



National Indigenous
Fire Safety Council Project

Projet du conseil national
autochtone de la sécurité-incendie

Determinates of firefighter Deaths and Injuries in Canada

Blaine Wiggins, Chief Operating Officer

Agenda

- Longitudinal Analysis Canadian Firefighter Deaths and Injuries – 2007-2021 *Accepted Claims National Workers Compensation Data Base*
- The Hierarchy of Controls for Fire Fighter Contamination *If it's on you it's in you*
- National Framework on Cancers linked to Firefighting *The Art of the possible*



NIFSC
CNASI

Progress is impossible
without change, and
those who cannot
change their minds
cannot change anything.

—Aristotle



Longitudinal Analysis Canadian Firefighter Deaths and Injuries – 2007-2021

Accepted Claims National Workers Compensation Data Base

Samar Al-Hajj, Ph.D
Larry Thomas, Fire Chief Surrey
Len Garis, Professor
Ian Pike, Ph.D



NIFSC
CNASI

Introduction

- In Canada, there are approximately:
 - **27,000** professional firefighters
 - **88,500** volunteer firefighters
- Firefighters have the second-highest injury rates among emergency responders
- Lower all-cause mortality than the general population (healthy worker effect)



NIFSC
CNASI

Objective

- Describe the determinants of traumatic injury, disease, and death among Canadian firefighters
 - Age
 - Region
 - Employment status



NIFSC
CNASI

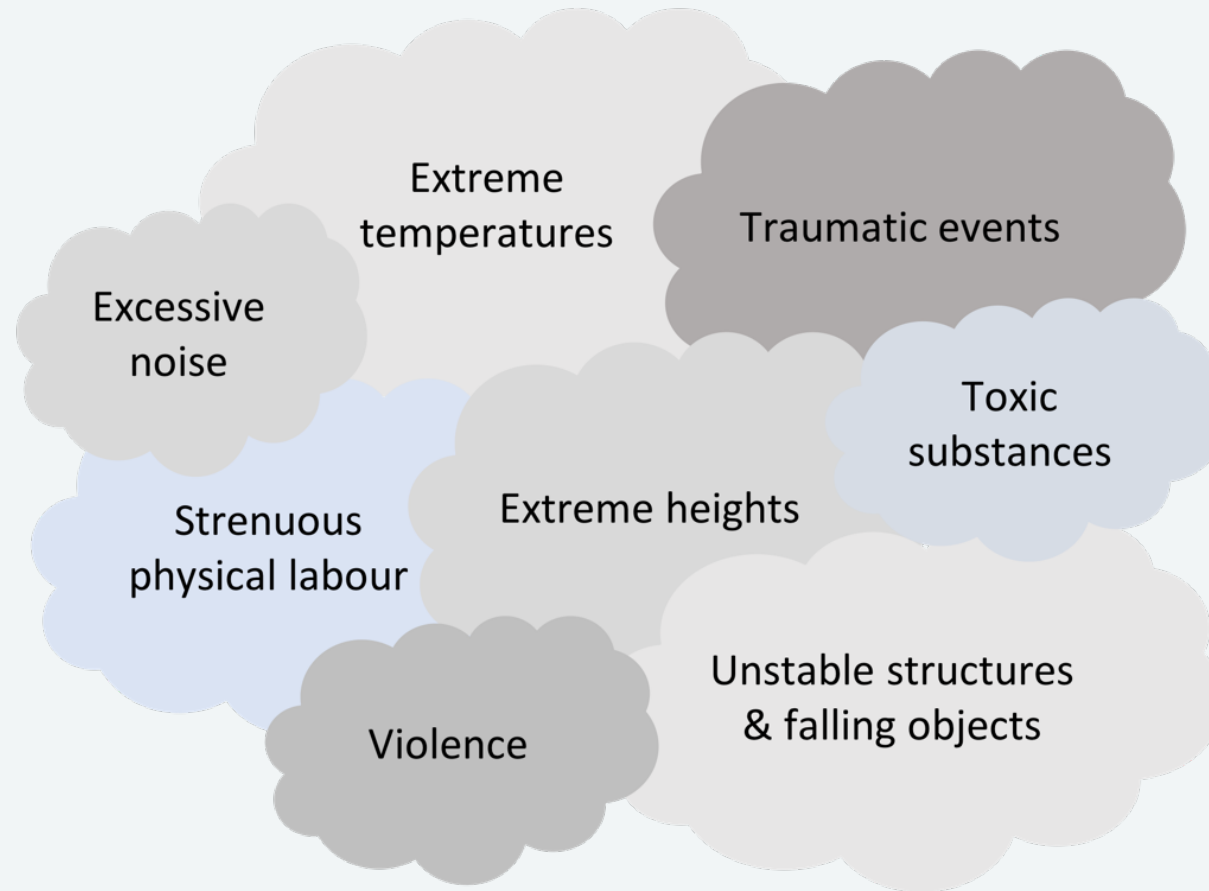
Methods

- Professional and volunteer firefighters >14 years
- Accepted time-loss and fatality claims between 2007 and 2021
- Descriptive analysis of claims data
 - Association of Workers' Compensation Boards of Canada
- Literature review (2007-2021): 62 articles



NIFSC
CNASI

Risk Factors



NIFSC
CNASI

Canadian Firefighter **Fatality** claims by **Nature**

Fatality claims by nature of injury, 2007-2021,CANADA, AWCBC		
Nature of injury	Fatalities - % of claims*	Fatalities - Rate per 100,000 FF*
Cancer	84.6%	993.7
Traumatic injury	6.5%	76.0
Cardiovascular system diseases	4.2%	49.9
Respiratory system diseases	2.6%	30.9
Nervous system diseases	0.6%	7.1
Mental health	0.7%	8.7
Unknown	0.3%	3.2
Infectious, bacterial, viral, parasitic diseases	0.1%	1.6
<i>*includes AB, BC,MB,NB,NS,ON,QC,SK,YU only</i>		



