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Injured Public Safety Workers

Fitness for Duty and Causation

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I have no disclosures to make.

Disclaimers

- I have no conflict of interest to report.
- The views expressed in this presentation are those of the author and do not reflect the official policy or position of the Transportation Security Administration, the Department of Homeland Security, or the U.S. government.
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Key Messages

- Departmental physician
- Modified duty
- Return to work criteria
- Is this injury job-related?

Firefighter Protection Act (SB 160)

SB 160

- Applies to firefighters*
- List of presumptive occupational diseases
- Coverage under Workers' Compensation Act

Cancers

- Bladder
- Brain
- Breast*
- Colorectal
- Esophageal
- Kidney
- Leukemia
- Mesothelioma
- Multiple myeloma
- Non-Hodgkin lymphoma
- Lung

Other Conditions

- Myocardial infarction
- Asbestosis

Not included

- PTSD
- Stress claim*
- Coronary artery disease, hypertension, other cardiovascular diseases
- COPD
- Prostate cancer

Time Requirements

- Within 10 years of firefighting activities
- Minimal number of years as firefighter (4-15 years)

Other requirements

- Objective medical findings of disease
- No requirement of causal relationship
- For myocardial infarction and lung cancer: “type that can reasonably be caused by firefighting activities”

Other requirements

- No “regular” tobacco use in past 10 years
- No second-hand tobacco exposure in past 10 years

Other requirements

- Medical examination at time of hiring, then every 2 years
- No “objective medical evidence or a family history of the presumptive occupational disease” during initial examination

Rebuttal

- Insurer has burden of proof to establish that the firefighter does not have condition
- Rebuttal if insurer established that exposure to “smoke or particles [was not] in a quantity sufficient to have reasonably caused the disease claimed”
- No rebuttal based on other risk factors?

Claim

- Limited to \$5 million for each claim
- Objective to provide “wage-loss and medical benefits” and not “to make an injured worker whole”
- Multiple employers

Conclusions

- Confirm diagnosis
- Confirm time requirements
- Check tobacco use / exposure in past 10 years (medical records?)
- Rebuttal based on other risk factors???

Conclusions

“[The workers compensation] system must be designed to minimize reliance upon lawyers and the courts to obtain benefits and interpret liabilities.”

Causation

Hypothetical case: FF & CAD

- 55 year old male, battalion chief in a busy fire department
- Disability retirement evaluation based on coronary artery disease
- Past medical history: Hypertension, hypercholesterolemia, obesity, tobacco use

Hypothetical case

- Recent abnormal stress test:
 - Small reversible defect in the inferolateral wall of the left ventricle, likely stress-induced ischemia
 - LVEF 55%
 - No LV wall motion abnormality
- Coronary angiography: 90% obstruction of the LAD
- One stent placed

Causation: FF & CAD

- Presumptive laws
 - State <http://iaff.org/hs/psob/infselect.asp>
 - Federal (PSOB)
https://www.bja.gov/programs/psob/hh_guide.pdf

Causation: FF & CAD

- Risks factors in our case:
 - Hypertension
 - Hypercholesterolemia
 - Tobacco use
 - Age
 - Male gender

Causation: FF & CAD

- Other possible risks factors:
 - Diabetes
 - Obesity
 - Metabolic syndrome
 - Poor fitness
 - Prior history of CAD
 - Family history of CAD

Causation: FF & CAD

- Occupational factors as **triggering cardiac event**:
 - Carbon monoxide (possible but unlikely, per NIOSH FF Fatality database)
 - Ultrafine particles [Baxter, JOEM 2010;52:791]
 - Diesel exhaust [Mills, NEJM 2007;357:1075]
 - Heat stress and dehydration [Smith, Prehosp Emerg Care 2015;15:323]
 - Physical exertion

Job Duty and Risk of On-duty Cardiac Death

JOB DUTY	Risk (1)	Risk (2)
Fire Suppression	64.0	136.0
Training	7.6	14.0
Alarm Response	5.6	10.5
Alarm Return	3.4	6.6
Non-Emergency	1.0	1.0

