

CAREX Canada

Estimating workplace exposure to
cancer-causing agents to help
reduce the risk

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Outline

- Overview of CAREX Canada
- Using CAREX exposure estimates to support prevention
- Prioritizing carcinogens for the Canadian context
- CAREX occupational exposure estimates
- Applying CAREX internationally

CAREX Canada: A brief overview

CAREX Canada estimates the number of Canadians exposed to substances associated with cancer in workplace and community environments



CAREX Canada: A brief overview

Goal is to inform efforts to reduce Canadians' exposures to known and suspected carcinogens.

Looks to identify:

- **What** carcinogens are Canadians exposed to at work and in their community?
- **Where** in Canada do these exposures occur?
- **How many** people are exposed?
- **How much** are people exposed to?



CAREX exposure estimates support cancer prevention

- Raising awareness of occupational cancer
- Informing policy, practice, research
- Driving prevention efforts
 - Targeting efforts (ID high risk groups)
 - Identifying priorities
 - Developing and supporting networks



CAREX Canada: Tools and resources

- Website platform, including carcinogen database
- Substance profiles (>75)
- Occupational exposure estimates (>40)
- Environmental exposure estimates (>30)
- Interactive tools to explore and use CAREX data:



EMISSIONS
MAPPING
PROJECT



eRISK



eWORK

How does CAREX Canada select carcinogens?

- Based on evaluations made by the **International Agency for Research on Cancer (IARC)**

International Agency for Research on Cancer



- We focus on >75 substances, ranked by IARC as either *Known Carcinogens*, *Probable Carcinogens*, or *Possible Carcinogens*

Selecting carcinogens: Two prioritizations

- Initial exercise in 2007
 - Identified which carcinogens to focus our efforts on
 - 53 substances selected for highest priority
 - E.g.: Asbestos, benzene, chromium, formaldehyde, silica
- Revisited in 2015
 - Identified additional carcinogens to focus our efforts on and updates where needed
 - Results do not include substances from 2007 exercise where no further action was recommended

Prioritization criteria (2015)

1. How **toxic** is the substance (carcinogenicity, other health effects)?
2. Is the substance likely to be **encountered in Canadian workplaces**?
3. Is it **feasible** to assess exposure in Canada?
4. Was there **special interest** in the substance from the public or scientific community?

Types of substances

Category	Examples
Pesticides	2,4-D, pentachlorophenol
Industrial chemicals	Benzene, formaldehyde
Fibres/Dusts	Asbestos, silica
Metals	Chromium (VI), nickel
Pharmaceuticals	Hazardous drugs (cancer treatment)
Exposure circumstances	Shiftwork, sedentary work
Radiation	Ionizing radiation
Other	Diesel engine exhaust, secondhand smoke

Prioritization categories (2015)

Priority level	Definition	Examples
High Priority	Could/should be addressed immediately by CAREX, already reviewed by IARC	Asbestos, silica, welding fume, gasoline engine exhaust, carbon nanotubes
Medium Priority	Evidence for Canadian exposure limited and/or IARC review not yet scheduled	Bisphenol A, secondhand smoke, coal dust, hydrazine
Low Priority	Known declining use, unknown but plausible Canadian use, or IARC review not yet scheduled	Vinyl chloride, parathion, estrogens

Occupational exposure estimates



- How many people are potentially exposed at work?
- Where do they work (industry); what do they do (occupation)?
- Where do they live and work in Canada?
- What levels are they exposed to?

Top workplace exposures in Canada

Known or suspected carcinogen	# exposed	Confirmed sites	Suspected sites
Shiftwork (night, rotating)	1,800,000		Breast, prostate
Solar radiation	1,500,000	Skin, lip	Eye
Diesel engine exhaust	897,000	Lung	Bladder
Silica	382,000	Lung	Others?
Benzene	374,000	Acute non-lymphatic leukemia	ALL, multiple myeloma, NHL, lung
PAHs	350,000	Lung, skin, bladder	
Wood dust	338,000	Sinonasal, nasopharynx	

Exposure estimate results: Formaldehyde

- Industry
- Occupation
- Region
- Exposure level
- Sex

152,000 WORKERS (EST.)  **FORMALDEHYDE EXPOSURE IN CANADA**

FIVE LARGEST EXPOSURE GROUPS BY INDUSTRY

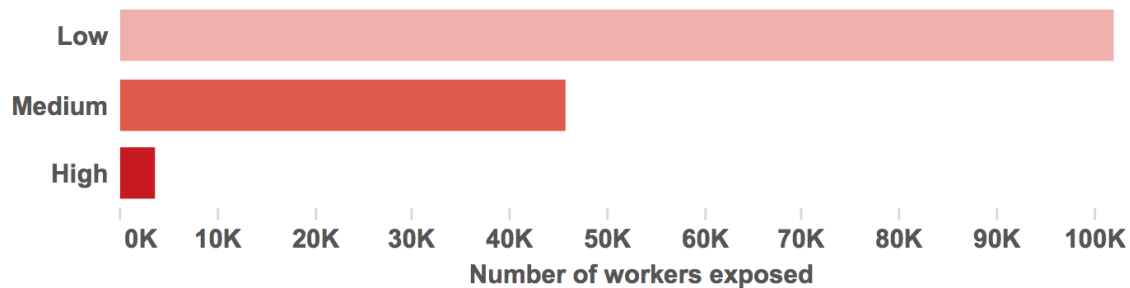
PROPORTION OF INDUSTRY EXPOSED

Household & institutional furniture and kitchen cabinet manufacturing	16,000	21%
Hospitals	13,000	<5%
Other wood product manufacturing	9,900	18%
Sawmills and wood preservation	7,000	11%
Building finishing contractors	6,500	<5%