Canadian Firefighter **Fatality** claims by **Nature**

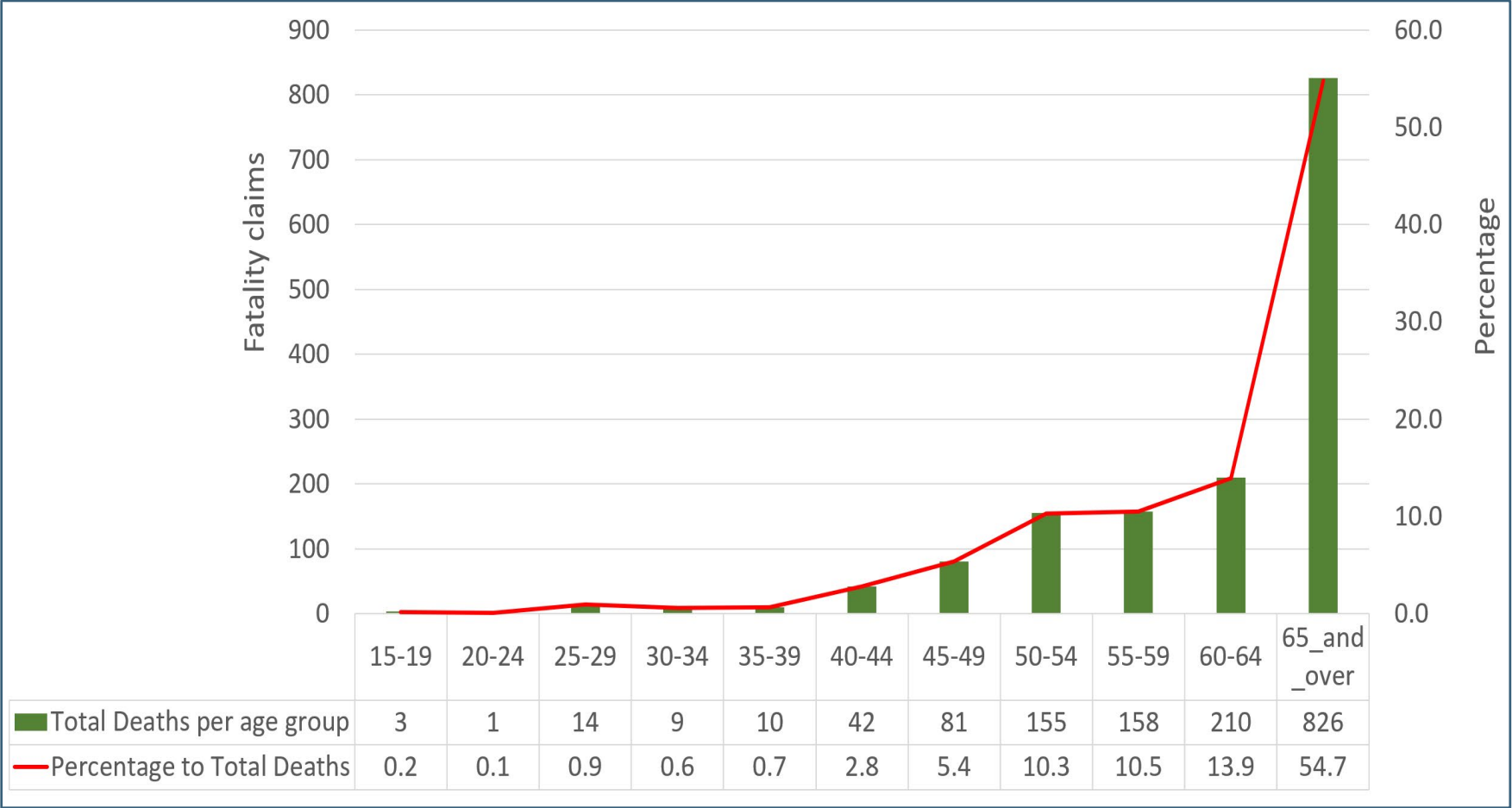
Nature of death	Percentage of Total Fatalities		
	Cohort 1	cohort 2	Pct.Diff.
Cancer	82.34	89.25	8.39
Traumatic Injury	7.87	3.58	-54.46
Cardiovascular disease	4.99	2.56	-48.71
Respiratory system disease	2.40	2.73	13.80
Mental disorder	0.96	1.19	24.47
Infectious disease	0.19	-	-
Nervous System	0.86	-	-

