Fire fighters can be exposed to these chemicals when breathing or through their skin.

In a report published in 2010, the **International Agency for Research on Cancer (IARC)**, part of the World Health organization (WHO), considered there to be sufficient evidence for several firefighting-related exposures causing different types of cancer:

- **Arsenic:** Cancers of the skin, lung, and liver
- **Asbestos:** Cancers of the lung, larynx, and gastrointestinal tract; mesothelioma
- **Benzene:** Leukemia
- **Benzo[a]pyrene:** Cancers of the lung, bladder, and skin
- **1,3 Butadiene:** Blood cancers
- **Cadmium:** Lung cancer
- **Formaldehyde:** Nasopharyngeal cancer
- **Radioactivity (gamma activity):** All cancer sites combined
- **Radionuclides (alpha-particle-emitting):** All cancer sites combined
- **Radionuclides (beta-particle-emitting):** All cancer sites combined
- **Silica (crystalline):** Lung cancer
- **Sulfuric acid:** Laryngeal cancer
- **2,3,7,8-tetrachloro dibenzo-para-dioxin:** Lung cancer, non-Hodgkin lymphoma, sarcoma; all cancer sites combined

but strong exposures)
- The types of protective equipment worn at fires
- Each person's unique genetic susceptibility
- Other lifestyle choices that might affect a person's cancer risk, such as whether they smoke

An added layer of complexity is the potential impact of heat, air temperature, and chemical mixtures on exposure doses at fires. Finally, cancers take years to decades to develop, and it can be hard to know the most important window(s) of exposure in people who develop cancer, as well as whether cumulative lifetime exposure is important.

In general, the American Cancer Society does not determine if something causes cancer (that is, if it is a *carcinogen*). We look to other respected organizations, such as the International Agency for Research on Cancer (IARC) for help with this. However, the research we do contributes to the body of evidence used by these organizations.

In its latest review of the scientific evidence (from 2022), IARC has classified occupational exposure as a fire fighter as "carcinogenic to humans" (Group 1). This is based on:

Sufficient evidence for cancer in humans for:

- Mesothelioma
- Bladder cancer

Limited evidence for cancer in humans for:

- Colon cancer
- Prostate cancer
- Testicular cancer
- Melanoma of the skin
- Non-Hodgkin lymphoma

The IARC Group 1 classification is used when there is the strongest *level of evidence* that something can cause cancer. However, the classification doesn't say anything about the *level of cancer risk* from the exposure. For example, two substances might be in Group 1 because there's strong evidence that they both cause cancer, but one of these substances might still be much more likely to cause cancer than the other.

To learn more about how IARC and other organizations study and classify cancer causes, see Determining if Something Is a Carcinogen[3] and Known and Probable Human Carcinogens[4].

Ongoing research

Continued research on the possible links between firefighting and cancer is happening around the world. Here are two of the larger studies now examining this topic.

Monographs on the Evaluation of Carcinogenic Risks to Humans, Volume 98. World Health Organization (WHO) Lyon, France. 2010:764.

International Agency for Research on Cancer. Press release No. 317: IARC Monographs evaluate the carcinogenicity of occupational exposure as a firefighter. 2022. Accessed at https://www.iarc.who.int/wp-content/uploads/2022/07/pr317_E.pdf on July 7, 2022.

Marjerrison N, Jakobsen J, Grimsrud TK, et al. Cancer incidence in sites potentially related to occupational exposures: 58 years of follow-up of firefighters in the Norwegian Fire Departments Cohort. *Scandinavian Journal of Work, Environment & Health*. 2022 Jan 11.