Knowledge Translation and CAREX Canada

Anne-Marie Nicol, PhD
Principal Investigator and Assistant Professor

Faculty of Health Sciences
Simon Fraser University

www.carexcanada.ca

CAREX CANADA

Related tables: Life expectancy and deaths, Births and deaths.

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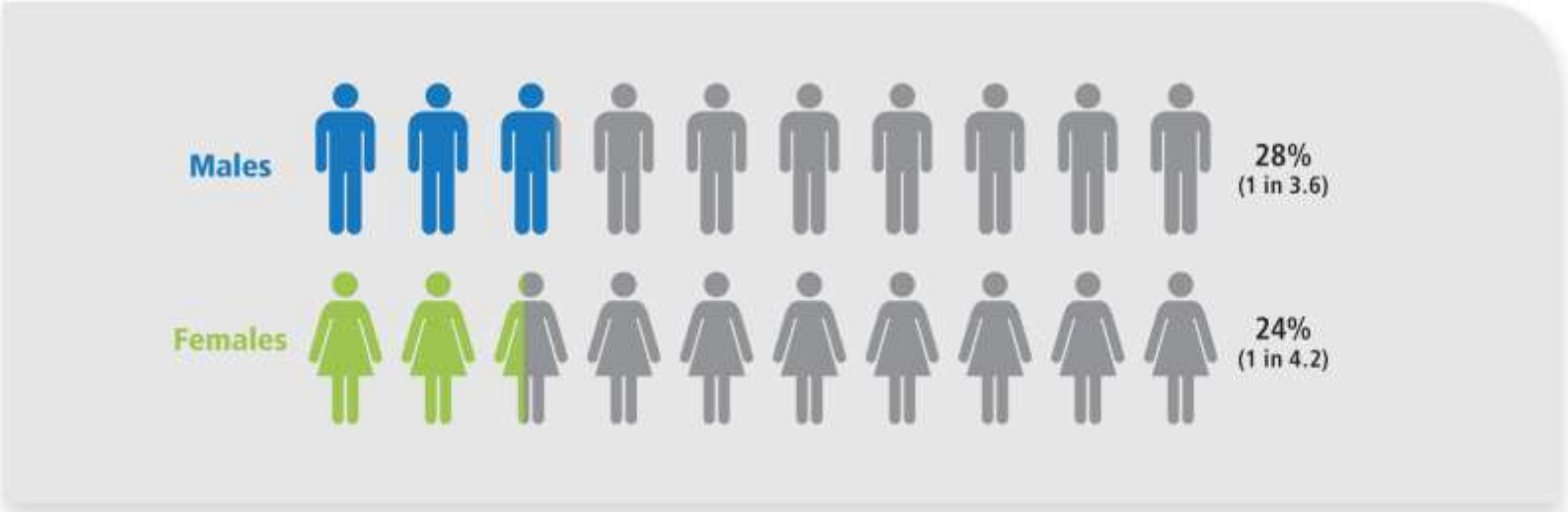
Leading causes of death, by sex (Both sexes)

	2011		
	Both sexes		
	rank	number	%
Total, all causes of death	...	**242,074**	**100.0**
Malignant neoplasms (cancer)	1	72,476	29.9
Diseases of heart (heart disease)	2	47,627	19.7
Cerebrovascular diseases (stroke)	3	13,283	5.5
Chronic lower respiratory diseases	4	11,184	4.6
Accidents (unintentional injuries)	5	10,716	4.4
Diabetes mellitus (diabetes)	6	7,194	3.0
Alzheimer's disease	7	6,356	2.6
Influenza and pneumonia	8	5,767	2.4
Intentional self-harm (suicide)	9	3,728	1.5
Nephritis, nephrotic syndrome and nephrosis (kidney disease)	10	3,294	1.4

Notes: Causes of death are coded to the 10th revision of the World Health Organization's International Statistical Classification of Diseases and Related Health Problems (ICD-10).
Sources: Statistics Canada, CANSIM table 102-0561.
Last modified: 2014-01-28.

