

IAFF OCCUPATIONAL PRESUMPTIVE CANCER LEGISLATION TESTIMONY



OCCUPATIONAL HEALTH AND SAFETY DEPARTMENT  
INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS, AFL-CIO-CLC

Good Afternoon, I am Dr. John Norton. I am an Occupational Medicine Fellow at Johns Hopkins University, Baltimore, Maryland currently rotating through the International Association of Fire Fighters in completion of my practicum year for board certification in occupational medicine. I am also currently employed full time as an emergency room physician at Calvert Memorial Hospital in Calvert County, Maryland. I received my MPH degree at the Medical College of Wisconsin in April of 1988.

On behalf of the International Association of Fire Fighters, I am here today to discuss the relationship between cancer and fire fighting and the need for passage of legislation which addresses the inordinate cancer experience of fire fighters.

Prior to doing this, I believe it is important for you to understand what our organization is and who we represent at these hearings.

The IAFF is an international union affiliated with the AFL-CIO and the Canadian Labour Congress. At the present time, we represent over 225,000 paid professional fire service employees in the United States and Canada. The membership of the IAFF is employed by various parties which include: the federal government, states, counties, municipalities, fire districts, airports, industrial manufacturers, and so on.

The IAFF has been actively involved in the health and safety problems of fire fighters for more than twenty years. Each year we conduct an annual death and injury survey with the cooperation and participation of various fire department administrators. This survey has shown that fire fighting is the most hazardous occupation in the United States.

During the ten year period, 1986-1995, the D & I survey has found that professional fire fighters experienced 352 line-of-duty deaths, 611 occupational disease deaths, 337,622 injuries and 7,467 forced retirements due to occupationally induced diseases or injuries. Fire fighter line-of-duty fatalities have ranked fire fighting among other publicized hazardous occupations in the private sector, such as mining and construction.

This afternoon, I wish to specifically address that are pertinent to the need to enact legislation to clearly indicate that cancer is occupationally related to fire fighting. I will address:

The phases of fire fighting;

Fire fighter exposure studies;

Prevalent fire fighter cancers and associations with such exposures; and

Conclusions regarding the need for this legislation.

#### Phases of Fire Fighting

- Not just fire suppression but:
  - Knockdown (refers to active firefighting): in which respirators and other personal protective equipment (PPE) are not 100% effective in preventing exposure, especially of substances that can enter the body through respiration;
  - Overhaul: which occurs after a fire has been put out and existing structures are destroyed and for safety purposes and to attempt to determine the cause of the fire. It is important to note that respirators are commonly not used during this phase, and the likelihood of repairable carcinogen in soot, as well as other carcinogens such as asbestos being dislodged and inspired exists.
  - Clean-up after a fire in which carcinogens in soot/residue on PPE may be absorbed, particularly through hydrated skin
  - Diesel exhaust in firehouses, where fire fighters spend long hours, is also an established carcinogen. Diesel exhaust from fire trucks, particularly if engines are run in closed houses without direct venting to outside air, may lead to high levels of diesel exhaust emission particulates that are likely carcinogenic.

In Buffalo, Brandt-Rauf et al. used personal portable sampling devices to measure exposures of 51 fire fighters at 14 fires. The tubes of the sampling devices were attached to the fire fighters' turnout gear, thereby representing ambient air outside the mask. Benzene was second only to carbon monoxide as the most common chemical substance detected at the fires. It was detected in 18 of 26 samples from twelve of 14 fires. When detectable, the concentration of benzene ranged from 8.3 to 250 ppm. In only one sample where benzene was detected was its concentration below 10 ppm. Even when the smoke's intensity was rated as low, benzene was usually present in concentrations ranging from 22 to 54 ppm. The authors noted that respiratory protection was only partially used or not used at all at the fires judged to be of low smoke intensity.

Jankovic and colleagues at the National Institute for Occupational Safety and Health (NIOSH) (NIOSH is the technical and research institute for OSHA) studied benzene and other exposures at 22 fires, including 6 training fires, 15 residential fires, and 1 automobile fire. Samples were collected via probes placed inside and outside the masks of working fire fighters. In addition, industrial hygienists used a variety of sampling devices at the fire scene. Samples were taken separately during the two phases of a fire: knockdown and overhaul.

Half of the samples taken during the knockdown phase of the fire showed benzene in concentrations of 1-22 ppm. Of the 29 organic substances analyzed qualitatively by gas chromatography/mass spectrometry, benzene was the most common compound detected and was the only substance present in all eight samples.

## Exposure Studies

- Firefighters are routinely exposed to complex and dynamic mixtures of chemical substances that are contained in fire smoke and building debris. Despite the large numbers of people employed in *this* occupation, the nature of these exposures *is not well defined*. *Nevertheless, I* will next outline numerous studies to date that demonstrate that fire fighters are routinely exposed to carcinogens:

### Benzene

Benzene is firmly established as a human carcinogen. Numerous studies have shown that benzene is a common airborne contaminant in fire smoke and occurs in concentrations that are considered deleterious in the context of chronic exposures.

In Boston, Treitman, Burgess, and Gold studies ambient environmental levels of a number of air contaminants, including benzene, at more than 200 structural fires. Benzene was detected in 181 of 197 (92%) samples taken at fire scenes by air sampling units placed on the chests of fire fighters. Half of the samples showed benzene over 1 part per million (ppm), the current Occupational Safety and Health Administration (OSHA) permissible exposure level. Approximately 5% of the samples were above 10 ppm benzene.

In Dallas, Lowry and colleagues studied fire fighters' exposure to benzene at nearly 100 structural fires. They found benzene at the majority of the fires but did not provide information about the levels measured. They also detected the presence of at least 70 organic chemical species regardless of whether synthetic materials were a major part of the materials burned.