Cohort 1: 2007-2018 – Cohort 2: 2018 - 2021



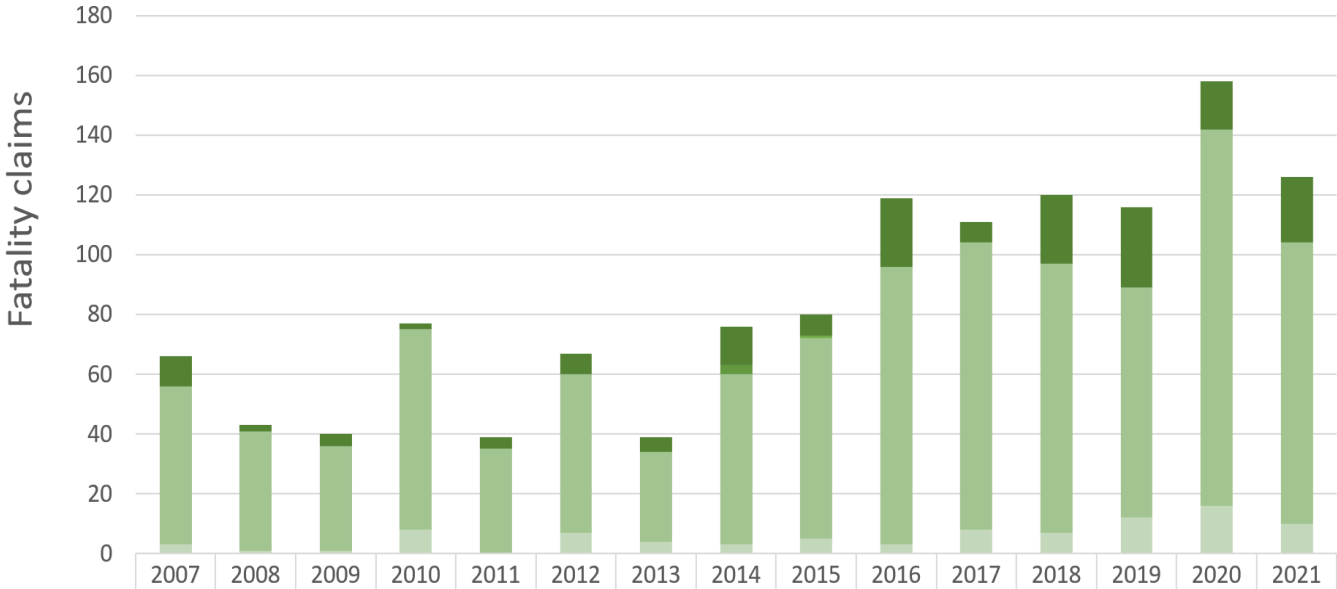
NIFSC
CNASI

Canadian Firefighter **Fatality** Claims by **Age Group** for All Cohorts (2007 – 2021)



NIFSC
CNASI

Cancer: Firefighter Fatality Claims from Cancer in Canada: 2007 – 2021

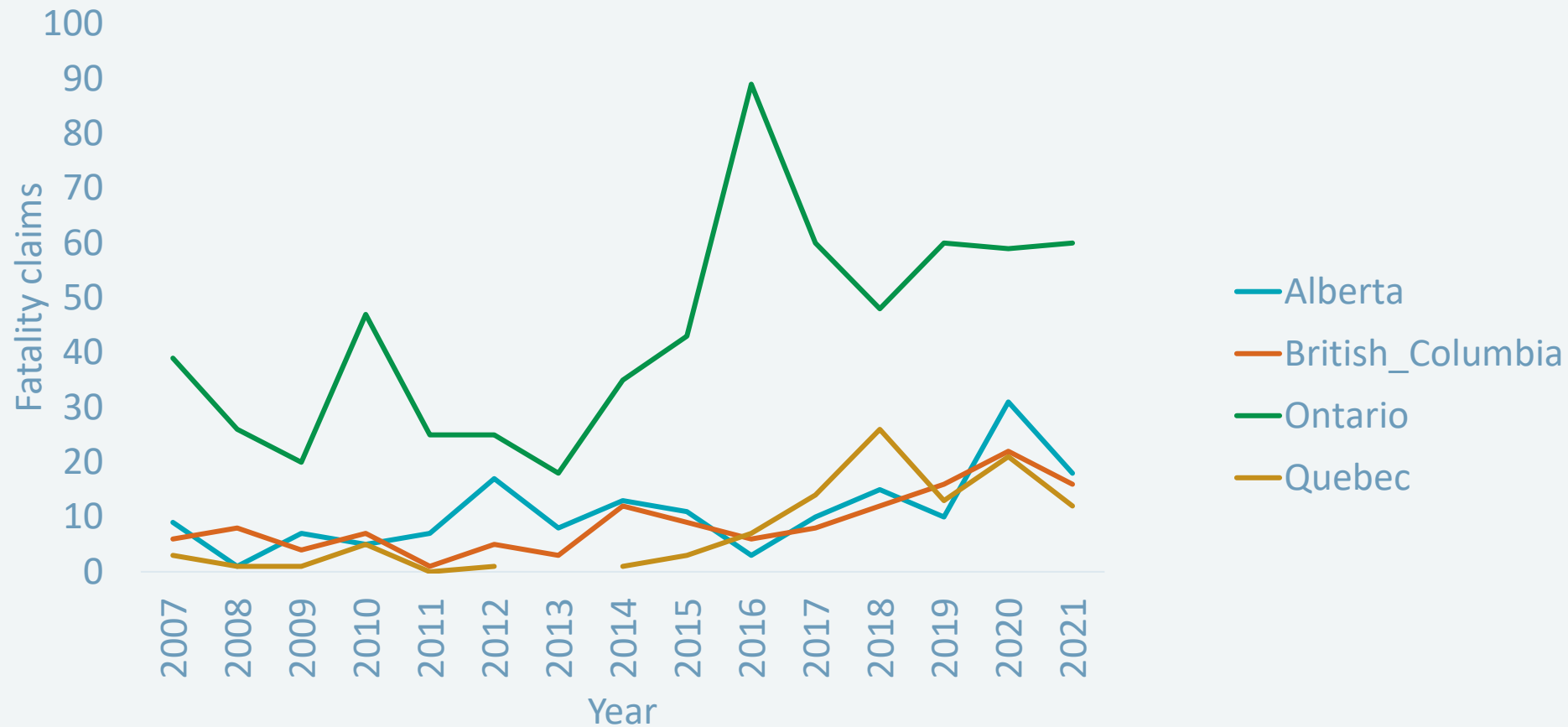


39 - Neoplasms, tumors, and cancer, n.e.c.	10	2	4	2	4	7	5	13	7	23	7	23	27	16	22
33 - Neoplasms and tumors of unknown properties	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
32 - Benign neoplasms and tumors	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
31 - Malignant neoplasms and tumors (cancers, carcinomas, sarcomas)	53	40	35	67	35	53	30	57	67	93	96	90	77	126	94
30 - Neoplasms, tumors, and cancer, uns.	3	1	1	8	0	7	4	3	5	3	8	7	12	16	10



NIFSC
CNASI

Firefighter Fatality Claims from **Cancer** in Canada by **Provinces** with Majority Claims: 2007 – 2021



