

**STATE OF VERMONT
DEPARTMENT OF LABOR**

Estate of A. G.

Opinion No. 51-06WC

v.

By: Margaret A. Mangan
Hearing Officer

VLCT as Insurer for
City of Burlington

For: Patricia Moulton Powden
Commissioner

State File No. U-00900

Hearing held in Montpelier on September 13, 2006
Record closed on October 25, 2006

APPEARANCES:

Joseph C. Galanes, Esq., for the Claimant
John T. Leddy, Esq., for the Defendant

ISSUES:

Was this firefighter's non-Hodgkins lymphoma causally related to his work?

EXHIBITS:

Claimant:

1. Personnel File
2. Medical record
3. James Edward Lockey, M.D., Original report
4. CV of Dr. Lockey
5. Doctors LeMasters and Lockey Supplemental Report of May 3, 2006
6. CV of Grace LeMasters, Ph.D
7. Tee Guidotti, M.D., M.Ph. Original Report
8. Dr. Guidotti CV
9. Dr. Guidotti Bibliography
10. Dr. Guidotti Rebuttal of April 27, 2006
11. Dr. Guidotti Publications
12. Dr. Guidotti Manitoba Report
30. Lockey and LeMasters Study
31. IARC Classification
33. Final Draft of Meta Analysis
36. JOEM Review
38. Guidotti on Chaudry et. al

13. Deposition of James Edward Lockey, M.D., M.S.
14. Deposition of Grace LeMasters, Ph.D.

Defendant:

- A. CV of Richard D. Gerkin, Jr., M.D.
- B. Report of Dr. Gerkin dated March 20, 2006
- C. Supplemental Report of Dr. Gerkin dated June 30, 2006
- D. CV of Kevin L. Wallace, M.D.
- E. Report of Dr. Wallace dated March 20, 2006
- F. Supplemental report of Dr. Wallace dated June 27, 2006

FINDINGS OF FACT

1. The City of Burlington hired A. G. ("Claimant") to work as a firefighter on August 2, 1963. He was 25 years old when hired. Over the next forty years Claimant held most of the jobs in the department. He rose through the ranks first to firefighter first class then lieutenant, captain, battalion chief, chief in charge of fire suppression and finally to assistant chief.
2. Claimant worked until July 14, 2003 when he passed away due to the effects of non-Hodgkin's lymphoma ("NHL").
3. Claimant smoked cigarettes for most of his life, but smoking has not been linked to NHL.

Firefighting and its Link to Carcinogens

4. All of the experts agreed that all firefighters that work in fire suppression encounter a host of agents known to be carcinogenic.
5. The International Agency on Research on Cancer located in Geneva, Switzerland compiled a short list of some of the chemicals firefighters are exposed to while fighting fires. These chemicals include Acetaldehyde, Acrolein, Acrylonitrile, Asbestos, Benzene, (1, 3) Butadiene, Chloroform, Crystalline silica, Formaldehyde, Glycidaldehyde, Soot, Styrene, Vinyl chloride, Wood dust, PAHs. These chemicals are all known carcinogens.
6. All of the experts agree that it is virtually impossible to know how all of the carcinogens react when they are mixed together as a result of combustion.

The Epidemiological and Medical Analysis

7. Epidemiology is the field of public health and medicine that studies the incidence, distribution, and etiology of disease in human populations. Epidemiology addresses whether an agent can cause a disease. It focuses on the question of general causation (i.e., is the agent capable of causing disease?) rather than that of specific causation (i.e., did it cause disease in a particular individual?).

8. The first question an epidemiologist addresses is whether an association exists between exposure to the agent and disease. An association between exposure to an agent and disease exists when they occur together more frequently than one would expect by chance.
9. In order to establish causation in such occupational disease cases as this case it is necessary to demonstrate that there is an association, which is plausibly causal, and that in the individual case the disease arose out of work. This can be achieved either by demonstrating that in the individual case there are risk factors that indicate probable causation or that, absent such individual circumstances, the epidemiological literature suggests that among firefighters in general it is “more likely than not” that the condition arose out of work.

Expert Opinions

10. The occupational health problems of firefighters have been extensively studied. The evidence available today is the best evidence obtainable.
11. Dr. Wallace and Dr. Gerkin agreed that, given the relative infrequency of NHL in the general population and the relatively small number of firefighters, it is virtually impossible to obtain more accurate information than the studies that exist and as summarized in Dr. Lockey and Dr. LeMasters’ meta-analysis and in the testimony of Dr. Guidotti.