1) Kales, Environ Health 2003;2:14

2) Kales, NEJM 2007;356:1207

Causation: FF & cancers

- Studies
 - First generation: cohort studies
 - Second generation: meta-analyses
 - LeMasters, JOEM 2006;48:1189
 - IARC Volume 98, 2010 <https://monographs.iarc.fr/wp-content/uploads/2018/06/mon098.pdf>
 - Third generation studies: larger cohorts
 - NIOSH
 - Nordic
 - Korean
 - Australian

Causation: FF & cancers

- LeMasters: Review of 32 studies

Probable Cancers	SRE (95% CI) <i>n</i> =number of studies
Testes	2.02 (1.30-3.13), <i>n</i> =4
Multiple myeloma	1.53 (1.21-1.94), <i>n</i> =10
NHL	1.51 (1.31-1.73), <i>n</i> =8
Prostate	1.28 (1.15-1.43), <i>n</i> =13

SRE: summary risk estimate

Causation: FF & cancers

- IARC Volume 98: Review of 42 studies

Probable Cancers	SRE (95% CI) n=number of studies
Testes	1.47 (1.20-1.80), <i>n</i> =6
NHL	1.21 (1.31-1.73), <i>n</i> =7
Prostate	1.30 (1.08-1.36), <i>n</i> =16

Causation: FF & cancers

NIOSH FF study

- Cohort of 30,000 FFs in San Francisco, Chicago, Philadelphia
- 1950-2009
- Mortality and incidence
- 4,461 cancer cases
- COPD was reported (but not smoking)
- Dose (exposure)-response analysis

<https://www.cdc.gov/niosh/pgms/worknotify/pdfs/ff-cancer-factsheet-final.pdf>

Causation: FF & cancers

NIOSH FF study

Outcome	Mortality		Incidence	
	Obs	SMR (95% CI)	Obs	SIR (95% CI)
All mortality	12,028	0.99 (0.97, 1.01)	NA	NA
All Cancers	3,285	1.14 (1.10, 1.18)	4,461	1.09 (1.06, 1.12)
Esophagus	113	1.39 (1.14, 1.67)	90	1.62 (1.31, 2.00)
Intestine	326	1.30 (1.16, 1.44)	398	1.21 (1.09, 1.33)
Lung	1,046	1.10 (1.04, 1.17)	716	1.12 (1.04, 1.21)
Kidney	94	1.29 (1.05, 1.58)	166	1.27 (1.09, 1.48)
Oral cavity [†]	94	1.40 (1.13, 1.72)	174	1.39 (1.19, 1.62)
Mesothelioma	12	2.00 (1.03, 3.49)	35	2.29 (1.60, 3.19)

Cancers with statistically significant excesses in mortality and incidence with U.S. rates referent (Daniels et al. *Occup Environ Med* 2014; 71(6): 388-397).

Oral cavity includes lip (excluding skin of the lip), tongue, salivary glands, gum, mouth, pharynx, oropharynx, nasopharynx, and hypopharynx

SMR, standardized mortality ratio; SIR, standardized incidence ratio

Causation: FF & cancers

Nordic study

- Cohort of 16,422 FFs from Denmark, Norway, Scandinavia, Finland, Iceland
- 1961-2005
- Incidence only
- 2,536 cancer cases

Pukkala, OEM 2014;71:398

Causation: FF & cancers

Nordic study

Cancer site	Observed	SIR (95% CI)
All cancers	2536	1.06 (1.02, 1.11)
Melanoma	109	1.25 (1.03, 1.51)
Prostate	660	1.13 (1.05, 1.22)
Other skin cancers	117	1.33 (1.10, 1.59)
Prostate (30-49 y)	12	2.59 (1.34, 4.52)
Mesothelioma (> 70 y)	10	2.59 (1.24, 4.77)