NIFSC
CNASI

Canadian Firefighter Time loss claims by Nature of Injury

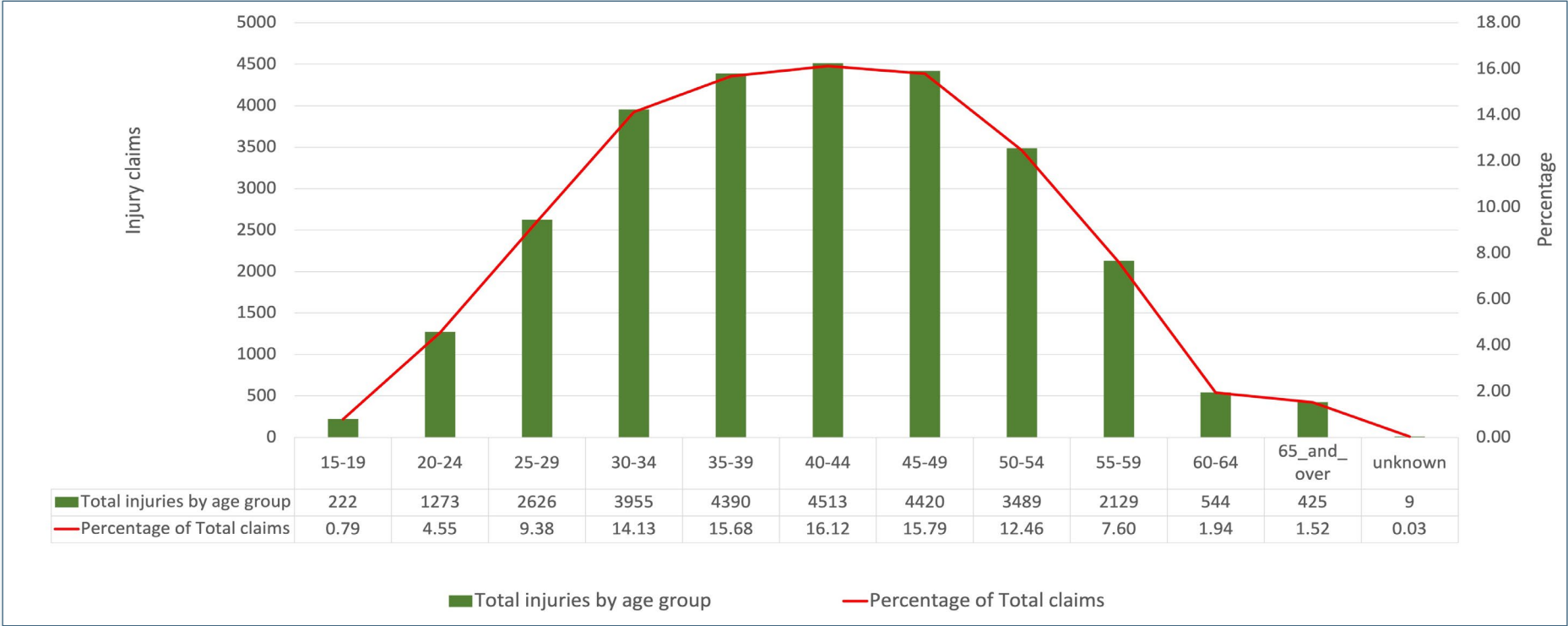
Cohort 1: 2007-2018 – Cohort – 2018 – 2021

Nature of Injury	Percentage of Total Time-Loss		
	cohort 1	cohort 2	Pct.Diff.
Traumatic injury	85.03%	70.10%	-17.56%
Mental health	3.59%	<u>11.89%</u>	<u>231.20%</u>
Musculoskeletal system and connective tissue diseases	2.38%	2.15%	-9.66%
Cancers	2.24%	<u>3.25%</u>	<u>45.09%</u>
Nervous system and sense organs diseases	1.37%	1.76%	28.47%
Other	1.36%	1.61%	18.38%
Digestive system diseases and disorders	1.35%	0.64%	-52.59%
Circulatory system diseases	0.75%	1.07%	42.67%
Unknown	0.60%	0.24%	-60.00%
Skin and subcutaneous tissue diseases	0.50%	0.42%	-16.00%
Infectious, bacterial, viral, parasitic diseases	0.47%	0.33%	-29.79%
Respiratory system diseases	0.37%	<u>6.56%</u>	<u>1,672.97%</u>
Genitourinary system diseases and disorders	0.005%	-	-



