

Worker-based science:

Where the voice of the worker and science meet

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Cance



What will we cover today?



Introduction to "worker-based" research and the steps involved in occupational disease/exposure investigations.



Applications: Salivary gland cancer among plastics/rubber production workers and neurodegenerative disease among mine workers exposed to McIntyre Powder.



Implications and lessons-learned: Where do we go from here?

The Lens: Plastics, Rubber, Mining



Occ. disease & exposure investigations



"Worker-based" participatory research



Primary Goal: Bridging the Gap



Workers





"Science"

Case study: *Rare salivary gland cancer among Ontario plastics and rubber workers*



Car bumpers manufactured at Ventra Plastics, Peterborough, Ontario.

Historic photo of Dominion Tire (Rubber) Factory in Kitchener, Ontario.

Salivary Gland Cancer is a Rare Cancer

Rare cancer = Less than 6 cases per 100,000 population per year*

Evidence is limited but some suspected occupational exposures include:

X- and Gamma- radiation Radioiodines, including iodine-131 Nickel compounds/alloy **Rubber and plastics manufacturing**



Salivary Gland Cancer at OHCOW

Worker Voice:

Workers raise concerns of suspected occupation-related illness and/or exposures

Seeking Support:

Workers seek support for investigation of occupation-diseaseexposure links

Initial Evaluation:

- How many cases?
- Hypothesized exposures?
- Immediate prevention needs?

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N=8 cases of salivary gland cancer

captured at OHCOW clinics over time, all from the below industries:

Rubber Plastics

Questions:

- Elevated rates compared to reference population?
- Common job types, common exposures?
- Feasibility for further investigation?

Where do we go from there?



Case Series: Salivary Gland Cancer



Key purpose(s):

Worker health education/support, hypothesis generation for future research

Step 1. Case Identification and Review

Step 2. Literature Review: Connections between occupational/environmental exposures and SGC cancer → Nitrosamines, solvents, ionizing radiation, etc.

Step 3. Exposure Assessment drawing on various

sources* to identify any common exposures

→ **Preview:** Rubber and plastics groups are largely distinct, with some potential overlap in exposure

Step 4. Publication of results



Occupational Disease Surveillance System (ODSS)

- Former WSIB claimants linked to provincial health databases
 - 2.37 million Ontario workers
- Salivary gland cancer cases identified from the Ontario Cancer Registry (1964-2020)

Work-Related Cancer and Disease: Occupational Disease Surveillance System







Salivary Gland Cancer Cases in the ODSS

• 878 incident cases



Median year of birth: 1949

Median age at start of follow-up: 42 (± 20 years)

Median years of follow-up: 19 (± 14 years)

Median age at diagnosis: 61 (± 19 years)



Results: Rubber and Plastic Products

	All	Males only
Rubber and Plastics Industries	34%	45%
Plastics Fabricating Industry	44%	73% *
Chemicals, Petroleum, Rubber, Plastic, and Related Materials Processing Occupations	27%	57%



Results: Healthcare

	All	Females only
Nursing Therapy and Related Assisting Occupations	21%	27%
Nurses: Registered, Graduate, Nurses-in-training	54%	60%*
Nursing Assistants	114%*	98% <mark>*</mark>



Results: Metal-related and Mining

	All	Males only
Metal Mining Industry	72%*	68%
Wire and Wire Products	92%	133%*
Mining and Quarrying, inc. Oil and Gas Field Occupations	77%*	74%
Mining and Quarrying: Cutting, Handling, and Loading	16%	11%

**Statistically significant* (α =0.05)



Findings based on 54 cases (27 cases among uranium miners)

Mining Master File (MMF) Results: Salivary Gland Cancer SIRs by Cohort and Ores Mined, 1964-2017



Mining Master File (MMF) Results: Salivary Gland Cancer SIRs by Ore Mining Employment Duration, 1964-2017



Implications



- Valuable findings from two studies of Ontario workers
- Challenging to interpret some findings; need for further understanding of SGC risk and related exposures
- Important for prevention and risk reduction strategies



Case study: Neurodegenerative disease among mine workers exposed to McIntyre Powder



What is McIntyre Powder?

MP = Very finely ground aluminum

•Used in over 200 workplaces globally between 1943-1979.

- •Administered as a non-consensual medical treatment on the theory that inhaling it would prevent the lung disease silicosis.
- •Developed at McIntyre Mine in Schumacher (Timmins), Ontario and controlled by the northern Ontario mining industry.
- Over 27,000 northern Ontario mine workers exposed to mandatory McIntyre Powder inhalation "treatments" each work shift.







'Worker-based' science: Listening to workers informs and improves scientific research



- Workers are the evidence of occupational disease
- If you expose a worker to toxic substances and the worker gets sick, that illness is evidence and that evidence requires investigation.
 - Are other workers getting sick?
 - What were they exposed to?
 - How do rates of illness compare to those observed in reference populations (e.g. general population)?
- If you are not talking to workers and monitoring their health both AT work and AFTER work, you will <u>FAIL</u> to find occupational diseases in the numbers & variety that actually exist.

If you are not looking for it, you will not find it.

