF-a; stress measures of self-reported perceived stress, vital exhaustion, job strain, effort-reward imbalance, social support; and CVD risk via the Framingham Risk Score and components of the metabolic syndrome were compared between the two groups.

RESULTS: The two groups did not differ in either global CVD risk or metabolic syndrome risk factors. Officers had higher levels of IL-1B, IL-6, IL-10 and TNF-a and lower levels of C-reactive protein and fibrinogen. They reported higher effort-reward imbalance but lower perceived stress, job strain and vital exhaustion. None of the stress measures explained more than 4% of the variability in any of the inflammatory mediators for the entire sample or for either group of participants.

CONCLUSIONS: Law enforcement officers may be at an increased risk for CVD due to a relatively greater pro-inflammatory vascular environment. However, this increased risk cannot be attributed to either chronic stress or the work-related stress measures.

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Evaluating Cardiovascular Risk in Fire Fighters: Implications for Work-Related Interventions

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(No disclosure reported)

PURPOSE: The strenuous nature of fire fighting coupled with presumed hyperadrenergia and superimposed environmental stresses may contribute to excessive cardiac demands of this activity, and a disproportionate incidence of acute coronary events in individuals `at risk.'

BACKGROUND: The Heart and Vascular Screening at William Beaumont Hospital was designed to identify risk factors for cardiovascular and peripheral vascular disease. Recently, we had an opportunity to screen a cohort of local fire fighters.

METHODS: Each fire fighter underwent 8 different testing procedures. The vascular assessment included an ultrasound of the carotid arteries and abdominal aorta as well as measurement of the ankle brachial index (ABI). Body mass index (BMI), systolic/diastolic blood pressure (SBP/DBP), lipid profiling (ie, total cholesterol, LDL cholesterol, triglycerides, HDL cholesterol), fasting glucose, and a resting ECG were also obtained. Values were calculated as the mean ± SD and expressed relative to normative data.

RESULTS: Screenings were completed on 39 fire fighters (2 women, 37 men), mean age \pm SD = 43.0 \pm 7.5 years. All of the fire fighters had normal ABIs (\geq 1.00) and no evidence of abdominal aortic aneurysm. On the other hand, 18% of the fire fighters had either a borderline or abnormal ECG (eg, LVH) and 8% demonstrated minimal or moderate occlusive carotid artery disease. Mean \pm SD values for the cardiovascular risk assessment are shown in the Table. Abnormal values for BMI (\geq 30 kg/m2), total cholesterol (\geq 200 mg/dL), HDL-cholesterol (\leq 40 mg/dL), LDL-cholesterol (\geq 130 mg/dL) and triglycerides (\geq 150 mg/dL) were observed in 26%, 26%, 29%, 23%, and 21% of the fire fighters, respectively. BMI SBP DBP Total Chol HDL LDL Triglycerides Glucose

(kg/m2) (mmHg) (mmHg) (mg/dL) (mg/dL) (mg/dL) (mg/dL) (mg/dL)

 $27.7 \pm 3.9\ 120.6 \pm 13.3\ 77.4 \pm 11.2\ 182.9 \pm 28.2\ 46.63 \pm 11.0\ 112.5 \pm 27.8\ 113.4 \pm 67.3\ 87.5 \pm 22.5$

CONCLUSION: Present findings demonstrate that a significant subset of relatively young and apparently healthy fire fighters have risk factors for and clinical evidence of cardiovascular disease that can be identified with appropriate screening. These data have relevance to evaluation and cardiovascular risk reduction programs in fire fighters, whose vocational demands/health status may influence personal and public safety.