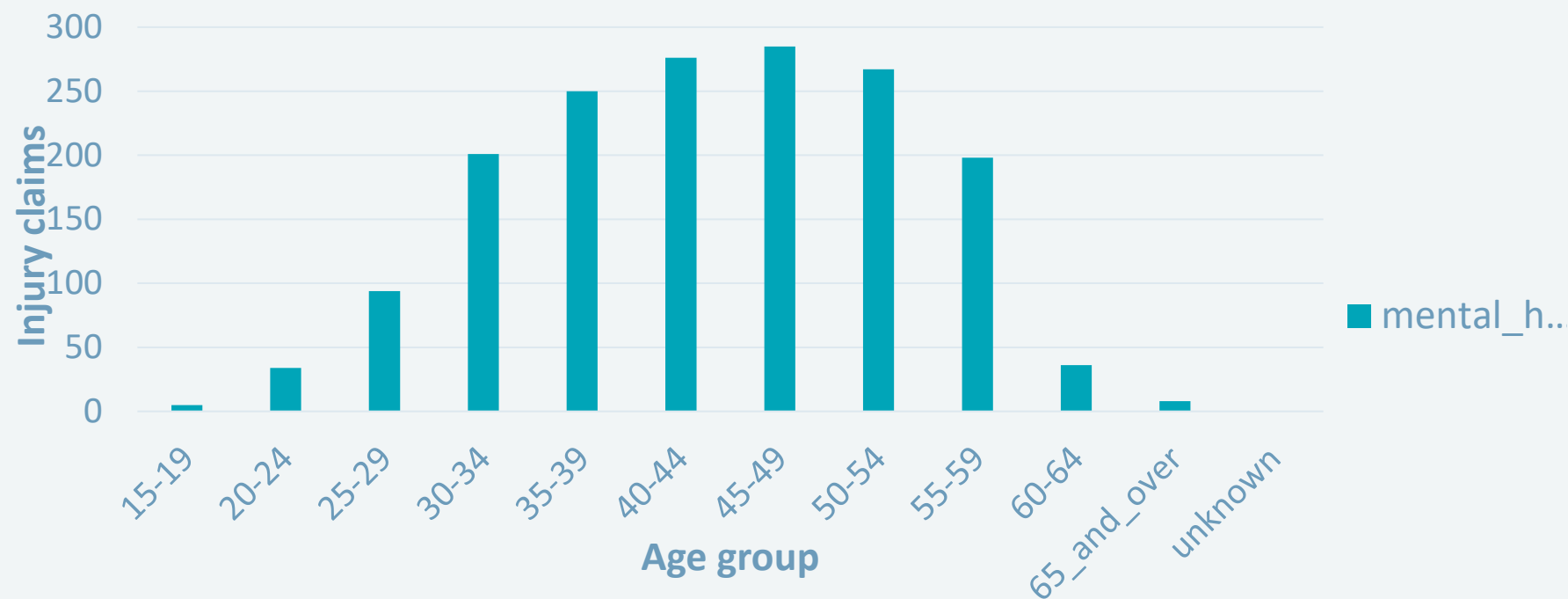
NIFSC
CNASI

Canadian Firefighter Injury Claims by Age Group (2007-2021)



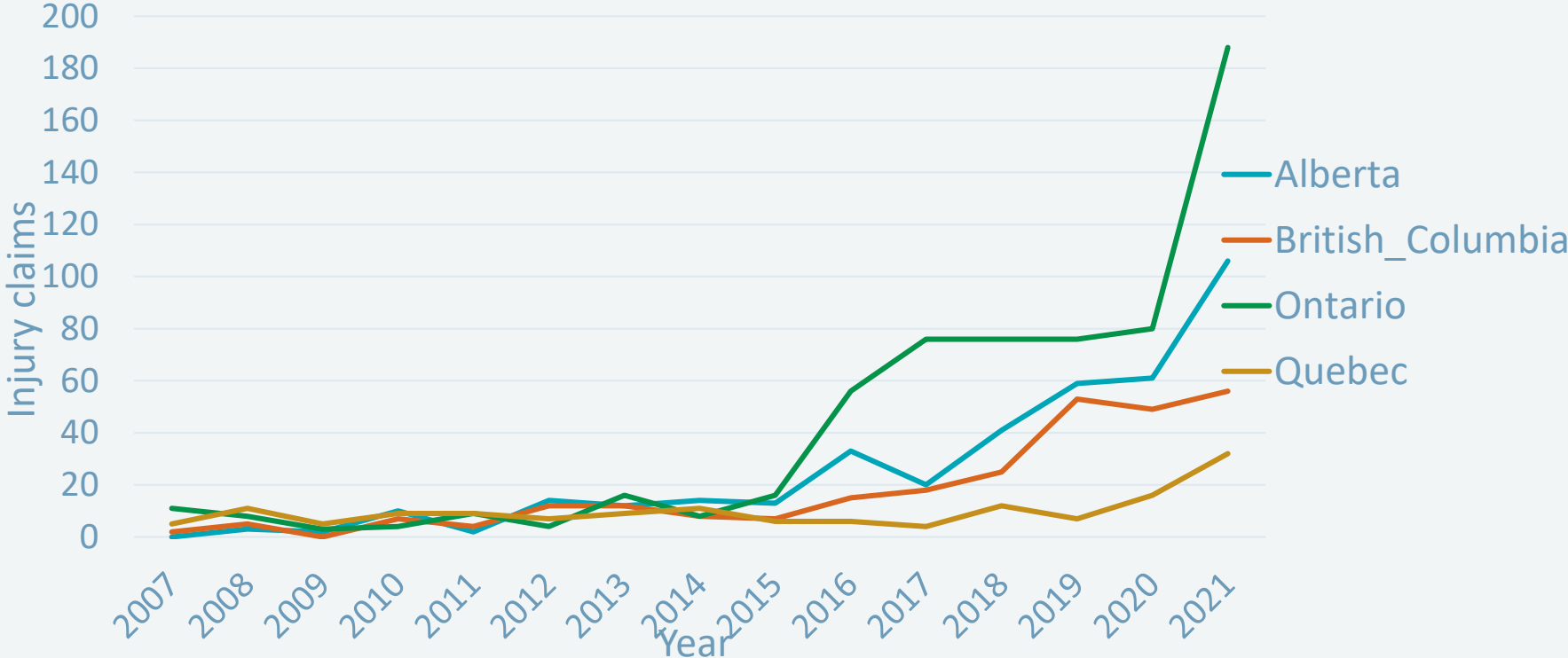
NIFSC
CNASI

Firefighter Injury Claims from Mental Disorder in Canada by Age Groups (2007-2021)



NIFSC
CNASI

Canadian Firefighter Injury Claims of Mental Disorder (top 4 Provinces)



Canadian Firefighter **Injury** Claims of **Mental Disorder** (2007-2021)