To measure the efficacy of respiratory protection, samples for benzene were taken inside and outside the mask. Surprisingly, the levels of benzene inside the mask were as high as those taken outside the mask and ranged from nondetectable to 21 ppm. The authors attributed this equivalence in benzene concentrations inside and outside the mask to partial nonuse of the mask at the fire, especially after the initial phase of fire knockdown. They further suggested that benzene may be present only during the latter part of knockdown.

During the overhaul phase of the fire, when respiratory protection is frequently removed, benzene was found.

### Asbestos

Asbestos is universally recognized as a human carcinogen and has caused an excess in risk of a variety of cancers in numerous occupations. Since the building destruction caused by fires and the building demolition actively performed by fire fighters during overhaul are likely to dislodge respirable asbestos fibers, the likelihood that fire fighters have exposure to asbestos is high.

In New York City, Markowitz and colleagues formed a study of 212 fire fighters who had begun employment in the New York City Fire Department at least 25 years previously. Twenty of the 152 (13%) fire fighters without prior exposure to asbestos had pleural thickening and/or parenchymal opacities on chest x-ray that represented characteristic sequelae of prior asbestos exposure.

The finding of excess risk of lung and pleural fibrosis due to asbestos among fire fighters indicated that significant asbestos exposure has occurred in this group. Since significant asbestos exposure confers excess risk for selected cancers, it is reasonable to expect that fire fighters have an increased risk of various cancers as a result of their exposure to asbestos.

### Polycyclic Aromatic Hydrocarbons

Polycyclic aromatic hydrocarbons (PAHs) are a class of organic substances that have been implicated as the carcinogenic substances in coal tar pitches, coal tar, and selected mineral oils. They have been associated with excess risk of a variety of cancers, including cancer of the skin, lung, kidney, and bladder.

Given the combustion of diverse materials at fires, it is likely that fire fighters would be exposed to significant levels of PAHs. In their recent study, Jankovic et al. evaluated the presence of PAHs at the scene of fires. All 14 PAHs measured, including benz(s)pyrene, were present at mean values of 3-63 micrograms/cubic meter during the knockdown phase of the fire.

### Formaldehyde

Formaldehyde has been measured at the fire scene by Lowry et al., Brandt-Rauf and colleagues, and Jankovic et al. reported combined formaldehyde and acetaldehyde levels, with a mean of 5 ppm and a range of 1 to 15 ppm. Brandt-Rauf and colleagues found aldehydes, including formaldehyde, at 4 of 14 fires at concentrations of 0.1 to 8.3 ppm. Jankovic et al. detected formaldehyde at levels up to 8 ppm during knockdown and only 0.4 ppm during overhaul. They also reported that airborne concentrations of formaldehyde inside the mask ranged from nondetectable to 0.3 ppm.

## Other Agents

Since the beginning of World War II, the production of synthetic chemicals has increased 350-fold in the United States. With the addition of thousands of synthetic chemicals annually, it becomes impossible to study the carcinogenic properties of each every one of them. Furthermore, the latency period (the time from exposure to disease manifestation) for many cancers is many years, and, therefore, adverse health effects (including cancer) are often not identified for decades.

## Prevalent Cancers in Firefighters and Associations with Carcinogenic Occupational Exposures

- The result of 19 epidemiological studies in the medical literature show that employment as a fire fighter increases the risk of developing and dying from certain specific cancers.

### Brain Cancer (refer to figure 1)

With reference to figure 1, the vertical axis represent the name of the study (and year). The horizontal axis represents risk. A risk of 100 means that there is no difference between the fire fighter and the comparison group (e.g., general population or police officer); a risk of greater than 100 means that an increased risk (e.g., 150 means 1.5 times greater); and a risk of less than 100 suggests a decreased risk for the fire fighter. It is important to look at the majority of the studies as indicating a trend in order to properly interpret these diagrams. Chemical exposures that are suspected causes of brain tumors include vinyl chloride, benzene, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), N-nitroso compounds, triazines and hydrazines. Recent epidemiologic studies consistently have found that brain cancer is strongly associated with firefighting, as shown in Brain Cancer figure 1. Generally, excess risk was most notable within 15-30 years of exposure, i.e., after a relatively short latency.

Most notably, Tornling et al. were unique in finding dose response relationships between brain cancer incidence and increasing age, duration of employment, and years since hire, and between brain cancer mortality and increasing age, duration of employment, and estimated number of fires fought.

*Most brain cancers are incurable.*

### Cancers of Blood and Lymphatic Systems

Leukemia and lymphoma are associated with environmental and occupational exposure to benzene and 1,3 butadiene. The prevalence of benzene as a solvent, as a component of gasoline, and as a combustion product that forms during the burning of plastics and synthetics, and of 1,3 butadiene, a monomer found in tires and synthetic rubber products, guarantees that fire fighters will be exposed to gases released by these materials as they burn.

#### - Leukemia

As seen in the Leukemia figure 2, the majority of epidemiologic studies have found that fire fighters are at increased risk of leukemia.

For example, Feuer and Rosenman reported a statistically significant increased risk of 2.7 times for fire fighters compared to police officers in New Jersey and an almost twofold increase in mortality compared to the general population in New Jersey and in the United States.

Similarly, Sama et al. found that fire fighters had almost three times the risk of police officers when incident cases reported to the Massachusetts Cancer Registry from 1982 to 1986 were examined.

A recent large study from NIOSH combining mortality data from 27 states reported excess risk of 2.8 times for fire fighters younger than 65.

- Non-Hodgkin's Lymphoma (refer to figure 3)

Several studies of fire fighters evaluated this group of malignant diseases. Without exception, marked increases in risk were found.

The study from the Massachusetts Cancer Registry by Sama et al. found a statistically significant risk of 3.3. times for fire fighters relative to police officers.

Studies by Giles et al. from Melbourne, Australia, and Aronson et al. from Toronto, Ontario Canada, reported that fire fighters had twice the risk of non-Hodgkin's lymphoma of males in the general population.