Bridging the gap: Create space to listen to workers

McIntyre Powder Project

OHCOW/USW McIntyre Powder Intake Clinics







Media interest in workers' stories



BUSINESS

Industry News v Regional v Columns v Features v Directory Careers Publications

Home > Industry News > Mining

Miners recall use of black powder during employment

Danny Hway vividly remembers the impact McIntyre Powder had on his father, Nicholas, who worked at Timmins' McIntyre Mine for 47 years. At home, his dad wouldn't speak of it, but he didn't need to.

Jul 12, 2016 2:43 PM By: Lindsay Kelly











Media stories raised focus on the issue

WSIB commissioned OCRC study of McIntyre Powder and neurological disorders

Evidence-based policy change



2020 – Research: OCRC research using the Mining Master File found:

Sneak peek: Miners who were exposed to MP (respirable aluminum) had elevated rates of Parkinson's disease. To be discussed in detail in next part of the presentation.

2022 – Policy Change: MP-based Parkinson's added to Schedule 3 of occupational diseases in Ontario.



Occupational Cancer Research Centre

McIntyre Powder & Neurological Disease OCRC Investigation





McIntyre Powder and the OCRC



- In 2017, the Ontario Workplace Safety and Insurance Board (WSIB) approached OCRC to ask if we could examine the risk of neurological disease among miners exposed to McIntyre Powder using the Mining Master File (MMF)
 - OCRC has been using the MMF for research on cancer for many years and the file has information on McIntyre Powder
- We were funded by the WSIB in 2018 through a grant for an independent and transparent study



The Mining Master File (MMF)

- Ontario miners employed
 between 1927-1987
 - Annual medical examinations
 - Actively maintained from 1951-1987
- Over 93,000 miners included
 - Detailed job history recorded annually
 - Previously used for health research by OCRC and others



McIntyre Powder & Neurologic Disease

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BIRTHPLACE DATE OF BIR							DATE OF FIRST DUST EXPOSURE						
PREVIOUS EXPOSURE NOT IN ONTARIO							PREVIOUS EXPOSURE IN ONTARIO						
YEAR	MINE OR O	THER RE	COUNTRY	ORE	BOL	MOS	YEAR	MINE	CAMP	ORE	JOB	MOS.	
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						-			<u></u>				
EXAMINATIONS													
NO.	DATE	STAT	US MINE		JOB	EXPOSURE S.L.E.	AL.	X-RAY	FINDINGS	CLAIM COMP.	REMARK	s	
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MASTER EXAMINATION RECORD													

• 27,500 miners reported McIntyre powder exposure, based on records from 1951 and forward.

Cohort & health records



- Before starting, we assessed the completeness of the electronic version of the MMF
- The MMF was sent to the Institute for Clinical and Evaluative Studies for electronic linkage to health records
- Records for 36,826 male miners were linked to:
 - Hospital visits and ambulatory care, including emergency department visits (2000-2018)
 - Physician billing (OHIP, 1992-2018)



MP Assessment Approaches

First assessment approach: Self-reports

Second assessment approach: Historical records

- Self-reported MP in the past 12 months during miners' annual medical fitness exams
- Cross checked with licensed mines' powder use period
- Assigned 'yes' for underground miners who worked at a licensed mine site during their MP use periods

 Approximately 26% of miners (n= 9,458) selfreported as exposed Approximately 38% of miners (n=13,828) estimated as exposed



Risk of neurological disease by duration of MP, secondary exposure assessment





Towards a cancer-free workplace

Conclusions



- MP exposure was associated with higher risks of parkinsonism and Parkinson's Disease (PD)
 - $\circ~$ Excess of Parkinsonism was due to PD
 - PD risk increased with duration of exposure
 - Highest among those exposed >1956
- No association with MP observed for Alzheimer's disease or motor neuron disease
- Among all miners, some increased risk of Alzheimer's disease and motor neuron disease compared to the general population

Thank you! Questions?

Many thanks to:

Each of you, for your time, feedback, and questions!

Ontario workers: For helping us to better understand Ontario workers' exposures and concerns as it relates to suspected occupation-related illnesses.

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Supplementary slides to follow

Bird's Eye View: What is our challenge?

Is a specific occupational exposure (or mix of multiple exposures) a "significant contributing factor" to disease development?



Supplementary Slide: "Coal's Deadly Dust" – PBS Frontline (2019)



- National Institute for Occupational Safety and Health (NIOSH) recorded 99 black lung cases in previous 5 years – from testing <u>working</u> miners
- Clinics in Virginia, West Virginia & Kentucky were dealing with out-ofwork miners – nearly 2000 cases of black lung recorded in the same fiveyear period in 16 clinics
- 95% of cases were being missed by surveillance of only working miners

Key takeaways:

Potential outcomes of worker-based investigations include:

- Occupational health education (workers, physicians, employers)
- Worker-based exposure prevention mechanisms established
- Industry-wide change in engineering controls and/or exposure limits
- Illness/Injury Compensation
- Policy change

Key considerations for moving forward:

- Important to conduct proactive educational outreach to vulnerable workers.
- Important to support/fund active surveillance research from both a disease and exposure perspective.
- In Ontario, we have an opportunity to reinstate a collaborative cluster investigation unit.