GC/MS Research Project 2014

Research Question

What is the Field Application for GC/MS to Firefighter Exposure to Fire Debris Contaminates?
Providing GCMS Data to Enhance Firefighter Safety

You guys do realize that the smoke is just as dangerous as the fire, right?
FIREFIGHTER EXPOSURE TO SMOKE PARTICULATES  
(DHS AFG Grant #EMW-2007-FP-02093)

Final Report  
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Prepared by:
Thomas Fabian, Ph.D., Jacob L. Bergersen, Ph.D., Stephen I. Kerber, M.S.,  
Pravinray D. Gandhi, Ph.D., P.E.,  
Underwriters Laboratories Inc.
C. Stuart Baxter, Ph.D., Clara Sue Ross, M.D., J.D., James E. Lockey M.D., M.S.  
University of Cincinnati
James M. Dalton, M.Arch.  
Chicago Fire Department

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Project Addressed Two Gaps from UL Study

The UL study offered recommendations for further research which numbers six and seven being our focus:

6. *Characterization of contaminants accumulated on firefighter protective equipment and the subsequent potential for firefighter exposures to these contaminants and resulting health effects.*

7. *Usage and industrial hygiene practices related to firefighter protective equipment, including cleaning patterns, length of use and storage practices (UL, 2010, p.vi).*
Picture of Fire Lab from UL 2010
Utah Valley University Fire Lab October 2013
Six Sets of PPE on Hanging Rods during Incipient Stage
Fire Transition to Fully Involved @ 7min then Water Applied
Doors were shut exposing the gear for ten minutes
Swab Sampling Technique for GUARDION GC/MS SPME Injection
Fire Smoke and Debris Relation to Firefighter Cancer

Taking Action Against Cancer in the Fire Service

August 2013 (V2)

Sponsored on behalf of firefighter safety, health and survival by Honeywell First Responder Products
Four Recommendations from the Research Project

1. Implement a “nothing by mouth” policy in the immediate proximity to a structural fire.

2. Rehab areas should treat PPE as contaminated and to limit secondary contamination, incorporate hand-washing procedures into hydration and food intake areas.

3. Implement on-scene decontamination procedures to reduce contaminates on the PPE.

4. Consider all PPE exposed to structural firefighting smoke and debris as contaminated with potential toxicants and carcinogens until decontaminated.
Recommendations for Further Research

1. Repeatable results are at the foundation of the scientific method. Conducting similar burns and expand sampling techniques would strengthen our findings.

1. Research is needed that confirms the contamination levels on PPE after a gross decontamination and after a technical decontamination.

3. Research is needed that identifies the levels of contamination that may penetrate firefighter PPE and remain on the skin until washing (Fent et al., 2013).

4. Random third party testing should be considered to confirm the levels of contamination on firefighter PPE and that procedures for washing are efficient and effective.

5. Referencing recent studies, research that strengthens the link between exposure routes and actual harm is warranted.
Primary References


• Firefighter exposure to smoke particulates. (UL 2010)

• Evaluation of dermal exposure to polycyclic aromatic hydrocarbons in firefighters (Report No. 2010-0156-3196) (USDHHS 2013)

• Taking action against cancer in the fire service (FCSN 2013)

• Thirdhand smoke causes DNA damage in human cells. (Mutagenesis 2013)

• National Fire Protection Association 1851 Standard on selection, care, and maintenance of protective ensembles for structural fire fighting and proximity fire fighting. (NFPA 2014)