

Clotting and Fibrinolytic Changes after Firefighting Activities

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ABSTRACT

SMITH, D. L., G. P. HORN, S. J. PETRUZZELLO, G. FAHEY, J. WOODS, and B. FERNHALL. Clotting and Fibrinolytic Changes after Firefighting Activities. *Med. Sci. Sports Exerc.*, Vol. 46, No. 3, pp. 448–454, 2014. Approximately 45%–50% of all duty-related deaths among firefighters are due to sudden cardiovascular events, and a disproportionate number of these fatalities occur after strenuous fire suppression activities. **Purpose:** The objective of this study is to evaluate the effect of strenuous firefighting activities on platelets, coagulation, and fibrinolytic activity and to document the extent to which these variables recovered 2 h after completion of the firefighting activity. **Methods:** Firefighters performed 18 min of simulated firefighting activities in a training structure that contained live fires. After firefighting activities, firefighters were provided with fluid and allowed to cool down and then recovered for 2 h in an adjacent room. Blood samples were obtained prefirefighting, postfirefighting, and 2 h postfirefighting. **Results:** Platelet number, platelet activity, and coagulatory potential increased immediately postfirefighting and many variables (platelet function, partial thromboplastin time, and factor VIII) reflected a procoagulatory state even after 2 h of recovery. Fibrinolysis, as reflected by tissue plasminogen activator, also was enhanced immediately postfirefighting but returned to baseline values by 2 h postfirefighting. In contrast, inhibition of fibrinolysis, as evidenced by a reduction in plasminogen activator inhibitor-1, was depressed at 2 h postfirefighting. **Conclusions:** Firefighting resulted in elevated coagulatory and fibrinolytic activity. However, 2 h postfirefighting, tissue plasminogen activator returned to baseline and coagulatory potential remained elevated. The procoagulatory state that exists after firefighting may provide a mechanistic link to the reports of sudden cardiac events after strenuous fire suppression activities. **Key Words:** HEMOSTASIS, COAGULATION, FIBRINOLYSIS, PLATELET ACTIVITY