- Multiple Myeloma

Howe and Burch combined the results of all cancer mortality studies of fire fighters available as of 1989 (including four unpublished reports) and concluded that there was a consistent evidence of a causal association between multiple myeloma and firefighting.

*Most blood cancers are incurable.*

- Bladder Cancer (refer to figure 4)

Occupational chemical exposures known to cause bladder cancer include several aromatic amines, solvents, benzidine, PAHs, coal tars and pitches, soot and oils, substances commonly encountered by fire fighters, particularly at fires in commercial establishments. As seen in Bladder Cancer figure 4, the majority of epidemiologic studies found that firefighting was associated with increased risk of bladder cancer deaths compared to general population rates.

- Kidney Cancer

Occupational exposures that have been implicated as risk factors for renal cell carcinoma include asbestos, PAHs, lead phosphate, dimethyl nitrosamine, coke oven emissions, and gasoline. This list clearly includes agents encountered in firefighting.

- Prostate Cancer (refer to figure 5)

High rates of prostate cancer have been reported among workers with cadmium exposure and in chemists, farmers, loggers, textile workers, painters, and rubber industry workers. The Prostate Cancer chart summarizes the data on fire fighters' risk for prostate cancer. A 30-40% increase in risk was consistently found in the majority of studies.

- Testicular Cancer

A recent report by Aronson et al. found higher than expected mortality for men employed by the Toronto Fire Department during 1950-1989. Over this 40-year period, three testicular cancer deaths occurred in the cohort when only 1.19 were expected based on the Toronto male population of the same age and calendar period. This gives an overall increased risk of 2.5 times for fire fighters. All three deaths occurred in younger men with less than 15 years as fire fighters and within 20 years of first exposure.

## - Cancers of the Digestive System

Several established occupational exposures increase the risk of cancer of the digestive system: asbestos, cutting and lubricating oils, dyes, solvents, and metallic compounds. It is hypothesized that, once cleared from the airways, inhaled particles and the carcinogens that adhere to them are transferred to the gastrointestinal tract and swallowed and exert their effect on the digestive epithelium. Cancers of the rectum, colon, liver, pancreas, stomach, and esophagus were assessed in the majority of epidemiologic studies.

## - Colon Cancer (or Lung Intestine Cancer) (refer to figure 6)

Of particular relevance to fire fighters are the higher than expected rates of colon and rectal cancer observed in workers with exposure to asbestos. Colon Cancer figure 6 demonstrates that excess rectal cancer has been found consistently in many studies of fire fighters. A similar pattern was evident for colon, colorectal or intestinal cancer. An analysis by Burnett and colleagues of mortality data for fire fighters from 27 states found a statistically significant excess risk of rectal cancer of 1.8 times in fire fighters, particularly under age 65. Orris et al. reported significantly higher mortality in Chicago fire fighters during 1940-1988 for both rectal and colon cancers.

## - Liver Cancer

Primary liver cancer is rare in the general population of the United States. Angiosarcoma of the liver has been associated with occupational and environmental exposures, including arsenic and vinyl chloride monomer from PVC. PVC can be assumed to be present at every structural fire site in recent years involving furniture, electrical wire, and cable insulation and water pipes, and at automobile fires.

The study with the largest number found a twofold excess of liver cancer mortality relative to the United States population among fire fighters in San Francisco who were employed between 1940 and 1970.

*Most liver cancers are incurable.*

#### - Skin Cancer

The most common risk factor for cancers of the skin is prolonged and intense exposure to sunlight. Occupational exposure to soot and tars, coke oven emissions, arsenic, and cutting oils also have been associated with increased risk. Substances containing carcinogenic agents such as PAHs and PCBs may be absorbed by the skin of exposed body areas, including the hands, arms, face and neck, and other sites when protective clothing is permeated. Contact with these substances can occur during fire knockdown and overhaul and during the cleaning of clothing or equipment.

Skin Cancer figure 7 summarizes the studies that addressed skin cancer risk. Feuer and Rosenman found an almost three-fold increase in skin cancer mortality for New Jersey fire fighters compared to the U.S. population (2.7 times greater). Risk among fire fighters clearly increased with duration of employment.

In conclusion, empirical data are sufficient to support the notion that fire fighters are exposed to carcinogens in their work environment.

In addition, the respiratory protection and other personal protective equipment used by fire fighters is of uncertain efficacy and in the real world. Additionally, the protective equipment is often not used in overhaul and carries carcinogens back to the fire station.

Furthermore, apart from known carcinogens, fire fighters are potentially exposed to thousands of new synthetic chemicals being introduced into houses and commercial structures yearly. There is much residual uncertainty as these chemicals are introduced.

The epidemiological studies presented demonstrate increased risk of several cancers that can be plausibly linked with carcinogenic exposures encountered by fire fighters in their work. The data most strongly suggest that fire fighters are at increased risk of developing and dying from leukemia, Non-Hodgkin's lymphoma, multiple myeloma, brain cancer, bladder cancer, and colon and rectal cancer.

Leukemia, Lymphoma, and Multiple Myeloma, cancers of the blood and lymphatic system, are caused by benzene and 1,3-butadiene. Exposure measurement show that fire fighters are exposed to high concentrations of benzene.

Skin cancer is caused by soot containing polycyclic aromatic hydrocarbons. Fire fighters are exposed to soot and polycyclic aromatic hydrocarbons;

Bladder cancer is caused by gasoline and polycyclic aromatic hydrocarbons. Fire fighters are exposed to gasoline and polycyclic aromatic hydrocarbons;

Colon and rectal cancer is caused by polychlorinated biphenyl compounds. Fire fighters are exposed to polychlorinated biphenyl compounds;

*and the list continues...*

The majority of studies that examined these cancers found markedly elevated risks of fire fighters, and there are no viable hypotheses or strong confounders that could readily explain their increased prevalence.