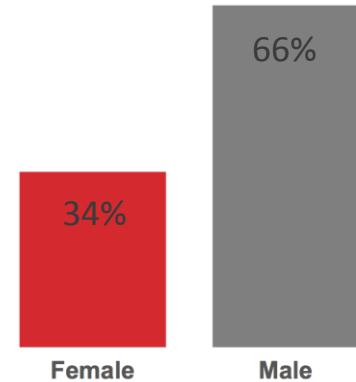
Exposure estimate results: Formaldehyde

- Industry
- Occupation
- Region
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- Sex

Estimated Level of Exposure



Sex of Exposed Workers



Current Canadian priorities



- Diesel engine exhaust
- Asbestos
- Silica
- Solar radiation
- Hazardous drugs

CAREX estimates informing policy: Examples

- Proposed asbestos ban (federal)
- Silica regulations (provincial)
- Proposed diesel occupational exposure limit (provincial)
- Proposed updates to hazardous drugs regulations (provincial)
- Strategic plan on occupational disease and illness prevention (provincial)



Using CAREX methods internationally

- Help guide substance prioritization and estimate development
 - CAREX approach
 - Resources/types of information used
- Improve global burden of disease estimates
- Examples:
 - Worked with colleagues in several Latin American and the Caribbean countries to develop their own CAREX projects
 - Working with South Africa, New Zealand to develop their own CAREX estimates and ways to more easily share our data

Resources

- Peters CE et al. "Priority setting for occupational cancer prevention." *Saf Health Work*. 2018;9(2):133-139.
- Peters CE et al. "CAREX Canada: an enhanced model for assessing occupational carcinogen exposure." *Occup Environ Med*. 2015;72(1):64-71.
- Hall AL et al. "Estimating national-level exposure to antineoplastic agents in the workplace: CAREX Canada findings and future research needs." *Ann Work Expo Heal*. 2017;61(6):656-658.
- CAREX Canada. Occupational Approach (website)
www.carexcanada.ca/en/occupational_approach
- CAREX Canada. Priority occupational carcinogens for surveillance in Canada: Preliminary priority list. 2007 (PDF)
https://www.carexcanada.ca/CAREX_Canada_Occupational_Priorities_Report.pdf

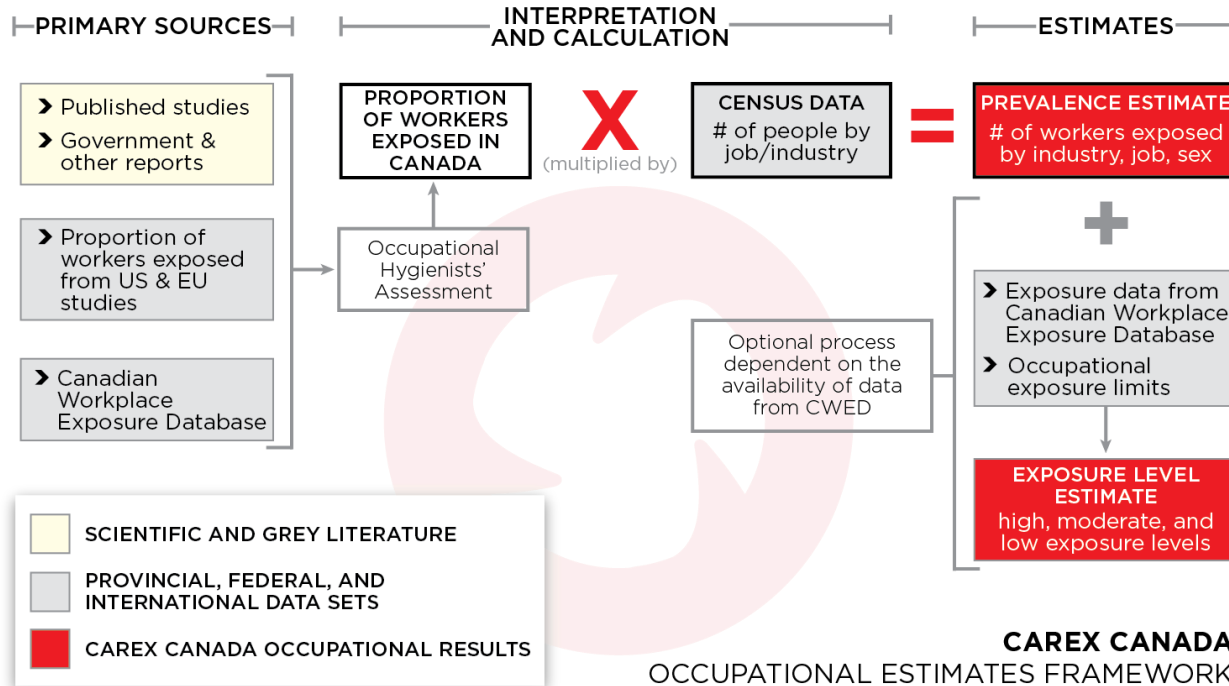
Thank you
for your
attention!

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Budget: Occupational stream estimates

- 2007-12: ~\$500,000 (CAD) per year
 - *Focus on exposure estimate and carcinogen profile production*
- 2012-17: ~\$300,000 (CAD) per year
 - *Focus on knowledge mobilization and maintaining exposure estimate credibility and relevancy*
- 2017-22: ~\$340,000 (CAD) per year
 - *Focus on knowledge mobilization and updating and maintaining exposure estimates*

Occupational estimates framework



Resources for prioritization - examples

- Exposure data collected in Canadian workplaces
- IARC monographs and documentation
- Risk assessments
- Environmental releases of hazardous substances from industrial sources
- Canadian and international databases on:
 - Chemical suppliers
 - Pharmaceuticals
 - Hazardous substances
 - Household products
 - Pesticides