NIFSC
CNASI

The Hierarchy of Controls for Fire Fighter Contamination

If its's on you it's in you



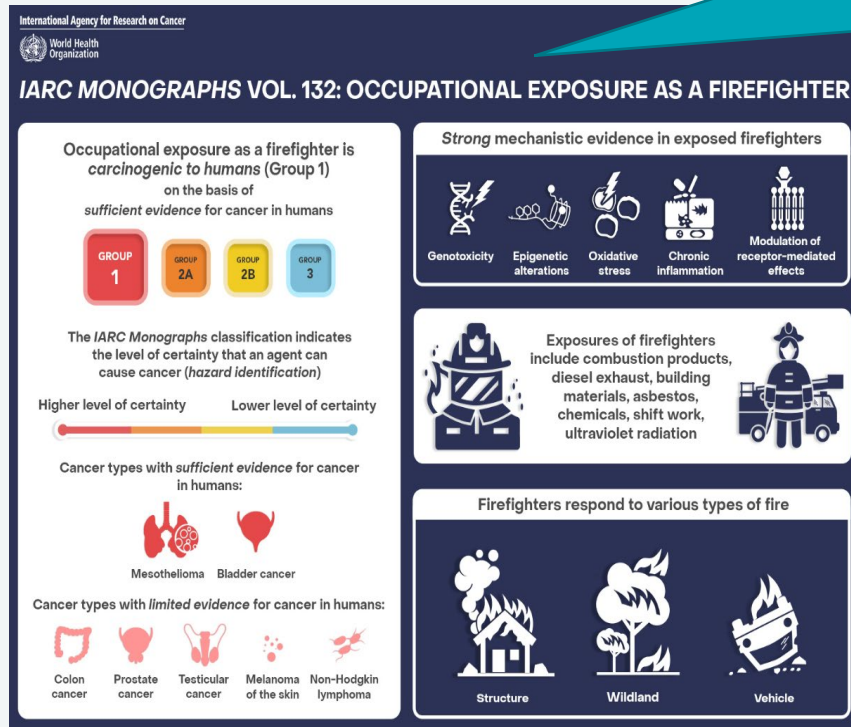
NIFSC
CNASI

International Agency
for Research on Cancer



World Health
Organization

Occupational exposure
as a firefighter is
carcinogenic to human
(Group 1)
on the basis of sufficient
evidence for cancer in
humans



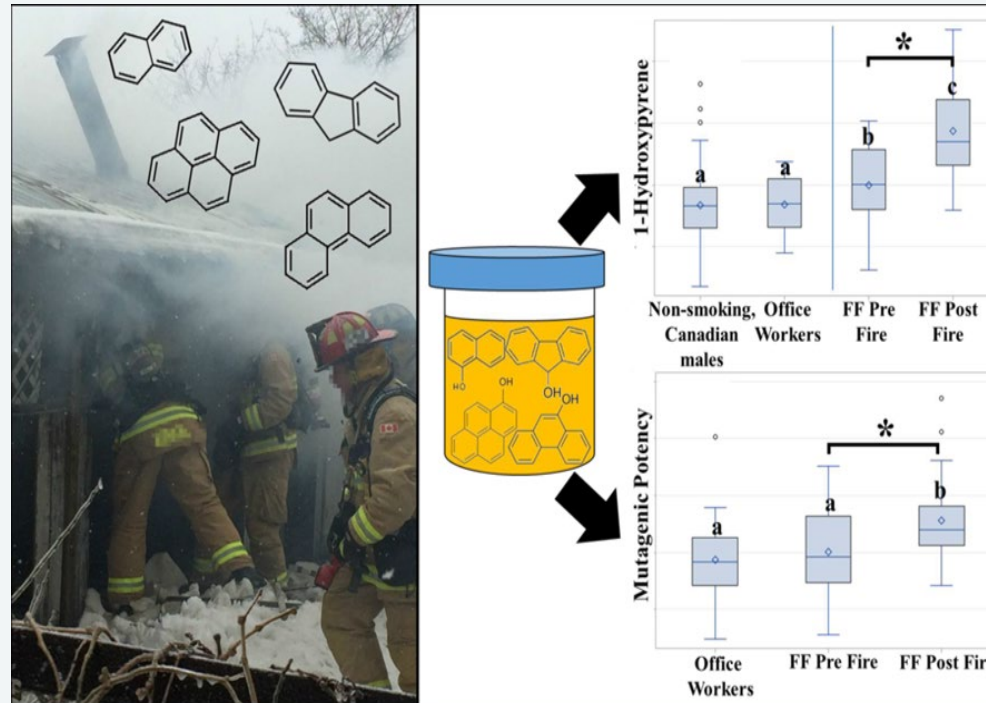
NIFSC
CNASI

Ottawa Fire Service 2017

18 office workers / 27 male firefighters

Exposures to polycyclic aromatic hydrocarbons and other organic mutagens

Tested urinary metabolite levels, levels of in dermal wipes and personal air samples, and urinary mutagenicity



The results showed significant 2.9- to 5.3-fold increases in average post-event levels of urinary metabolites, average post-event levels of urinary mutagenicity showed a significant, event-related 4.3-fold increase!