Although there are more questions to be answered, and more chemicals to be studied for adverse health effects, I believe that there is enough scientific and medical evidence to show that fire fighters suffer from cancer due to their exposures in performing tasks associated with fire fighting. I believe that Wisconsin should enact legislation to indicate that cancer is occupationally related to firefighting.

*References:*

Golden, Anne L., PhD., Markowitz, Steven B., MD, Landrigan, Philip J., MD, MSc: "The Risk of Cancer in Firefighters," OCCUPATIONAL MEDICINE: State of the Art Reviews - Vol. 10, No. 4, October-December 1995.

# Professional Fire Fighters of Wisconsin, Inc.

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**DATE:** March 17, 1998

**MEMO TO:** State Representatives

**MEMO FROM:** Joe Strohl, Lobbyist JS  
Professional Fire Fighters of Wisconsin

**RE:** ALLIANCE OF CITIES CANCER STUDY

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The Alliance of Cities would have you believe they have reviewed the cancer studies of fire fighters and that there is little evidence that there is any increased risk for fire fighters.

**THE CANCER STUDIES DO SHOW THAT THERE IS INCREASED RISK!**

Attached is a copy of the Alliance of Cities so-called analysis of the various studies. We have looked at the portions of the real studies they quote and have refuted and/or responded to each claim made by the Alliance.

Attached is the PFFW response.

If you have any questions, please let us know.

Enclosures (2)

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March 4, 1998

COPY

Dear Senator Plache:

## SB-329--Cancer Presumption Bill

The Wisconsin Alliance of Cities maintains that there is little or no evidence indicating that there is increased risk of cancer among fire fighters. Their position is summarized in a document titled "**SUMMARY OF SCIENTIFIC STUDIES ON CANCER RISK AMONG FIRE FIGHTERS.**"

The Alliance apparently reviewed some cancer studies and selectively used quotes in an attempt to prove their point of view. In reviewing the full studies, we have found that the quotes were either taken out of context or when the study did conclude there was a direct link between fire fighting and cancer that was omitted.

We have reviewed at least seven of the studies quoted and want to point out where we believe the Alliance has been misleading. These include:<sup>1</sup>

1. *Researchers at the National Cancer Institute of Canada reported in December, 1990, a lower than expected lung cancer death rate and the same risk of colon cancer as among the general population, based on studies of fire fighters in Boston, the Pacific Northwest, Canada and western Australia. (Howe and Burch, 1990)*

**Howe and Burch combined the results of all cancer mortality studies of fire fighters available as of 1990. They derived pooled estimates of risk for specific types of cancer and strictly evaluated the consistency of the results of the various studies. Howe and Burch found that for three cancers, there was evidence of a consistent association with fire fighting: Brain cancer--1.45 times the normal rate, multiple myeloma--1.51 times the normal rate and melanoma at 1.73 times the normal rate.**

<sup>1</sup> The material in italics is quoted from the Alliance document. The statement in bold is what the League failed to mention but is included in the studies.

2. *A researcher at the University of Alberta in Edmonton found that there was "no strong evidence" of increased risk of lung cancer, heart disease or obstructive pulmonary disease among fire fighters and that the death rates of fire fighters from all causes and from heart disease were "close to the expected standardized mortality ratio." (Guidotti, 1993)*

**Guidotti went on to state that fire fighters risk of developing cancer of the kidney or ureter was 4.14 times the normal rate, cancer of the bladder was 3.16 times the normal rate and colon and rectal cancer was 1.61 times the normal rate. Overall, statistically significant excesses were found for all cancer.**

3. *A 1991 California study on causes of death among San Francisco fire fighters found a lower than expected overall death rate among more than 3,000 fire fighters employed between 1940 and 1970 and "fewer cancer deaths than expected." The study did find excess deaths from esophageal cancer, cirrhosis and other liver diseases. "These increased risks may have been due to toxic exposure, alcohol consumption, or interaction between alcohol and toxic exposure, the researchers concluded ". . . taken as a whole the studies published to date (including the present study) do not consistently show increased risk for any type of cancer." (Beaumont, 1991)*

**Beaumont found incidences of cancer of the esophagus at more than twice the normal rate. Among subgroups by years since hire, stomach cancer increased after 40 years to more than twice the normal rate and biliary tract (liver and gall bladder) cancer after 30-39 years increased to almost four times the normal rate. Death rates for cancer of the lip, rectum and skin were also higher than expected overall.**

4. *A 1987 study of Boston fire fighters found "inconsistent evidence for and increased risk of mortality from cardiovascular disease, respiratory disease, cancer and accidents." (Musk, 1978)*

**Musk did find evidence of excess mortality from cancer of the rectum. Rectal cancer rates in fire fighters were found to be 1.53 times the normal rate.**

5. *A 1987 study of more than 1,800 fire fighters in Buffalo found fewer than expected deaths from all causes but higher than expected incidence of colon and bladder cancer. (Vena and Fiedler, 1987)*

**Overall cancer mortality was highest in long-term fire fighters, and risk increased with increasing latency (2.2 times normal rate for all malignant neoplasms after 40 years). Statistically significant increases were seen particularly among fire fighters employed 40 years or more. Colon cancer--4.71 times normal rate after 40 years, bladder cancer--5.71 times**

Wisconsin Legislator  
Cancer Presumption Bill  
March 4, 1998

the normal rate after 40 years and for fire fighters employed for 20-29 years brain cancer risk was found to be 3.75 times the normal rate.

6. *A 1984 study of male fire fighters in Seattle and Tacoma, Wash., found cancer risk among fire fighters "similar to both the police and the general male population for the common sites." (Demers, 1994)*

Compared to the general population, Demers found the risk of prostate cancer was significantly elevated, moderate nonsignificant excesses were seen for stomach cancer and melanoma of the eye. Compared to police, the risk of non-Hodgkin's lymphoma and cancers of the bladder, brain, colon and rectum were somewhat elevated.