Dr. Lockey

12. Dr. Lockey opined, within a reasonable degree of medical probability that Claimant’s work as a firefighter was the cause of his NHL. Dr Lockey has significant background, training and experience in occupational epidemiology, which is a significant part of his daily work. He has frequently acted as lead investigator on many epidemiology studies. He has published many peer-reviewed articles, which are based on epidemiological evidence.
13. In his work at the University of Cincinnati Dr. Lockey does clinical research in the field of occupational environmental exposures. His practice in environmental occupational epidemiology focuses on the relationship between occupational environmental exposures and the potential to cause disease in human populations. That work ranges from exposures that may be associated with cancer, exposures that may be associated with allergic rhinitis and allergic asthma, exposures that may be associated with pulmonary disorders, as well as mental disorders.
14. Dr. Lockey was retained by Claimant to consider the question whether firefighting caused A. G.’s cancer.

15. Dr. Lockey's analysis is based on the following:

- An examination of potential exposures experienced by firefighters on a regular and ongoing basis. He noted that it is a diverse list.
- An examination of potential agents to which a firefighter may be exposed and asked whether any of those agents are known to be carcinogenic. He concluded that the answer to this question was yes.
- He asked whether there were any other potential factors as it applies to Mr. G. that would be known to be associated with a risk for the occurrence of non-Hodgkin's lymphoma. He could not identify any other known risk factors based on the information that was available.
- He examined the medical literature as it applied to firefighters, where he found consistency, across that medical literature, based on epidemiology studies of a cause-effect relationship between this profession and the occurrence of non-Hodgkin's lymphoma.

16. Dr. Lockey opined that the medical research showed a clear association between firefighting and NHL and he noted a lack of any confounders. Smoking is not an issue in this case; and there was no known immune deficiency disorder. Finally, he took into consideration that Claimant worked as firefighter for 40 years and didn't work in other professions.
17. The majority of the human studies either demonstrated a significantly elevated risk from a statistical perspective, or a risk estimate that was substantially higher than the referenced population, but not at a statistically significant level. He noted consistency across the epidemiology studies in relationship to a cause-effect relationship between working as a firefighter and the occurrence of non-Hodgkin's lymphoma.
18. When Dr. Lockey first examined the question presented by this case he advised that he could not reasonably conclude that firefighting legally caused NHL. He explained that the initial data he examined did not seem to reach a threshold for legal causation.
19. But as he got more into the medical literature and looked at more of the articles and put the articles side by side, he saw a much more consistent relationship between the outcomes of the various epidemiology studies and working as a firefighter. He found upon reexamination that the vast majority of the studies demonstrated statistically elevated risk ratios or elevated risk ratios, but not at a statistical level, with a few exceptions. Based on the individual articles, he concluded that in fact there is a cause-effect relationship.
20. During the same time frame, he received a grant from the Ohio Bureau of Workers' Compensation and he became involved with the meta-analysis of firefighters. The results of that study confirmed that there is a statistically significant association between working as a firefighter and a risk for non-Hodgkin's lymphoma.

21. In anticipation of Defendant's first line of defense (i.e. that the epidemiological evidence needs to demonstrate at least a doubling of risk before one can consider the question of causation) Dr. Lockey acknowledged that doubling of risk is a research convention, but that "there's no golden rule that a doubling effect is actually valid or not valid." However, that theory focuses on individual epidemiological studies, in contrast with the multiple studies he evaluated in this case, which increased the rigor of the analysis. Furthermore, he was evaluating data for an individual, not for a group population.

Dr. Tee Guidotti

22. Dr. Guidotti opined "within reasonable medical certainty and given the weight of evidence, [that] Mr. G.'s non-Hodgkin's lymphoma arose from his work as a firefighter and was caused by exposures in the course of his occupation as a firefighter."
23. Dr. Guidotti is a Professor of Occupational and Environmental Medicine and Chair of the Department of Environmental and Occupational Health in the School of Public Health and Health Services at George Washington University Medical Center in Washington, D.C. He has published dozens of peer-reviewed articles in the field of occupational and environmental medicine many of which include analysis of epidemiological evidence.
24. The question of cancer and firefighting has been of interest to Dr. Guidotti since he began studying the link between cancer and firefighting in the 1980s, at first rejecting causation after reviewing the literature available at the time.
25. Since that initial work, Dr. Guidotti published several papers and three books on the subject and has written one book chapter for a separate volume. He has also published on the topic of lymphomas and was a member for two terms of the Vietnam Veterans and Agent Orange Update Committee of the Institute of Medicine (National Academy of Sciences), which has extensively considered lymphomas in another context.
26. In response to his retention in this case Dr. Guidotti updated his review of the medical scientific literature regarding firefighting and NHL and gathered all relevant evidence regarding A. G. He concluded that there was a strong association between cancer and firefighting. Dr. Guidotti then concluded that the association was causal in this case. He based this conclusion on all of the available literature; the fact that A. G. worked for forty years as a firefighter and the fact that there was no evidence of confounders such as immunologic deficit.

