

IARC Firefighting Exposure Reclassification

After thoroughly reviewing the available scientific literature, the International Agency for Cancer (IARC) Working Group classified the occupation of firefighting as carcinogenic to humans (Group 1), IARC's highest carcinogenic hazard classification. This is supported by epidemiological studies and mechanistic evidence. Fire fighter exposures are definitively linked to five main characteristics of carcinogenesis:

- **Genotoxicity:** DNA damage, gene mutation, etc.
- **Induced epigenetic alterations:** DNA methylation, microRNA expression
- **Induced oxidative stress:** oxidative damage to macromolecules
- **Induced chronic inflammation:** altered cytokine/chemokine production, elevated white blood cells
- **Modulates receptor-mediated effects:** receptor in/activation (e.g., aryl hydrocarbon receptor and related enzyme P450 cytochrome)

Previously, IARC had classified fire fighter occupational exposure as Group 2B, possibly carcinogenic to humans. The new classification as Group 1 puts firefighting on par with tobacco and benzene as *carcinogenic to humans*.

There are four different categories classified by the IARC monographs:

Group 1: The agent is *carcinogenic to humans*. This category is used when there is *sufficient* evidence for cancer in humans. In other words, there is convincing evidence that the agent causes cancer in humans.

Group 2A: This category includes agents with a range of evidence regarding cancer in humans and in experimental animals. At one extreme of the range are agents with positive but not conclusive evidence regarding cancer in humans. The agent is *probably carcinogenic to humans*.

Group 2B: The agent is *possibly carcinogenic to humans*.

This category is used when there is *limited* evidence for cancer in humans and less-than-sufficient evidence for cancer in experimental animals. It may also be used when the evidence regarding cancer in humans does not permit a conclusion to be drawn.

Group 3: The agent is *not classifiable as to its carcinogenicity to humans*.

The IARC working group, made up of 25 international experts, found that “occupational exposure as a fire fighter causes cancer.” The IARC found sufficient evidence for cancer in humans for mesothelioma and bladder cancer, and limited evidence for several other cancers, including colon and prostate cancer.

The classification, announced in Lyon, France, on July 1, marks a dramatic shift in IARC’s position on fire fighter occupational cancer. This designation will likely have a major impact on the fight against cancer in the fire service, from ongoing medical research to presumptive laws. .

Sources:

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