7. *A 1994 study of fire fighters in Stockholm found "cancer incidence . . . equal to the expected." (Tornling, 1994)*

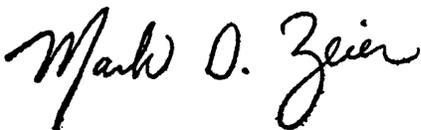
Tornling found the total cancer incidence and mortality were at the expected level, however, increasing risk was observed with increasing age, employment time and number of fires. Incidence of stomach cancer was significantly more common than expected. Both incidence and mortality increased with duration of employment and number of fires. Excess mortality from brain cancer was seen with increasing risk with increasing exposure. Incidence was nonsignificantly elevated for cancer of the rectum and anus as well as liver and prostate.

The Alliance document must have inadvertently included at least one study that they admit supports the position of the PFFW. Early in their document, they state "A Seattle researcher found in 1988 that fire fighters under age 40 who served in four cities from 1945 to 1980 were **60% more likely** (emphasis from the Alliance) than other Americans to die of cancer."

The PFFW agrees with that statement! That is the reason SB-329 is before the State Legislature.

If you have any questions regarding this information, please do not hesitate to give us a call.

Sincerely,



Mark D. Zeier  
State President



## WISCONSIN ALLIANCE OF CITIES

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### SUMMARY OF SCIENTIFIC STUDIES ON CANCER RISK AMONG FIRE FIGHTERS

#### Overall Cancer Risk:

"Fire fighters are exposed to heavy smoke, poisonous gases and carcinogens every day, but data linking cancer as an occupational risk of fire fighting have been conflicting at best," the *Journal of the National Cancer Institute* reported in July, 1991.<sup>1</sup>

The publication was commenting on three studies:

- Researchers at the National Cancer Institute of Canada reported in December, 1990, a lower than expected lung cancer death rate and the same risk of colon cancer as among the general population, based on studies of firefighters in Boston, the Pacific Northwest, Canada and western Australia. (emphasis in this and following cases added)<sup>2</sup>
- A Seattle researcher found in 1988 that firefighters under age 40 who served in four cities from 1945 to 1980 were 60% more likely than other Americans to die of cancer.<sup>3</sup>
- A researcher at the University of Alberta in Edmonton found that there was "no strong evidence" of increased risk of lung cancer, heart disease or obstructive pulmonary disease among firefighters, and that the death rates of fire fighters from all causes and from heart disease were "close to the expected standardized mortality ratio."<sup>4</sup>

Also, a 1991 California study on causes of death among San Francisco firefighters found a lower than expected overall death rate among more than 3,000 fire fighters employed between 1940 and 1970 and "fewer cancer deaths than expected." The study did find excess deaths from esophageal cancer, cirrhosis and other liver diseases.<sup>5</sup>

"These increased risks may have been due to toxic exposure, alcohol consumption, or interaction between alcohol and toxic exposure," the researchers concluded. "...Taken as a whole the studies published to date (including the present study) do not consistently show increased risk for any type of cancer."

A 1994 study of deaths among firefighters in metropolitan Toronto<sup>6</sup> found a lower than expected number of deaths from all causes but "some evidence" of an increased risk of death from cancer of the brain, "ill-defined" cancers ("other malignant neoplasms) and aortic aneurysms.

The researchers were unequivocal only in their conclusion about brain cancer.

"Despite conflicting results for various cancer sites from epidemiologic studies, excess brain cancer mortality is consistently related to fire fighting," they said.

<sup>1</sup> Francis X. Mahoney Jr., *JOURNAL OF THE NATIONAL CANCER INSTITUTE*, Vol. 83, No. 13, July 3, 1991

<sup>2</sup> Geoffrey R. Howe & J. David Burch, *AMERICAN JOURNAL OF EPIDEMIOLOGY*, Vol. 132, No. 6, December 1990

<sup>3</sup> citation unavailable

<sup>4</sup> Tee L. Guidotti, *AMERICAN JOURNAL OF INDUSTRIAL MEDICINE*, Vol. 23, p. 921-940 (1993) (Not yet published in 1991.)

<sup>5</sup> James J. Beaumont et. al., *AMERICAN JOURNAL OF INDUSTRIAL MEDICINE*, Vol. 19, p. 357-372 (1991)

<sup>6</sup> Kristan J. Aronson et. al., *AMERICAN JOURNAL OF INDUSTRIAL MEDICINE*, Vol. 26, p. 89-101 (1994)

## CANCER RISK STUDY SUMMARY

### Page 2

Some other research:

- A 1992 study of more than 4,500 fire fighters in Seattle, Tacoma and Portland found "no excess risk of overall mortality from cancer but excesses of brain tumours...and lymphatic and haematopoietic cancers."<sup>7</sup>
- A 1978 study of Boston fire fighters found "inconsistent evidence for an increased risk of mortality from cardiovascular disease, respiratory disease, cancer and accidents."<sup>8</sup>
- A 1990 study of fire fighters in Denmark found a significant increase in lung cancer in older firefighters and increased non-pulmonary cancer among younger fire fighters.<sup>9</sup>
- A 1987 study of more than 1,800 fire fighters in Buffalo found fewer than expected deaths from all causes but higher than expected incidence of colon and bladder cancer.<sup>10</sup>
- A 1986 study of New Jersey fire fighters found an increase in skin cancer and cirrhosis.<sup>11</sup>
- A 1995 study of Parisian fire fighters found a "far lower overall mortality" than the typical French male, but greater than expected deaths from genito-urinary cancer.<sup>12</sup>
- A 1984 study of fire fighters in western Australia found "no evidence of increased mortality from cardiovascular or respiratory disease, or from any other cause."<sup>13</sup>
- A 1994 study of male firefighters in Seattle and Tacoma, Wash., found cancer risk among firefighters "similar to both the police and the general male population for the common sites."<sup>14</sup>
- A 1994 study of fire fighters in Stockholm found "cancer incidence...equal to the expected."<sup>15</sup>

