

The Atlantic

How Modern Furniture Endangers Firefighters

Consumer goods are increasingly made of synthetic materials and coatings. The carcinogens they give off when they burn could be driving high cancer rates among first responders.



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TEXT SIZE



Tony Stefani had been a firefighter in San Francisco for nearly 28 years when, one January day in 2001, he was out jogging and began to feel weak. “The last mile I could barely run, I had to walk,” he told me

recently. When he got home, he urinated blood. He was soon diagnosed with transitional cell carcinoma, a rare cancer of the kidney.

Chris Miller, a firefighter in Kentucky, had lymphoma 10 years ago. He got chemo, went to rehab, spent six weeks in a hospital, and lost 60 pounds. He took four months off work. The chemo wore him out and made his limbs tingle. It made him sterile. He will be 45 in November.

In 2008, Keith Tyson had recently retired after 34 years of firefighting in Miami when doctors found an aggressive cancer in his prostate. He says roughly a third of his department has had some form of cancer in the past three years.

“I’m not saying that every single one of those cancers was caused by the job,” Tyson said. “But at the same time ... we have a problem.”

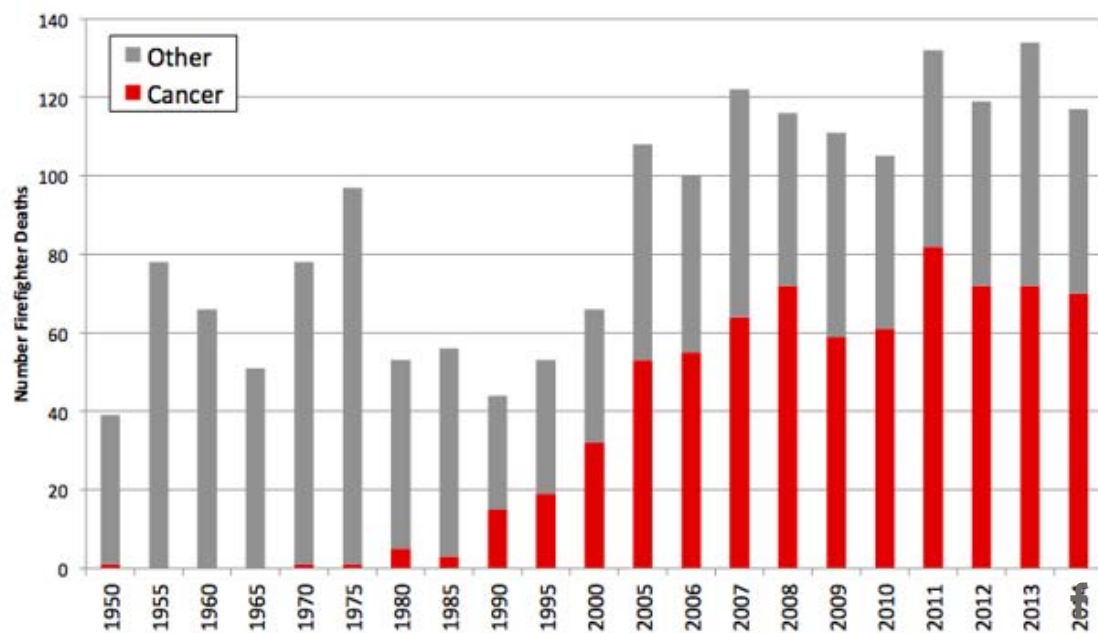
Ironically, the most dangerous thing about an occupation that involves running into burning buildings isn’t the flames, but the smoke. Cancer is the leading cause of firefighter line-of-duty deaths in the United States, and according to the International Association of Fire Fighters, about 60 percent of career firefighters will die this way, “with their boots off,” as they call it.

There’s a misconception that only the firefighters who responded to the World Trade Center attacks on 9/11 risk developing cancer, because of [their exposure](#) to asbestos and jet fuel. But in fact, cancer threatens firefighters everywhere, every day.

Although a causal link has not yet been proven, the association between firefighting and a greater cancer risk began to build about 10 years ago. A [meta-analysis](#) found that firefighters have a higher risk of multiple

myeloma, and possibly a greater risk of contracting non-Hodgkin lymphoma, prostate, and testicular cancers.

Rise in Firefighter Cancer Deaths Since 1950



IAFF / Susan Shaw

From there, more evidence rolled in: Research into Massachusetts firefighters [found](#) greater odds of developing brain and colon cancers. Firefighters in their 30s and 40s from five [Nordic countries](#) were found last year to have a greater chance of developing prostate and skin cancers. In 2013, researchers studying 30,000 firefighters in three U.S. cities found the profession was associated with “small to moderate increases” in risk for various cancers, particularly respiratory, digestive and urinary malignancies. The study [also found](#) that the risk of lung cancer increased with every fire they fought.

“The longer you’re a firefighter, the greater your chance of getting some kind of cancer,” says Susan Shaw, the executive director of the Marine & Environmental Research Institute and a professor of environmental health sciences at the State University of New York in Albany. “These are people who have a gladiator mentality, and they’re really tough. [But] now you have a different kind of danger.”

* * *

The problem is our stuff. Possessions make our lives cozy and convenient, but when they catch fire, they become noxious fuel. The cancer rates are being driven up, researchers believe, by chemicals that lace the smoke and soot inside burning buildings. Consumer goods are increasingly manufactured using synthetic materials, and fires are more toxic as a result.

