



Firefighters & Mesothelioma

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DetecTogether

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GENERAL EPIDEMIOLOGY: MESOTHELIOMA

A fairly rare cancer, mesothelioma is only diagnosed in about 3,000 new cases each year³. Survival rates for mesothelioma vary depending on the stage, and are quite low. Firefighters have an elevated risk for developing mesothelioma. The combined 5 year relative survival rate is 10%⁴.

INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC)

In June 2022, IARC convened an international meeting of scientists to re-evaluate firefighting as an exposure related to cancer. They determined the literature supports reclassifying **firefighting to a Group 1 carcinogen (carcinogenic to humans) based on “sufficient” evidence**¹. This is the **highest** classification of exposure only assigned when there is scientific certainty.

Their statement indicated:

There was also “strong” mechanistic evidence that occupational exposure as a firefighter shows the following key characteristics of carcinogens in exposed humans: “is genotoxic”, “induces epigenetic alterations”, “induces oxidative stress”, “induces chronic inflammation”, and “modulates receptor-mediated effects”.

It should be noted that IARC criteria and classifications are focused on *scientific levels of certainty* which are more stringent than those focused on the “weight of the evidence”² which is often used in cases of workers compensation.

IARC & MESOTHELIOMA AMONG FIREFIGHTERS

In addition to the general classification of firefighting as a Group 1 carcinogen, the IARC committee also noted **sufficient evidence** for the relationship with mesothelioma specifically. According to their findings:

“Seven studies examining mesothelioma incidence among firefighters were included in the meta-analysis. For these combined studies, the Working Group meta-analysis estimated a 58% higher risk (95% CI 14–120%) for mesothelioma among firefighters compared with mostly general populations. Heterogeneity in the estimate was low across the group of studies ($P=8%$). Asbestos exposure in firefighting is a plausible causal agent to support the observed associations. Confounding by sources of exposure outside of firefighting, and other biases, were considered unlikely to explain the magnitude and consistency of study results.”¹

GENERAL RISK FACTORS FOR MESOTHELIOMA CANCER

There are a number of risk factors associated with developing mesothelioma:

- **Gender:** Mesothelioma is more common in men than in women, a pattern probably due to the likelihood of men being exposed to asbestos in the workplace⁵.
- **Age:** There is a positive correlation with age and risk of mesothelioma. While it can occur in young people, its rare in people under the age of 45. Two out of three cases occur in people 65 or older⁵.
- **Asbestos:** Being exposed to asbestos is the main risk factor for developing mesothelioma. When asbestos fibers are inhaled, they can stay in the lungs and enter the pleural lining of the lung and chest wall, causing mesothelioma over time. Exposure to asbestos is often a result of the work environment⁵.

RISK FACTORS RELEVANT TO FIREFIGHTERS

Firefighters are exposed to a broad range of chemicals, both in the firehouse and during emergency response. Recent research conducted with live burns has begun to identify and quantify the presence of carcinogens that typically are present on the fire ground⁶. Most alarming are findings that, even when the air appears “clear” there are often ultra-fine respirable particles and gaseous chemicals of several known carcinogens present. Unfortunately, this time period when there is no visible smoke is typically when firefighters remove their personal protective equipment and self-contained breathing apparatus. Firefighters face several routes of exposure including inhalation, dermal absorption, secondary exposure through contaminated dust from particulates post incident, and potentially the semi-volatile off-gassing of gear.

Specific to mesothelioma, firefighters are exposed to asbestos. **Asbestos** is a group of minerals which present as bundles of tiny fibers. While people may be exposed to low levels in outdoor air, most exposure occurs as a result of asbestos being used in products such as insulation. Although asbestos is no longer used in products, there is still a risk of exposure when particles escape into the air, such as when buildings have been exposed to fire⁶.

RISK OF MESOTHELIOMA CANCER AMONG FIREFIGHTERS

In one of the largest single studies of U.S. career firefighters, Daniels and colleagues⁷ studied a pooled cohort of 29,993 firefighters from San Francisco, Philadelphia, and Chicago. They found that **firefighters were significantly more likely to be diagnosed with mesothelioma** than the general population (SIR=2.29, 95% CI=1.60-3.19), and **more likely to die from mesothelioma** than the general population (SMR=2.00, 95% CI=1.03-3.49).

A meta-analysis conducted by Jalilian and colleagues⁸ found **a significantly elevated risk of developing mesothelioma** in firefighters (SIREs=1.60, 95% CI=1.09-2.34).

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