Howe and Burch, *op. cit.*, reviewed six of the studies cited above, and concluded that overall there were 68 fewer cancer deaths than expected among the 15,800 fire fighters tracked in the six studies. From those studies and others they found "substantial evidence ... that no association exists between the occupation of fire fighter and risk of overall cancer mortality."<sup>16</sup>

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### Risk for Specific Cancers:

1997 Senate Bill 329 would create a presumption that various types of cancer contracted by fire fighters were caused by his or her employment. Cancers cited in the bill:

**Skin Cancer:** "Although there is some evidence of a statistical association between fire fighting and increased risk of malignant melanoma, there is little evidence to support the causality of the association," Canadian researchers found.<sup>17</sup>

**Bone Cancer:** "Overall, the conclusion must be very tentative because of limited numbers, but there appears to be some evidence of a positive association for multiple myeloma," the same researchers concluded.<sup>18</sup>

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<sup>7</sup> P.A. Demers et al., BRITISH JOURNAL OF INDUSTRIAL MEDICINE, September 1992, p. 664-670.  
<sup>8</sup> A.W. Musk, et al., BRITISH JOURNAL OF INDUSTRIAL MEDICINE, May 1978, p. 104-108.  
<sup>9</sup> E.S. Hansen, BRITISH JOURNAL OF INDUSTRIAL MEDICINE, December 1990, p. 805-809.  
<sup>10</sup> J.E. Vena, R.C. Fiedler, AMERICAN JOURNAL OF INDUSTRIAL MEDICINE, Vol. 11, p. 671-684.  
<sup>11</sup> E. Feuer, K. Rosenman, AMERICAN JOURNAL OF INDUSTRIAL MEDICINE, Vol. 9, p. 517-527.  
<sup>12</sup> S. Deschamps, et al., EUROPEAN JOURNAL OF EPIDEMIOLOGY, December, 1995, p. 643-646.  
<sup>13</sup> E. Eliopoulos, et al., BRITISH JOURNAL OF INDUSTRIAL MEDICINE, May 1984, p. 183-187.  
<sup>14</sup> P.A. Demers, et al., CANCER CAUSES CONTROL, March 1994, p. 129-135.  
<sup>15</sup> Goran Tornling, et al., AMERICAN JOURNAL OF INDUSTRIAL MEDICINE, February, 1994, p. 219-228.  
<sup>16</sup> Howe & Burch, *op. cit.*, p. 1043.  
<sup>17</sup> *Ibid*, p. 1047.  
<sup>18</sup> *Ibid*, p. 1047.

## CANCER RISK STUDY SUMMARY

### Page 3

#### Digestive System Cancer

a. **Colon Cancer:** Only the Buffalo study uncovered any evidence of a link between colon cancer and fire fighting, the Canadian researchers reported. "It therefore appears that the weight of evidence favors the lack of any association," they wrote.<sup>19</sup>

b. **Rectal Cancer:** Of nine studies, three found fewer than expected cases among fire fighters, and just two found more than a 50-50 chance that a case of rectal cancer was job-related.<sup>20</sup> Another researcher found three studies in which deaths from rectal cancer occurred at twice the expected rate, but a more recent study found rectal cancer incidence was no different among fire fighters, police and the general population.<sup>21</sup> Findings like these prompted Dr. Tee L. Guidotti to conclude that there was "no defensible general presumption of risk."<sup>22</sup>

c. **Pancreatic Cancer:** "In general, epidemiological data suggest that firefighting is not associated with cancer of the pancreas," researchers at Mt. Sinai School of Medicine concluded. One study found a "large but nonsignificant" elevation of pancreatic cancers compared with police officers; four reported risk equal to the general population.<sup>23</sup>

d. **Liver Cancer:** Liver cancer is a rare disease. Researchers at Mt. Sinai School of Medicine analyzed studies ranging from the San Francisco study that found a twofold excess of liver cancer mortality among firefighters to the Stockholm study, which found lower than expected incidence of liver cancer. Three studies showed no association between fire fighting and liver cancer, they reported.<sup>24</sup>

e. **Stomach and Esophageal Cancer:** Seven studies that the Mt. Sinai team analyzed found a positive association between stomach cancer and fire fighting, but none of the numbers were statistically significant. Three studies found a positive association for esophageal cancer, and three found a negative association.<sup>25</sup> A California study concluded that increased risks of esophageal cancer "may have been due to firefighter exposures, alcohol consumption, or interaction between alcohol and exposures."<sup>26</sup>

**Lymphatic and Hematopoietic Cancer:** "There is some evidence for both an association and a general presumption or risk," Canadian scientists reported in 1995. "However, the aggregation is medically meaningless." We therefore recommend a case by case approach.<sup>27</sup>

**Other cancers cited in SB 329:** The evidence on other cancers enumerated in the bill is cited in the attached studies but for space reasons is not summarized here.

<sup>19</sup> *Ibid*, p. 1044.

<sup>20</sup> Guidotti, AMERICAN JOURNAL OF OCCUPATIONAL AND ENVIRONMENTAL MEDICINE, December, 1995, p. 1352.

<sup>21</sup> Ann L. Golden, et al., OCCUPATIONAL MEDICINE, Vol. 10, No. 4, December, 1995.

<sup>22</sup> Guidotti, *op. cit.*, p. 1351

<sup>23</sup> Golden, *op. cit.*, p. 814.

<sup>24</sup> *Ibid*.

<sup>25</sup> *Ibid*.

<sup>26</sup> Beaumont, *op. cit.*, p. 357.

<sup>27</sup> Guidotti, *op. cit.*, p. 1348.

