

The Three Key Fire Fighter Cancer Studies

Three key studies provide the scientific basis regarding increased cancer risk from the occupation of firefighting. The LeMasters meta-analysis, a study by the National Institute for Occupational Safety and Health (NIOSH) and a study by Pukkala and colleagues of fire fighters in Nordic countries provide significant information about cancer risks in fire fighters.

LeMasters Meta-Analysis

The LeMasters meta-analysis was a widely reviewed report developed by environmental health researchers at the University of Cincinnati.

This study, published in 2006, was a comprehensive investigation of cancer risks associated with fire fighters using a research technique known as “meta-analysis.” Meta-analysis is a quantitative statistical analysis method that pools data from separate but similar experiments or studies. Using meta-analysis, researchers are able to test the pooled data for statistical significance which is better able to detect increased risk.

LeMasters and her colleagues combined data from 32 smaller studies of fire fighters for 20 different cancer types. They classified the cancers into three categories: probable, possible, or unlikely. The study identified 10 cancers that have significant increases in fire fighters.

Fire Fighters' Increased Risk of Developing Cancer Compared to the General Population:

- i) Testicular cancer (102% greater risk)
- ii) Multiple myeloma (53% greater risk)
- iii) Non-Hodgkin lymphoma (51% greater risk)
- iv) Skin cancer (39% greater risk)
- v) Prostate cancer (28% greater risk)
- vi) Malignant melanoma (32% greater risk)
- vii) Brain cancer (32% greater risk)
- viii) Rectum (29% greater risk)
- ix) Stomach (22% greater risk)
- x) Colon cancer (21% greater risk)

LeMasters GK, Genaidy AM, Succop P, Deddens J, Sobeih T, Barriera-Viruet H, et al. Cancer risk among firefighters: a review and meta-analysis of 32 studies. JOccup Environ Med.. 2006 Nov;48(11):1189–202.

The NIOSH Study

A study from the National Institute for Occupational Safety and Health (NIOSH) examined firefighters in the statewide California Cancer Registry and found that firefighters had increased risks for several major cancers. Black and Hispanic firefighters were found to have increased risks for more types of cancer than white firefighters. For the purposes of the study, only adult male subjects were included.

Firefighting is considered one of the most hazardous occupations and involves regular exposure to known carcinogens. In this study, which used data from 1988-2007, firefighters were found to have increased risks for several cancers, including melanoma, acute myeloid leukemia, multiple myeloma, and cancers of the esophagus, prostate, brain, and kidney. Black and Hispanic firefighters, unlike white firefighters, were also found to have increased risks for non-Hodgkin lymphoma, chronic lymphocytic leukemia, chronic myeloid leukemia and cancers of the tongue, testis, and bladder.

Of the 32 cancers assessed, the risks of 14 cancers were significantly elevated in one or more firefighter groups. The study, which used data from 1988-2007, found firefighter to have increased risks for several cancers, including melanoma, acute myeloid leukemia, multiple myeloma, and cancers of the esophagus, prostate, brain, and kidney.

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sai, R.J., Luckhaupt, S.E., Schumacher, P., Cress, R.D., Deapen, D.M. and Calvert, G.M. (2015), Risk of cancer among firefighters in California, 1988–2007. Am. J. Ind. Med., 58: 715-729. doi:[10.1002/ajim.22466](https://doi.org/10.1002/ajim.22466)

The Nordic Study

The Nordic study, the third key study, studied the likelihood of cancer risk in a cohort of 16,422 fire fighters from five Nordic countries. Cancer incidence was assessed by linking national cancer registries to census data on occupations from 1961 – 2005.

The study found an increased risk for all cancers combined in fire fighters similar to the NIOSH study.

An increased risk, mainly in ages of 70 years and higher, was observed for non-melanoma skin cancer (SIR=1.40, 95% CI 1.10 to 1.76), multiple myeloma (SIR=1.69, 95% CI 1.08 to 2.51), adenocarcinoma of the lung (SIR=1.90, 95% CI 1.34 to 2.62), and mesothelioma (SIR=2.59, 95% CI 1.24 to 4.77).

It also found statistically significant increased risk for developing the following cancers:

- i) Prostate cancer (13% increase)
The highest risk was found among fire fighters 30 – 49 years old: (159% increased risk)
- ii) Malignant melanoma (25% increase)
- iii) Non-melanoma skin cancer (33% increase)
- iv) Mesothelioma in fire fighters over 70 years of age (159% increase)
- v) Lung adenocarcinoma (29% increased risk)

Pukkala, E, et al. (2014). "Cancer Incidence among firefighters: 45 years of follow-up in five Nordic countries JPccup Environ Med 71:398-404.