27. Dr. Guidotti considered the convention that a doubling of risk was necessary in order to reach a conclusion that an occupation exposure was causally related to a disease process. He explained that with respect to NHL it was probably statistically impossible for any scientific study to obtain a risk ratio the equaled or exceeded a doubling of the risk. Non-Hodgkin's lymphoma is a collection of widely disparate diseases that are not commonly separated in epidemiological studies, for reasons of practicality. Any particular non-Hodgkin's lymphoma that may have a risk elevated substantially above two will be diluted by the inclusion of those that do not. The effect of this is to obscure the association that may exist and to render nearly impossible the demonstration of an association sufficient to satisfy the criterion of "more likely than not" on epidemiological grounds, even when there is evidence that it is present.
28. Dr. Guidotti explained that the cancer contracted by A. G., small lymphocytic cell lymphoma, a B-cell lymphoma, is known to be associated with different occupational risk factors such as solvent exposure and herbicide exposure. As a result, the risk ratio for this particularly type of cancer is probably diluted by inclusion with all the other types of lymphoma that have no association with the exposure. He opined that the true risk for small lymphocytic cell lymphoma, a B-cell lymphoma probably exceeds 2.0.

Dr. LeMasters

29. Dr. LeMasters has a bachelor's and master's degree in nursing and a Ph.D. from the Department of Environmental Health at the College of Medicine, University of Cincinnati. She is a Professor in the Division of Epidemiology and Biostatistics.
30. Based on both a quantitative and qualitative evaluation of the scientific research questioning the causal link between firefighting and NHL she and her coauthors determined that it was a probable risk for firefighters to contract non-Hodgkin's lymphoma. Dr. Grace LeMasters did not render an opinion on specific causation in this case. She is not a medical doctor and did not feel it was within the realm of her expertise to address specific causation. She primarily testified in order to respond to certain criticisms of the meta-analysis she and Dr. Lockey were involved with.

Dr. LeMasters' and Dr. Lockey's Meta-Analysis

31. The meta-analysis undertaken by Dr. Lockey and Dr. LeMasters and their coauthors was funded by the Ohio Workers' Compensation Bureau. They were asked to examine whether the scientific literature supported a causal link between firefighting and cancer.
32. A meta-analysis combines observed and expected risk across a multitude of studies, and then estimates risk. Meta-analysis is helpful when one has particularly rare disease outcomes, such as cancer, and most of the scientific studies have difficulty accumulating sufficient number of cancers for each cancer type. The meta-analysis in this case examined thirty-two studies, eight of which dealt with NHL.

33. Based on their systematic scientific review the researchers concluded that non-Hodgkin's lymphoma showed approximately a 50 percent increase in risk for firefighters over those people who do not engage in firefighting, and this finding was statistically significant.
34. The researchers conclude based upon the quantitative as well as the qualitative assessment of the data and the individual studies that firefighting probably caused non-Hodgkin's lymphoma.

Other Evidence in Support of Finding Causation

35. The Industrial Disease Standards Panel (IDSP) of the Ontario Workers' Compensation Board which reports to the provincial government for Ontario conducted a review of relevant research and reported that "a probable connection exists between firefighting and primary lymphatic and hematopoietic cancers." The IDSP recommended that cancers of the lymphatic and hematopoietic systems be made a rebuttable presumption in cases before the Ontario Workers Compensation Board; its recommendation was accepted.