# STATES WITH CANCER PRESUMPTION LAWS

ALABAMA

CALIFORNIA

ILLINOIS

LOUISIANA

MARYLAND

MASSACHUSETTS

MINNESOTA

MISSOURI

NEBRASKA

NEVADA

NEW HAMPSHIRE

NORTH DAKOTA

OKLAHOMA

RHODE ISLAND

TENNESSEE

TEXAS

VIRGINIA

## FAX Transmission Sheet



International Association of Fire Fighters, AFL-CIO, CLC  
Department of Occupational Health and Safety  
1750 New York Avenue, NW  
Washington, DC 20006  
(202) 737-8484 FAX: (202) 737-8418

TO: Joe Strohl

ORGANIZATION: PFF of Wisconsin

FAX NUMBER: 608-251-8707

FROM: Rich Duffy

DATE: March 5, 1998

TIME: 11:08 hours

TOTAL # PAGES: 1

COMMENTS: Joe,

From our conversations, the following cancers are covered by your bill:

skin, breast, CNS and Lymphatic, digestive, hematopoietic, urinary, skeletal, oral and reproductive.

*Cancers that would not be covered include:*

respiratory (covered by heart and lung bill), muscle/heart including soft tissue and carcinomas, cervix (this is not a reproductive cancer, but actually a sexually transmitted disease), eye/orbit cancers, and endocrine cancers including thyroid and adrenal.

# Professional Fire Fighters of Wisconsin, Inc.

7 North Pinckney Street • Suite 135 • Madison, WI 53703-2840 • 608/251-5832

Fax 608/251-8707

Member of INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS

Member of WISCONSIN STATE A.F. of L.-C.I.O.



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May 16, 1997

Blair Testin  
Retirement Research Committee  
Room 316  
110 E. Main Street  
Madison, WI 53703

Dear Blair:

We recently discussed with you legislation to provide "presumptive cancer" disability benefits for fire fighters. The original draft of the bill was sent to you some time ago.

During our discussion, we indicated that we would provide you with information on the number of Wisconsin fire fighters that have developed cancer.

We have now completed our survey. The results are as follows:

1. There are 56 municipalities with full time fire departments in Wisconsin. This includes both the City of Milwaukee and a local at the Milwaukee County airport. We have results from 55 of these departments. The only one we have been unable to collect information from is the North Shore Milwaukee Department. This is a new department having been formed from three small departments. The combined department has less than 100 employees.
2. Total employment among the 56 departments is approximately, 3,500 union and 300 in management.
3. During the past 20 years, 26 fire fighters with at least 10 years of service have developed a type of cancer other than lung cancer. (We did not include cancers in these numbers that are already covered under the heart and lung presumption, e.g. lung, esophageal, throat).
4. Of the 26 fire fighters that developed cancer, only 16 were under age 53 and thus eligible for disability benefits under the proposed cancer presumption legislation.

5. Of these 16 fire fighters under age 53, 10 died within one year of leaving the job. Only one lived beyond one year, two are still living (both left their departments within the past 2 years, and three we do not know if they are still living.
6. The average age of the 16 fire fighters when leaving service was 46.67 years.
7. The average numbers of years served as a fire fighter for these 16 was 20.60 years.

We hope this information is helpful to you. I am enclosing copies of the surveys that we received back from our locals. If you have any questions regarding this information, please do not hesitate to give me a call.

Sincerely,



Mark D. Zeier  
State President

Enclosure

## STATE EXPERIENCE WITH CANCER PRESUMPTION

It is difficult to determine the actual cost impact of Cancer Presumption Laws in other states. No two states have exactly the same law. Among the differences are:

1. Some states provide a cancer benefit to all firefighters, even those that retire and then develop cancer. SB-329 only applies to firefighters under age 50 years.
2. Some states only require a firefighter to have been in the occupation for 5 years, SB-329 requires 10 years.
3. The statistics for some states' experience includes lung cancer. That is already covered under Wisconsin law.
4. Most states do not have a state disability or retirement system and thus there are no statewide statistics available.
5. In some states, the firefighter has a choice of either the cancer presumption benefit or workmens compensation.
6. Some state programs apply to both volunteers and to full time firefighters. Wisconsin's only applies to full timers.

Here is what we have been able to determine from some states:

1. MINNESOTA - Law since 1988, they have about 2,000 full time firefighters. In Wisconsin there are approximately 3,500. Only 4 cases have been filed. Three of these have been approved. One of the three had been initially denied by the state but was overturned by state courts.
2. MASSACHUSETTS - Law since 1990, they have about 12,000 firefighters. The state averages about one per month but this includes lung cancer and the state has four times as many firefighters. Lung cancer amounts to about 1/4th of the cancers there.
3. CALIFORNIA - Law since 1987, they have about 23,000 firefighters. They average about 60 cancers per year. However this included both lung cancers and cancers among retirees. There are about 2,000 retirees.
4. RHODE ISLAND - Law since 1986, they have 1,700 firefighters. Between 1991 and 1996 there were six claims.
5. OKLAHOMA - Law since 1987, they have 3,500 firefighters. Between 1993-1996 there were 14 claims paid.

\* \* \*

**STATE OF WISCONSIN****APPENDIX TO 1997 SENATE BILL 329****REPORT OF JOINT SURVEY COMMITTEE ON RETIREMENT SYSTEMS**

(Introduced by Senators Wirch, Rude, Rosenzweig, Wineke, Chvala, Clausing, Burke, Roessler, C. Potter, Risser, Darling, Decker, George, Jauch, Panzer, Plache, Ellis, Moen, Shibilski, Breske and Farrow; cosponsored by Representatives Klusman, Walker, Musser, Krusick, Kreibich, Porter, Handrick, Schneider, Dobyns, R. Potter, Travis, Green, Ryba, Kreuser, Robson, Duff, Steinbrink, Johnsrud, Kedzie, Ladwig, L. Young, Sykora, Lorge, LaFave, Huebsch, Baumgart, J. Lehman, M. Lehman, Harsdorf, Otte, Boyle, Plale, Gunderson, Kaufert, Seratti, Gronemus, Hasenohrl, Underheim, Staskunas, Lazich, Goetsch, Rutkowski, Ott and Plouff.) An Act to amend 40.25 (2), 40.25 (2m), 61.66 (2), 111.35 (4) and 891.45; and to create 40.25 (2t), 40.65 (7)(ar) and 891.455 of the statutes; relating to presumption concerning employment-connected disease for certain municipal fire fighters.