Causation: FF & cancers

Korean study

- Cohort of 33,416 professional emergency responders
 - 29,438 FFs
- 1980-2007
- Incidence only
- 486 cancer cases

Ahn, AJIM 2012;55:768

Causation: FF & cancers

Korean study (FF numbers)

Cancer site	Observed	SIR (95% CI)
All cancers	446	0.97 (0.88, 1.06)
Colorectal	72	1.27 (1.01, 1.59)
Kidney	20	1.56 (1.01, 2.41)
Bladder	17	1.60 (1.01, 2.56)
NHL	18	1.69 (1.01, 2.67)

Causation: FF & cancers

Australian study

- Cohort of 30,057 full-time and part-time fire fighters from 8 agencies
- 1982-2010
- 1,208 cancer cases
- 329 cancer deaths
- Glass, OEM 2016;73:761

Causation: FF & cancers

Australian study (full time FFs)

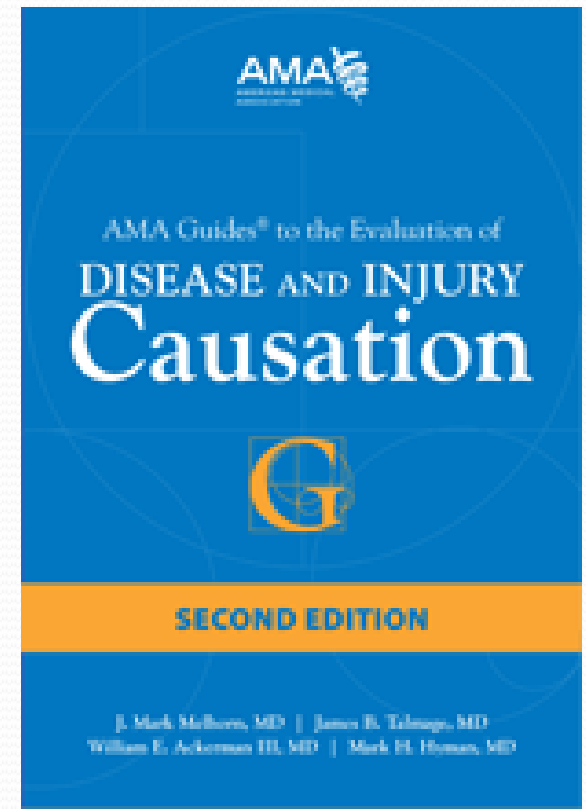
Cancer site	SIR (95% CI)
All cancers	1.09 (1.03, 1.14) all FFs
Prostate (dose-response)	1.23 (1.10, 1.37)
Melanoma	1.45 (1.26, 1.66)

Causation: FF & cancers

- Presumptive laws
 - State <http://iaff.org/hs/psob/infselect.asp>
 - Federal (WTC)
<https://www.cdc.gov/wtc/conditions.html>

AMA Guides to the Evaluation of Disease and Injury Causation 2nd Edition

- Published in 2013
- Chapter 31: Causation in Public Safety Personnel



AMA Guides – Causation: Firefighters

- Hearing loss
 - “excessive loss in firefighters”
 - Dose-response

AMA Guides – Causation: Firefighters

- Cancer

“Overall there is a strong level of evidence for cancer associated with firefighting, though the evidence varies greatly depending on which type of cancer is under consideration.”

AMA Guides – Causation: Firefighters

- Heart disease
 - “no overall increase in mortality due to cardiovascular disease in firefighters”
 - Healthy worker effect
 - Increase in SMR with time

AMA Guides – Causation: Law Enforcement Officers

- Life expectancy (post retirement): “as long or longer than the general population”
- Cancers: insufficient evidence (for all cancers and for specific cancers)
- Cardiovascular: insufficient evidence
- Suicide: insufficient evidence
- PTSD: “strong evidence, after critical events, especially disaster or use of deadly force/life-threatening situation”