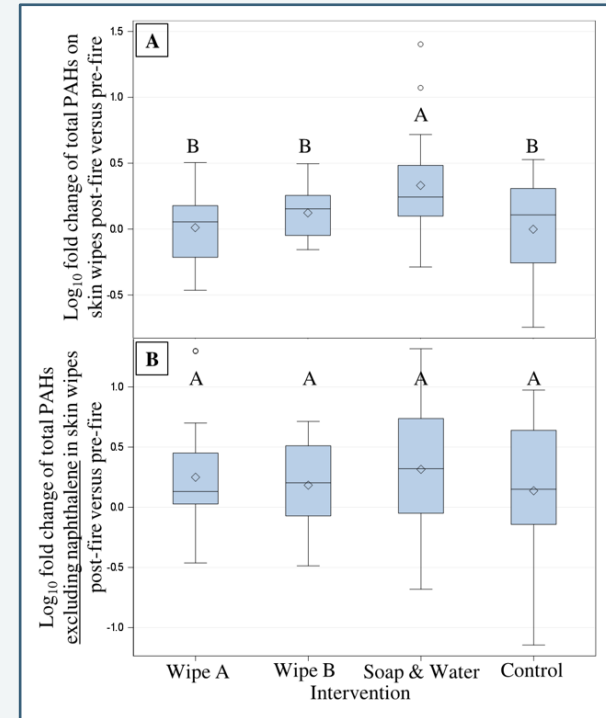
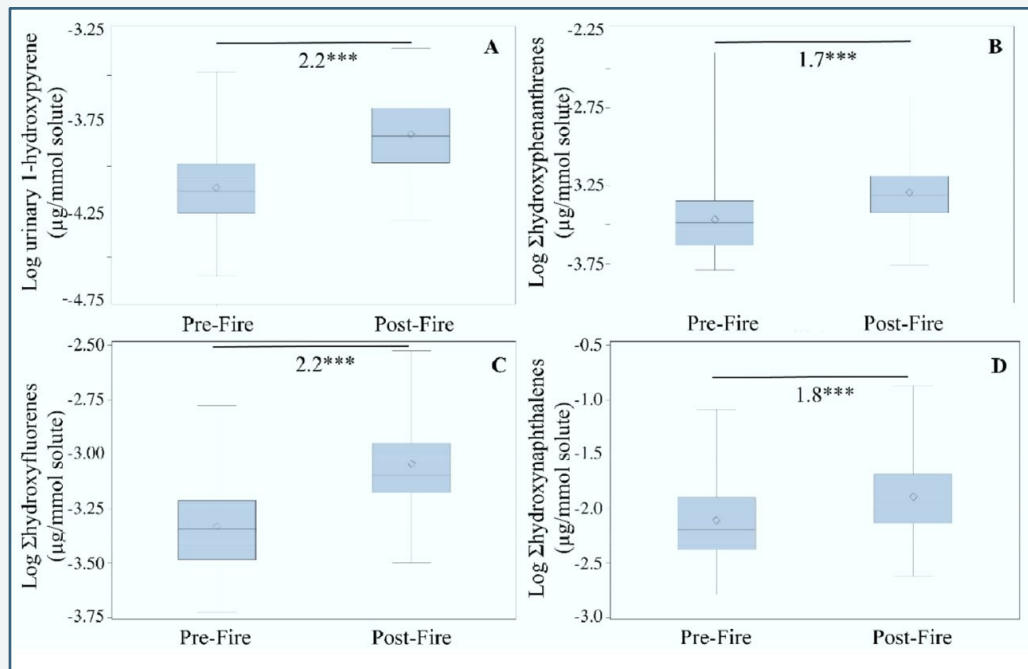
<https://www.sciencedirect.com/science/article/abs/pii/S0048969719341889#:~:t>



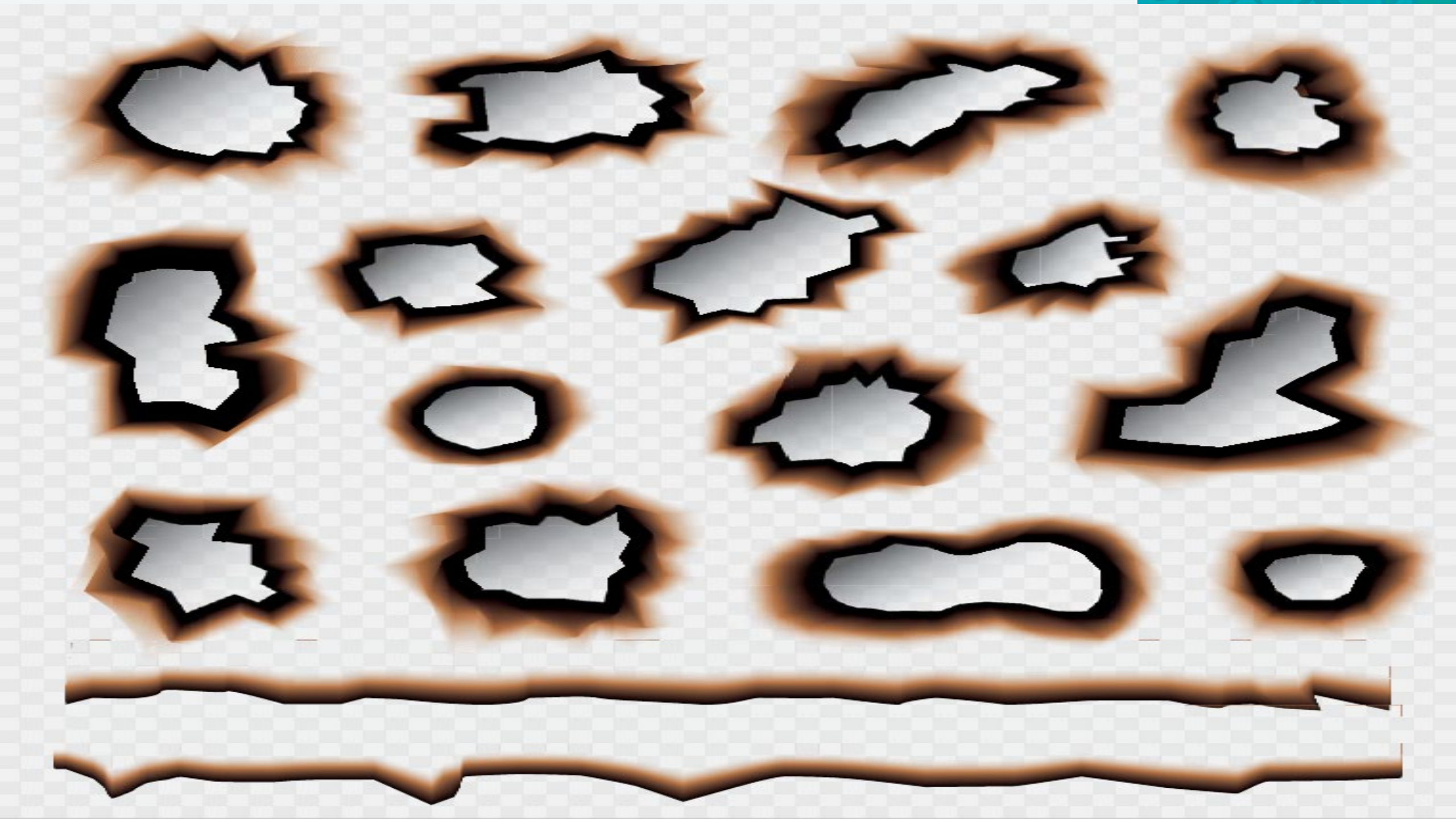
NIFSC
CNASI

Effectiveness of Dermal Interventions

for reducing firefighter exposures to PAH & Genotoxins 2022



Source: Effectiveness of dermal cleaning interventions for reducing firefighters' exposures to PAHs and genotoxins - PubMed (nih.gov)



