

Endocrine Disruptor Exposure in Firefighters

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Firefighting is among the most dangerous of occupations, and firefighters are frequently exposed to countless known or unknown chemicals at fire scenes. Epidemiological studies showed the prevalence of multiple myeloma, non-Hodgkin's lymphoma, prostate and testicular cancers is elevated in firefighters. The underlying mechanism of these cancers in firefighters remains unclear. Since both prostate and testicular cancers are hormone-sensitive, we believe that volatile chemicals that the firefighters absorb transdermally or by inhalation may act as endocrine disruptors to perturb hormonal homeostasis. Amongst the most prevalent of those chemicals are phthalate esters and their derivatives. Similar to hormones, these agents are highly lipophilic and hence readily absorbed through skin. More importantly, the firefighters may have higher absorption rates for those lipophilic compounds when their blood circulation rate and skin temperature increase during fire suppression or when working close to the fire scene. In this pilot project we therefore hypothesize that firefighters are exposed to smoke-derived chemicals, which have endocrine disrupting effects, directly from deposits on their skin and indirectly from clothing. We will use protective firefighter gear (gloves and hoods) which have been exposed extensively to smoke and volatile chemicals derived from municipal fires. We will then extract the volatile chemicals using an organic solvent, concentrate them and apply them to a high throughput assay, with the use of genetically engineered yeasts, to determine their endocrine disrupting (estrogenic/antiestrogenic/androgenic/antiandrogenic) potentials. If this project is successfully executed, the results may increase understanding of the mechanisms of cancer induction in firefighters, provide new guidelines for firefighters to evaluate levels of biohazard, minimize exposure to endocrine disrupting compounds during service and thereby set standards for maximal annual exposure.

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