**EXTRACT OF COMMITTEE'S RECOMMENDATION ON THIS BILL****PURPOSE OF THE BILL**

Current law presumes that firefighters who develop heart or respiratory disease subsequent to their employment as firefighters, and after five years of service, have developed the disease as a consequence of their employment, and are therefore eligible for disability and death benefits under Wis. Stats. 40.65. S.B. 329 would provide similar presumption of occupational disability and eligibility under Sec. 40.65 to firefighters with 10 years of service who contract cancer of a type other than that already covered under the existing heart and lung provisions of state law. Unlike other Sec. 40.65 disabilities, they would need 10, rather than 5, years of service to be eligible, and they would not be allowed to withdraw the member's accumulated WRS contributions in addition to drawing an annuity under Sec. 40.65.

- 2 -

### **ACTUARIAL EFFECT**

This bill would have no material actuarial effect on the WRS.

### **PROBABLE COST**

James Searcy, actuary for the Group Insurance Board, has estimated the cost of this bill to be about 0.24% of the payroll for covered firefighters. Estimating that payroll to be \$131.7 million in 1999 implies an estimated cost to employers of \$316,000 for that year. The cost should remain at about 0.24% of firefighters' payroll for a period of 14 years, and then decrease to about 0.14% of payroll, which will be the equivalent of \$190,000 annually measured in current dollars. (This is because the actuary contemplated a 14-year payoff of the initial unfunded liability to the s. 40.65 program that would arise under this legislation.) This cost would be borne by the employers, and there would be no cost to the state.

### **PUBLIC POLICY**

To date, 17 states have adopted cancer presumption laws for firefighters. Of Wisconsin's near neighbors, this includes Minnesota and Illinois.

Research on the exposure of firefighters to carcinogenic agents in the course of their duties has found damaging levels of numerous known and suspected carcinogens present at fires and in firehouses as well. Chief among these are benzene and other aromatic hydrocarbons, asbestos, formaldehyde, chemicals present in diesel exhaust, PCB's, styrene, methylene chloride, and other organic chemicals. One 1995 review of 19 epidemiologic studies of cancer in firefighters concludes that "The data show that employment as a firefighter increases the risk of developing and dying from certain specific cancers: leukemia, nonHodgkins lymphoma, multiple myeloma, and cancers of the brain, urinary bladder, and, possibly, prostate, large intestine, and skin." ("The Risk of Cancer in Firefighters", Occupational Medicine, vol. 10, no. 4, Oct - Dec 1995.)

Face masks and protective clothing are often inadequate protection for a firefighter, as notably in situations where their use interferes with doing the job (e.g., fogged face masks), and they are not used. Many harmful chemicals absorb through the skin as well as by inhalation, so that it may be impossible for a firefighter to avoid receiving harmful doses of carcinogens. In fact, diesel exhaust from firetrucks present in the air at firehouses has been determined to be a major cause of increased cancer risk for firefighters.

Based on those studies surveyed in the research paper already cited, for which statistical significance was found in the data to support the conclusion of increased cancer risk for firefighters, estimates were made for six types of cancer to answer this question: "What percentages of the cancers occurring in the sampled firefighters would not have occurred if they were not firefighters?" Here are the results:

<u>Type of Cancer</u>	<u>Percentage of Cancers Estimated To Be Due to Additional Occupational Risk of Cancer</u>
Brain cancer	54%
Leukemia	68%
Bladder cancer	54%
Prostate cancer	62%
Rectal cancer	36%
Skin cancer	59%

Under present Wisconsin law, a firefighter contracting cancer is not presumed to be occupationally disabled, so will typically continue to work until he/she is no longer able to, and then take disability retirement under Sec. 40.63 (nonoccupational disability). Social Security disability benefits are, of course, not available to firefighters in our state.

During the past 20 years, 26 Wisconsin firefighters with at least 10 years of service have developed cancer of a type covered under this bill (e.g., not lung cancer). Of these 26, only 16 were under age 53 and thus would have been eligible for disability benefits if S.B. 329 had then been law. Their average age when leaving service was 47 years, and their average length of service was 21 years. Ten of the 16 died within one year of leaving their jobs.

In light of this, the following table of six hypothetical cases seems fairly illustrative of the benefits now available to Wisconsin firefighters under Sec. 40.63 of statute. For each of these six firefighters it is assumed that.....

- Termination from service occurs in 1999.
- Final average earnings at termination from service is \$45,000, and salary history has been typical.
- The firefighter is male, with a wife 4 years younger.

- The firefighter elects a 100% Joint and Survivor annuity (with no certain period) to give his wife the largest possible widow's pension.
- Death occurs one year after the disability annuity commences.

Note that \$45,000 is close to the actual average salary for the 2,600 firefighters now in WRS. To consider salary levels other than \$45,000, simply scale the annuity amounts shown here in proportion to a salary of \$45,000.

Illustrative s. 40.63 Annuities to Firefighters with Cancer  
 (Final Average Earnings = \$45,000 in each case.)

<u>Age Hired</u>	<u>Age Disabled</u>	<u>Credited Service</u>	<u>Annual Annuity Paid</u>	
			<u>First Year</u>	<u>To Surviving Wife**</u>
24	29	5*	\$33,555	\$ 1,589
24	39	15	32,961	5,735
24	49	25	29,891	20,621
34	39	5*	22,270	1,668
34	44	10	21,448	7,713
34	49	15	20,833	11,477

\* Included for comparison only. 5 years of service does not qualify under this bill.

\*\* Includes one year's dividend based on expected (8%) fund rate of return.