

ABSTRACT

Objectives: Wildland firefighters in the United States are occupationally exposed to high levels of woodsmoke. Results from experimental studies show that exposure to woodsmoke induces inflammation. Therefore, a study was conducted to investigate the effect of occupational woodsmoke exposure on inflammatory biomarkers in firefighters working at prescribed burns.

Methods: Twelve United States Forest Service wildland firefighters at the Savannah River Site, South Carolina volunteered to give blood samples during 4 prescribed burns between February and March, 2011. Twenty-four paired (pre- and post-work shift) blood samples were collected using dried blood spot method to facilitate repeated sample collection. Inflammatory biomarker concentrations in blood samples were measured using the Meso Scale Discovery multi-spot assay system. Additionally, concurrent personal PM_{2.5} and CO monitoring of firefighters was conducted. Linear mixed models were used to test whether cross-work shift differences occurred in the following inflammatory biomarkers—IL-1 β , IL-8, CRP, SAA, ICAM-1, and VCAM-1.

Results: IL-8 showed a significant cross-work shift difference as indicated by a post/pre-work shift ratio of 1.70 (95% CL: 1.35, 2.13; $p=0.0012$). Concentrations of IL-8, CRP, and ICAM-1 increased in > 50% of samples across work shift. Firefighters who lighted fires as opposed to other work tasks had the largest cross-work shift increase in IL-8.

Conclusions: A significant cross-work shift increase in IL-8 in blood samples was observed in healthy wildland firefighters working at prescribed burns. Further research is needed to understand the physiological responses underlying the adverse effects of woodsmoke exposure, and the dose-response relationship between woodsmoke exposure and inflammatory responses.

Keywords: dried blood spot; inflammation; interleukin-8; prescribed burns; woodsmoke