Defendant's Experts

36. In its defense of this case Defendant offered the opinions of Dr. Michael Wallace and Dr. Richard Gerkin.
37. Dr. Gerkin is Board Certified in Internal Medicine, Medical Toxicology and Cardiology. He practices in Phoenix, Arizona in Internal Medicine, Medical Toxicology and Medical Biostatistics. From 1987 to 2001 he was the Medical Director of the Phoenix Fire Department. Dr. Gerkin opined that there is insufficient medical scientific evidence to support the conclusion that there exists general causation of non-Hodgkin's lymphoma by the occupation of firefighting.
38. Dr. Wallace is Board Certified in Emergency Medicine and Medical Toxicology. He is a Staff Physician at the Banner Good Samaritan Medical Center in Phoenix, Arizona. He is also in the Department of Medicine Divisions of Clinical Pharmacology, Toxicology and Occupational Medicine; Associate Director, Center for Environmental Health Sciences; and Leader, Clinical and Translational Toxicology Group at Dartmouth-Hitchcock Medical Center. In his opinion, when one fails to apply a systemic evidence-based approach to toxicologic causal determination, the results are limited to speculation and/or non-evidence based presumption regarding the presence or absence of a cause-effect relationship.
39. In Dr. Wallace's opinion, none of the scientifically accepted criteria that are applied to toxicologic causation had been satisfied in this case to support a general causal association between firefighting and non-Hodgkin's lymphoma.

40. Dr. Wallace and Dr. Gerkin both assert that there is insufficient evidence to support a causal link between firefighting and cancer. However, neither Wallace nor Gerkin have a working knowledge of occupational epidemiology. Neither has conducted a single retrospective study similar to the ones evaluated in this case and neither has published a single peer reviewed article that addresses issues even remotely similar to the issues presented in this case. Neither has performed medical research examining occupational causes of non-Hodgkin's lymphoma or even occupational causes of cancer generally.
41. Dr. Gerkin based his opinions in this case on his education, training, and experience as a medical toxicologist, and as a biostatistician-epidemiologist. However, Dr. Gerkin has not published an epidemiological study that dealt with cancer risk. Nor has he published epidemiological work assessing the risk of contracting occupational disease. He authored one book chapter, which reviewed three of the relevant studies and concluded that there was not enough evidence at that point to make a conclusion regarding causation.
42. Dr. Gerkin criticized the methodology and conclusions set forth in the meta-analysis. He first claimed that meta-analyses comprising observational studies are considered weaker than clinical studies. Dr. LeMasters responded that Gerkin was comparing these to clinical trials, which divide populations into treatment and non-treatment groups. With epidemiological mortality studies, the firefighters are dead. They cannot be divided into a clinical trial of treatment versus non-treatment group. Furthermore, no occupational environmental study can ethically divide individuals into groups (exposed and unexposed) and then expose half of the study population to suspected carcinogens.
43. Gerkin next pointed out that there are no estimates of exposure in most of the seven studies. Dr. LeMasters points out that comparing subjects as exposed or unexposed, firefighter or not, is a valid surrogate measure of exposure and is often the best available. There is practically speaking no way to consistently measure exposures at each and every fire.
44. Both Dr. Wallace and Dr. Gerkin decry the use of death certificates in the studies used in the meta-analysis. However, all of Claimant's experts in this case and, all experienced in epidemiology, agreed that death certificates are reliable when consider in large numbers. Any errors are probably equally distributed on either side of the equation and as a result the errors offset one another in the final analysis. In this case the studies that utilized death certificates looked at tens of thousands of death certificates.
45. Finally, Dr. Gerkin claimed that the qualitative analysis section of the meta-analysis could cause risk to be overestimated. However, the qualitative analysis could only downgrade the risk estimate connected to any particular study. Under no set of circumstances did the qualitative analysis result in a higher estimate of risk.

46. Dr. Wallace also criticized the studies on which Claimant relied, stating “taken as a whole, the available epidemiologic evidence is of limited internal validity, strength, and consistency and fails to reach or surpass the threshold of more likely than not.” Dr. LeMasters, on the other hand, responded that there was consistency in all seven studies with elevated risk estimates. Further, “these were SMR studies, proportional mortality studies, incidence studies and 10 case control type odds ratio mortality studies.”
47. Next, Dr. Wallace expressed the concern that the “criteria of specificity and experimental evidence/biologic plausibility are not fulfilled in the analysis of firefighting as a possible cause of NHL or any of its subtypes.” However, As Dr. LeMasters noted, “biological plausibility dictates a determination that an exposure could cause an effect.’ From that basic premise is added the fact that benzene, butadiene, styrene and vinyl chloride cause cancer and have been associated with NHL. Therefore, there is a biological plausibility that a firefighter exposed to these elements developed NHL as a result.
48. Dr. Wallace when questioned at the hearing tried to conceal his employment with an entity known as Veritox. When asked about his current employment on direct examination Dr. Wallace failed to disclose his employment with Veritox. Defendant paid Veritox for the opinions of Dr. Wallace. It is reasonable to infer that Dr. Wallace did not reveal this fact because 100% of Veritox’s work is for defendants or insurance companies.
49. Further, in his final written report Dr. Wallace touted the results of one particular governmental study that appeared to support his conclusion in this case. However, he did not know of or look for the several governmental studies that reached a conclusion consistent with Claimant’s position here.
50. Claimant’s counsel entered into a Contingency Fee Agreement with the Estate of A. G., which calls for payment of attorney fees in this matter. A copy of this agreement has been produced. In addition, the total costs of suit to date are \$20,597.