Control options for the fire service based on the hierarchy of controls approach

Potential effectiveness	Types of controls	Options that are being researched
Least	PPE	
	Inhalation	Consistent use of respiratory protection during all phases of a response
	Dermal	Tightening the interfaces of turnout gear, use of particulate-blocking hoods
	Administrative controls	Use of specific fire attack tactics, crew rotation, PPE donning and doffing practices, PPE decontamination, PPE retirement/removal from service, skin cleaning, fire apparatus cleaning, fire station cleaning
	Engineering controls	Fire station design, diesel exhaust capture, training prop design
	Substitution	Training fuel selection, use of simulated smoke and flame, replacing hazardous chemicals in products with less hazardous chemicals (e.g., fluorine-free foams), replacing diesel apparatus with electric or hybrid-electric apparatus
Most	Elimination	Public education programs (increased installation of smoke alarms and sprinklers), fuel reduction efforts to prevent exterior fires transitioning to structure fires

Source: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9928012/>



NIFSC
CNASI

National Framework

October 7 , 2024

FRAMEWORK PILLARS

PILLAR #1—RESEARCH ON CANCERS LINKED TO FIREFIGHTING

PILLAR #2—RESEARCH ON CANCER PREVENTION & DATA COLLECTION

PILLAR #3—TRAINING AND EDUCATION IN HEALTH CARE SETTINGS

PILLAR #4—DIAGNOSTIC TESTING FOR FIREFIGHTERS

PILLAR #5—INFORMATION & KNOWLEDGE SHARING

PILLAR #6—STANDARDS ON HEALTH AND SAFETY AND WORKERS' COMPENSATION

**NATIONAL
FRAMEWORK
ON CANCERS
LINKED TO
FIREFIGHTING**



**NIFSC
CNASI**

National Framework

October 7, 2024 Parliament and announced an investment of \$12.29 million over 5 years and \$220,000 ongoing, to advance firefighter health and safety.

There are 18 references to Indigenous firefighters in the framework



**NIFSC
CNASI**

National Firefighter Cancer Registry and Statistics Canada

The Art of the possible



NIFSC
CNASI

Statistics Canada

The Canadian Cancer Registry (CCR) is a population-based registry that includes data collected and reported to Statistics Canada by each provincial/territorial cancer registry.

The person based CCR collects information about each new primary cancer diagnosed among Canadian residents since 1992.

The objective is to produce standardized and comparable incidence data that can be used to assist and support health planners and decision-makers to, identify risk factors; plan, monitor and evaluate cancer screening, treatment and control programs; and conduct research.

Statistics Canada is prohibited by law from releasing any information it collects which could identify any person, business, or organization, unless consent has been given by the respondent or as permitted by the Statistics Act. Various confidentiality rules are applied to all data prior to release or publication, such as suppression of confidential variables in microdata and suppression, random rounding or controlled rounding of tabular data.



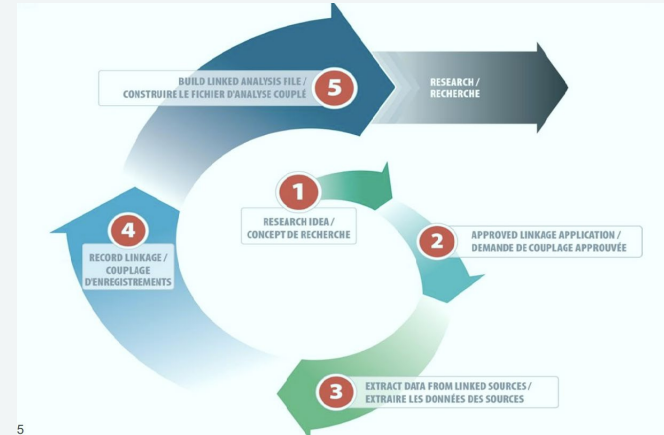
NIFSC
CNASI

Statistics Canada

Social Data Linkages Environment (SDLE)

Creating linkages between;

- Cancer Registry – 1992
- Tax – Income tax – Volunteer FF - 2011
- 2021 Census – 600 Firefighters
- Indigenous Firefighters need to be identified
- Vital Statistics (Deaths)
- Health Records
- National Fire Information Data Base (NFID)



NIFSC
CNASI

Developing a road map for the future

The Art of the possible

Understanding your business

- A National Cancer Registry can be created from 1992 onward
- Personal Identifiers are needed to link to the registry for career and Indigenous Firefighters
- Fire reporting required by the provinces can create an exposure data base – adding names of attendees to the fire reports.



Final Words



- Canada is in position to establish a comprehensive Firefighter cancer and exposure registry(s),
- Bill C-244 is a platform to advance this work,
- Stats Canada and Health Canada have partnered,
- We will need to identify Career and indigenous Firefighters,
- Records linking from the existing cancer registry and the National Information Data Base (NFID) for exposures is possible,
- This work can influence Presumption and Screening,
- Influence exposure controls through pre-post testing,
- Influence operational to reduce exposures.



NIFSC
CNASI

Questions

If its's on you it's in you



NIFSC
CNASI