

Research collaboration changes international classification of firefighting to carcinogenic

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The International Agency for Research on Cancer (IARC) recently classified occupational exposure as a firefighter as "carcinogenic," changing the previous classification of "possibly carcinogenic." The

reclassification came after many new studies, including several led by the University of Arizona Health Sciences in collaboration with the Tucson Fire Department, supplied evidence that occupational exposure as a firefighter causes cancer.

"The IARC, the foremost international body for [cancer](#) research, is saying that [firefighting](#) is definitely associated with cancer," said Jeff Burgess, MD, Ph.D., professor in the Mel and Enid Zuckerman College of Public Health and BIO5 Institute member. "This is a really important outcome that our research has helped to support, but it's also just the beginning. Now it's our job to work with the fire service to help way find ways of preventing these increased numbers of cancers."

The International Agency for Research on Cancer, the cancer agency of the World Health Organization, convened a working group of 25 international experts and three invited specialists from eight countries to review the scientific literature. They found sufficient evidence that occupational exposure as a firefighter causes mesothelioma and bladder cancer, and limited evidence that it causes colon cancer, prostate cancer, testicular cancer, melanoma of the skin and non-Hodgkin lymphoma. Dr. Burgess was one of the invited specialists who assisted the working group by gathering information on firefighter exposures.

Additionally, new mechanistic studies found consistent evidence that occupational exposure as a firefighter met five key characteristics of carcinogens, providing strong mechanistic support for the new classification. Several of the findings, specifically about epigenetic and receptor-mediated mechanisms of cancer, were from studies Dr. Burgess led in collaboration with the Tucson Fire Department, an organization he has worked with for three decades.

Through this partnership with the University of Arizona Health Sciences and the Fire Fighter Cancer Cohort Study, the Tucson Fire Department

became a national leader in firefighter cancer research. One particularly impactful achievement was identifying interventions to reduce firefighter exposures and thereby reduce their cancer risk. The Tucson firefighters are now sharing their successful interventions with other fire departments around the country.

"I am so proud of the partnership with the University of Arizona Health Sciences and the Fire Fighter Cancer Cohort Study," said Darin Wallentine, retired deputy chief of safety and wellness for the Tucson Fire Department. "During my time with the Tucson Fire Department and the Safety and Wellness Division, the Tucson Fire Department became a national leader in firefighter cancer research. Being named as a co-author in groundbreaking firefighter [occupational exposure](#) studies is a tremendous honor and a rewarding career achievement."

More than 15 million firefighters worldwide are exposed to a complex mixture of combustion products from fires—[polycyclic aromatic hydrocarbons](#), [volatile organic compounds](#), metals and particulates—diesel exhaust, building materials such as asbestos, and other hazards including heat stress, shift work, and ultraviolet and other radiation. In addition, the use of flame retardants in textiles and of persistent organic pollutants including per- and polyfluorinated substances in firefighting foams has increased over time.

"The research that supports this new IARC classification gives us new insights into the risks firefighters face on the job. It's another example of how public [health](#) research provides data to create a safer, healthier world," said Iman Hakim, MD, Ph.D., MPH, dean of the Zuckerman College of Public Health. "I'm so proud of Dr. Burgess and his team for the collaborative research they have done—and continue to do—with the Tucson Fire Department. This is an area where the college brings unique expertise that benefits first responders in Arizona and around the world."

"The new classification gives even more emphasis to the need for exposure reduction and to look at other ways that we might be able to modify the effects of exposures," Dr. Burgess said. "We need to figure out how to prevent or reverse those effects, beyond just reducing exposures."

A summary of the final evaluations that led to the new classification was published online in *The Lancet Oncology*. The detailed assessment will be published in 2023 as Volume 132 of the International Agency for Research on Cancer Monographs.

More information: Paul A Demers et al, Carcinogenicity of occupational exposure as a firefighter, *The Lancet Oncology* (2022).
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