CONCLUSIONS OF LAW

1. Claimant seeks to prove by a combination of epidemiological evidence and an individualized assessment that Claimant’s forty years of work as a professional firefighter caused his non-Hodgkin’s lymphoma.
2. The claimant has the burden of establishing all facts essential to the rights asserted. *Goodwin v. Fairbanks*, 123 Vt. 161 (1963). He must establish by sufficient credible evidence the character and extent of the injury and disability as well as the causal connection between the injury and the employment. *Egbert v. Book Press*, 144 Vt. 367 (1984).

3. There must be created in the mind of the trier of fact something more than a possibility, suspicion or surmise that the incidents complained of were the cause of the injury and the inference from the facts proved must be the more probable hypothesis. *Burton v. Holden & Martin Lumber Co.*, 112 Vt. 17 (1941).
4. Claimant offers opinions from three experts: Dr. James Lockey; Dr. Tee Giudotti; and Dr. Grace LeMasters (only as to the general causation and not specific causation).
5. Dr. Lockey and Dr. Guidotti concluded firefighting caused A. G.'s NHL. To reach this conclusion Dr. Lockey and Dr. Guidotti reviewed all relevant medical evidence, including studies each of them had authored; considered all of the personal information such as length of employment and absence of other risk factors for NHL; and applied their highly relevant background, experience and training as occupational environmental epidemiologists to reach their sound scientific conclusions.
6. Dr. Grace LeMasters did not offer an opinion on specific causation (whether firefighting caused cancer in this particular case). However, in the process of conducting scientific research she reviewed all of the relevant medical literature on the question presented here and she coauthored a peer reviewed scientific study on the exact question presented in this case. The peer-reviewed study concluded that there is a causal link between firefighting and NHL generally. Dr. LeMasters is not a medical doctor and did not feel qualified to render a decision on specific causation in this case.
7. By contrast, Defendant's medical experts, Dr. Michael Wallace and Dr. Richard Gerkin, concluded that there is insufficient scientific evidence to support a causal relationship in this case.
8. None of the medical experts in this case had a treating relationship with A. G. He passed away long before any of the experts became involved in this case. All of the medical experts had all of the relevant medical records.
9. Although Claimant's evidence is detailed and strong, it proves association, not causation. The claimant has not established a causal connection between the general activity of firefighting and NHL.
10. While the experts agree firefighters are exposed to carcinogens, there is no detail as to where those carcinogens exist, and in what amount, in industrial, residential or commercial settings. Intuitively one would expect greater exposures at commercial or industrial fires, especially at facilities where known carcinogens were stored or manufactured in large amounts. The record contains no evidence on the number of such fires attended by Claimant.

11. There is no evidence speaking to the number of fires that Claimant fought, his level of participation in those fires, or the number of industrial or commercial fires where known carcinogens might be present. There is no evidence on the frequency of exposure or types of exposures Mr. G. may have had, respiratory, contact or otherwise. Such evidence may have drawn a clearer picture as to causation. Absent this data, we find that the NHL is possible, but not probable.
12. Even taking the opinions of Dr. Lockey, Dr. Guidotti and Dr. LeMasters as the most authoritative, I find that it is merely possible, not probable, that Claimant's work as a firefighter caused his NHL. Unfortunately that is an insufficient basis for an award under *Burton*.

ORDER:

Therefore, based on the foregoing findings of fact and conclusions of law, this claim is DENIED.

Dated at Montpelier, Vermont this ____ day of February 2007.

Patricia Moulton Powden
Commissioner

Appeal:

Within 30 days after copies of this opinion have been mailed, either party may appeal questions of fact or mixed questions of law and fact to a superior court or questions of law to the Vermont Supreme Court. 21 V.S.A. §§ 670, 672.