A century ago, we furnished our houses with wood, cloth, metal, and glass. Today, it’s plastics, foams, and coatings—all of which create a toxic soup of carcinogens when they burn. Fire experts say synthetic materials create hundreds of times more smoke than organic ones; flame retardants alone double the amount of smoke and increase toxic gasses 10-fold. Your TV, your kid’s Barbie, your Saran wrap, your couch: all of them can be poisonous when they’re ignited and their fumes are inhaled.

“Every substance, when it burns, changes its chemical structure,” said Timothy Rebbeck, a professor at the Dana-Farber Cancer Institute and the Harvard School of Public Health. “Particularly when you burn something that’s synthetic or man-made, you’re creating strange compounds that we don’t know what they’ll do.”

This video, made by the National Institute of Standards and Testing, shows how a “modern” room with synthetic furniture burns faster and with more smoke than does a “legacy” room with wood and cotton furnishings.

Among the chemicals Shaw and others suspect might be harmful are benzene, found in furniture wax; the formaldehyde in cleaning materials; hydrogen cyanide, which is used in the manufacture of synthetic fibers; stick- and stain-resistant coatings like Scotchgard and Teflon; and the flame-retardants that are added to the foam inside furniture.

In 2012, Shaw [had paramedics](#) draw the blood of 12 firefighters after they responded to a fire. Their samples contained three times the level of flame retardants as the general population. Their blood levels of perfluorinated chemicals, which are used as non-stick coatings, were twice as high as those of the World Trade Center first responders.

Some flame retardants were phased out in 2005 after studies showed they were building up in human breast milk, but they were replaced with new compounds. [Most](#) new couches contain flame retardants, and researchers know little about their health impacts. “The chemical industry replaces

the phased-out chemical but with something similar, but it has one bond difference,” Shaw said. “Scientists are trying to follow the market and figure out, ‘What’s in it now?’ It’s extremely frustrating.”

CANCER AND FIREFIGHTERS



[The States That Don't Protect Sick Firefighters](#)

[Where to Buy a Safe Couch](#)

[Hoarding Is Making Firefighting Harder](#)

The American Chemistry Council has defended flame retardants. “Protective chemistries like flame retardants help prevent fires from starting, slow their spread, and reduce their intensity,” the industry group said in a statement.

All people are exposed to these household chemicals, but fires magnify this exposure. When flame retardants and other compounds burn, they create reactive oxygen species—molecules that bind to DNA and cause mutations that can lead to cancer.

“Think about smoke as a bunch of carcinogens, because that’s basically what it is,” said Virginia Weaver, a professor of environmental health at Johns Hopkins University. “The more synthetics there are in the home, the more chemicals are present in the smoke, and the more chemicals that are carcinogens.”

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Firefighters have between one and two minutes to get ready when they’re called. That’s 90 seconds to don 25 pounds of “turnout gear”—thick pants, a coat, boots, gloves, a hood, and mask. The coat and pants don’t seal together. Smoke snakes up under the coat and clings to the body;

toxic soot settles in the gaps between gloves and sleeves. Around their necks, firefighters wear permeable, sweatshirt-like hoods that are porous to chemicals.

The suit itself soaks up toxins and later “offgasses” them. Studies have confirmed that firefighters’ gear and skin gets coated in higher levels of potentially carcinogenic compounds, such as phthalates—chemicals that are added to plastics to make them soft—as well as arsenic, lead, and mercury.

The extreme heat helps chemicals enter through the skin: With every 5 degrees that body temperature rises, skin absorption rates increase by as much 400%.

The gasses creep in through mouths and noses. As a firefighter at a house fire, you wear a mask connected to a can of compressed air that you carry on your back. Each breath is effortful and makes a faint sucking sound. The mask is unbearably hot and uncomfortable—it feels like swimming goggles encasing your entire face. You sweat, and it slides around. Leaving a burning building, the only thing you want to do is rip it off and gulp fresh air.

That’s also the worst thing you could do. The “overhaul” period—when the fire is mostly out but the embers are still smoldering—is often when a fire is at its most toxic. Some fire departments have begun stationing safety monitors at overhauls to make sure firefighters don’t take off their masks prematurely.

To reduce their cancer risk, firefighters must remove their gear immediately after leaving a fire and take a shower. (Walking around the firehouse in turnout pants—as firefighters are sometimes depicted doing in movies and TV shows—needlessly increases exposure.)

Ideally, the turnout gear would be laundered immediately. But it requires specialized washing machines that are expensive and not widely available.

Marc Bashoor, the fire chief of Prince George's County in Maryland, said a few of his stations have the washing machines, but they break easily and are expensive to repair. He says the county firefighters' gear gets professionally cleaned once a year, which isn't nearly enough, according to Shaw.

To further reduce risk, firefighters should have a second set of turnout gear to wear in case there's a fire while the first set is being cleaned. But that would cost at least an additional \$1,500 per firefighter—a sum many pinched municipalities don't have.

In Boston, where fire officials [estimate](#) that members of the force are 2.5 times more likely to get cancer than civilians, Kathy Crosby-Bell, the mother of a fallen firefighter, [raised \\$500,000](#), in part to equip the city's firehouses with washers and dryers.

“This major health threat deserves urgent action on all our parts,” Crosby-Bell [said](#) at a city council hearing last year. “I’m shocked they don’t have something so basic as a washer and dryer for their gear.”

In the meantime, firefighters around the country are [educating](#) each other about strategies to prevent cancer despite their departments' budgetary limitations. Ryan Pennington, a firefighter in Charleston, West Virginia, said he sometimes takes two or three showers after responding to a fire. The tough-guy image of firefighters, their faces smeared with soot, is actually a dangerous one, he says.

“We all think of firefighters as gritty folks with black all over faces,” he said. “But really, we need to be the squeaky clean people who could go into an office.”

ABOUT THE AUTHOR



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