

Chemicals and Breast Cancer Risk

There are very few studies on women firefighters and the risk of female cancers, including breast cancer. Other studies of workplace exposures to certain chemicals have shown some evidence of a higher risk of breast cancer. Some of these chemicals are also encountered in firefighting (see *Formaldehyde and Benzene*, below). Hence, it is prudent to take precautions against exposures to these chemicals.

For many other chemicals, studies have not yet been done on workplace exposures and the cancer risk of women. Because cancer biology is similar in people and laboratory animals, animal studies are one of the important tools used to identify chemicals that may be a cancer risk for humans (see *Laboratory Animal Studies*).

Occupational Studies in Women

Formaldehyde – Most studies on formaldehyde exposure in the workplace and cancer risk have been done in men. In women exposed to formaldehyde, two studies have shown a higher risk of developing or dying of breast cancer. Because of overall evidence of increased risk of several types of cancer, and potential exposure in fire scenarios, it is important to take protective action to minimize exposure to this chemical.

Benzene – Breast cancer risk was higher in several large-scale studies of women working in jobs exposed to high levels of benzene (as an organic solvent). More studies are needed on whether benzene inhalation in other professions affects the risk of breast cancer.

Laboratory Animal Studies

The National Toxicology Program has found the following chemicals to be capable of inducing mammary tumors in long-term cancer studies conducted in rats and mice. All of these chemicals can be generated in various fire scenarios.

- Benzene
- 1,3-Butadiene
- Isoprene
- Methylene chloride
- 1,2,3-Trichloropropane
- 2,4-Toluenediamine
- 2,4-Toluene diisocyanate
- 2,6-Toluene diisocyanate

Authors

Nellie J. Brown, M.S., C.I.H.

Director, Workplace Health & Safety Programs
Cornell University School of Industrial and
Labor Relations

Suzanne M. Snedeker, Ph.D.

Associate Director of Translational Research
Cornell University Sprecher Institute for Comparative
Cancer Research
Program on Breast Cancer and
Environmental Risk Factors (BCERF)

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BCERF *Alert* for...

Women Firefighters

Chemical Exposures in Your Workplace and Breast Cancer Risk

There are many risk factors for breast cancer. Exposures to certain chemicals have been identified as possible risk factors for breast cancer. Exposure to some of these chemicals may occur during firefighting activities.

This brochure is designed to help you understand how you may be exposed to these chemicals in your work, and encourages you to use proper protection to minimize exposures during all phases of firefighting.



Cornell University
Sprecher Institute for
Comparative Cancer Research

Program on Breast Cancer and Environmental Risk Factors (BCERF)
Vet Box 31 • Cornell University • Ithaca, NY 14853-6401
Phone: 607 254-2893 • Fax: 607 254-4730
E-mail: breastcancer@cornell.edu • <http://envirocancer.cornell.edu>

Protection is Prevention

Personal protective equipment, especially Self-Contained Breathing Apparatus (SCBA) needs to be worn at all phases of firefighting, since there may be potential exposure to chemicals that may increase breast cancer risk in all types of non-structural and structural firefighting activities.



Structural Fires

Overheating

Isocyanates – generated from polyurethane found in mattresses, sleeping bags, clothing, foam, upholstered furniture and paints.

2,4-Toluenediamine – generated from thermal decomposition of foam made from toluene diisocyanate (see *isocyanates* above).

1,2,3-Trichloropropane – generated from thermal oxidative degradation of “Tris,” a flame retardant that was used on fabrics.

Smoldering Combustion

Benzene – generated from epoxy resins, and the decomposition of polyester foam and fiberfill found in bedding and upholstery. Generated from polyvinyl chloride (PVC) used as coating on wire and cables, in electrical equipment, and in window treatments (drapes and blinds) and wall coverings.

1,3-Butadiene – detected in smoldering, structural fires.

Formaldehyde – released from permanent press finishes on fabric treated with melamine-formaldehyde resins, and from simple acrylics found in paints and bed clothing, and epoxy coatings.

Isocyanates – generated from polyurethane found in mattresses, sleeping bags, clothing, foam, upholstered furniture, and paints.

Isoprene – released from the pyrolysis of natural rubber.

Non-Structural Fires

Fire Training Exercises

1,3-Butadiene – released from the cellulose and other components found in wood.

Benzene – detected in smoke released during fire training exercises involving buildings or motor vehicles (see *Smoldering/Flaming Combustion and Tire Fires*).

Forest Fires, Wildfires & Brush Fires

1,3-Butadiene and Isoprene – released from wood during smoldering combustion, active pyrolysis (flaming combustion), and overhaul activities.

Benzene and Formaldehyde – detected in the smoke of burning wood.

Flaming Combustion (Knockdown)

Benzene – detected in smoke from house and municipal fires. Generated from thermal decomposition of polypropylene plastics used in housings of small kitchen, bathroom and office appliances; from polyester found in bed sheets, mattresses, carpeting and clothing; and from polyvinylchloride (PVC) used as a coating for wires and cabling, in plastic switches, wallpaper, and window treatments (drapes and blinds), and PVC plumbing.

1,3-Butadiene – detected in smoke from municipal structural fires.

Formaldehyde – released from permanent press fabric treated with melamine-formaldehyde resins, and from thermal decomposition of polyethylene used in building materials (e.g. some plastic bathtubs).

Overhaul, Salvage, and Fire Investigation Activities

Benzene and Formaldehyde – released during salvage tasks performed during and after a fire; released during overhaul tasks, including pulling apart walls, ceilings and floors, and removing furniture to find and extinguish hidden fires; and released during delayed off-gassing after chemicals adsorbed onto masonry and concrete.

Methylene chloride – detected during overhaul of municipal structural fires.

Oil Fires

Isoprene – released from petroleum in oil fires.

Tire Fires (Vehicle, landfill or monofill tire fires)

Benzene – released from styrene-butadiene rubber during smoldering combustion.

