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)

- 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**

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

## Prioritization categories (2015)

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

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

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

- Industry
- Occupation
- Region
- Exposure level
- Sex

![Table showing the five largest exposure groups by industry and the proportion of industry exposed to formaldehyde in Canada.](image-url)

- 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

- Exposure level
- Sex

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**Estimated Level of Exposure**

- Low
- Medium
- High

**Number of workers exposed**

- 0K
- 10K
- 20K
- 30K
- 40K
- 50K
- 60K
- 70K
- 80K
- 90K
- 100K

**Sex of Exposed Workers**

- Female: 34%
- Male: 66%

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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

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
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