FIGURE 3.1 Lifetime probability of dying from cancer, Canada, 2007



Analysis by: Chronic Disease Surveillance and Monitoring Division, CCDP, Public Health Agency of Canada
Data source: Canadian Vital Statistics Death database at Statistics Canada

CAREX Canada – a brief overview

CAREX

EXPOSURE

CARCINOGEN

CANADIAN **PARTNERSHIP** AGAINST **CANCER**

PARTENARIAT CANADIEN CONTRE LE **CANCER**

Originally funded as a pilot project by WorkSafe BC in 2003

Fully funded by CPAC in 2008 (renewed 2012)

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Project goal and questions

Our goal: To help lower Canadians' exposures to known and suspected carcinogens in workplaces and communities.

The projects looks to identify:

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

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Workplace cancer burden

Author and Location		Attributable Fraction (%) By Cancer Site and Gender					
		Lung	Leukemia	Bladder	Skin (NMSC)	Nasal	Total
Nurminen et al (2001) Finland	Male	29	18.5	14.2	13.1	24	13.8
	Female	5.3	2.5	0.7	3.8	6.7	2.2
Steenland et al (2003) United States	Male	8-19.2	0.8-2.8	5.6-19	1.2-6	31-43	3.3-7.3
	Female	2	0.8-2.8	5.6-19	-	-	0.8-1.0
Rushton et al (2010) United Kingdom	Male	21.1	0.9	7.1	7.1	46.0	8.2
	Female	5.3	0.5	1.9	1.1	20.1	2.3
Alberta Health Services, AHS (2010), Alberta	Male	6-33	1.8-18.5	1.2-27	1.2-13.1	24-64.3	3.3-13.8
	Female	1-5.5	0.5-3	0.4-19	3-3.8	2-18.4	0.1-2.2

Courtesy of the Occupational Cancer Research Centre (OCRC)

Financial burden of occupational disease

Direct medical cost associated with these - estimated $15.6 million

- Excludes loss of productivity and allied costs

The Ontario Cancer Research Centre (OCRC) has applied the Alberta predictions to Ontario and results suggest:

- 500-2300 Ontarians will die of workplace cancer each year

Environmental cancer burden

Lung Cancer mortality

- 16% attributed to Radon (Health Canada 2012)
- 7.4% attributed to **Air Pollution-PM $_{2.5}$** (Almaskut 2012)

Other cancer sites and exposures less clear

- Drinking water exposures (**arsenic, disinfection by-products**) (Boyd 2007)
  - Potential sites include skin, kidney, bladder
  - Exposures vary: well water versus municipal systems

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How does CAREX Canada select carcinogens?

- Based on evaluations made by:

- We focus on 72 substances, ranked by IARC
- Substances were selected based on:
  - Potential for O & E exposure in Cdn setting
  - Feasibility of assessing exposure

How does CAREX Canada carry out its work?

Where does CAREX get its data?

- We use existing data, mostly provincial and federal Canadian government data, and published data
- Transparency a key aspect of mandate

How is CAREX knowledge and dissemination reviewed?

- Scientific Advisory Committees
- Peer-reviewed publications
- Knowledge Translation Advisory Committee

What tools and resources has CAREX created?

- Substance profiles
- Occupational exposure estimates, approach, methods
- Environmental exposure estimates, approach, methods
- Media scan of exposures (Carcinogens in the News)
- Interactive tools to explore and use CAREX data:

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Potential uses

- Identify groups at risk of high exposure
- Help to set priorities for prevention
- Inform exposure reduction policies
- Assess impact of changing regulations on exposures
- Identify data gaps and research priorities
- Predict future cases of disease
- Enable interprovincial (or international) comparisons

CAREX Canada – Knowledge Translation

CAREX Staff:

Anne-Marie Nicol

Alison Palmer

Joanne Telfer

- End-of-grant KT (guided by CIHR)
- Objectives:
  - Enhance access to and awareness of O&E exposure estimates
  - Build capacity to apply these estimates to guide and evaluate decisions about cancer prevention research, programs, and policies

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Ian D. Graham. 2012. *Guide to Knowledge Translation Planning at CIHR: Integrated and End-of-Grant Approaches*. Canadian Institutes of Health Research.

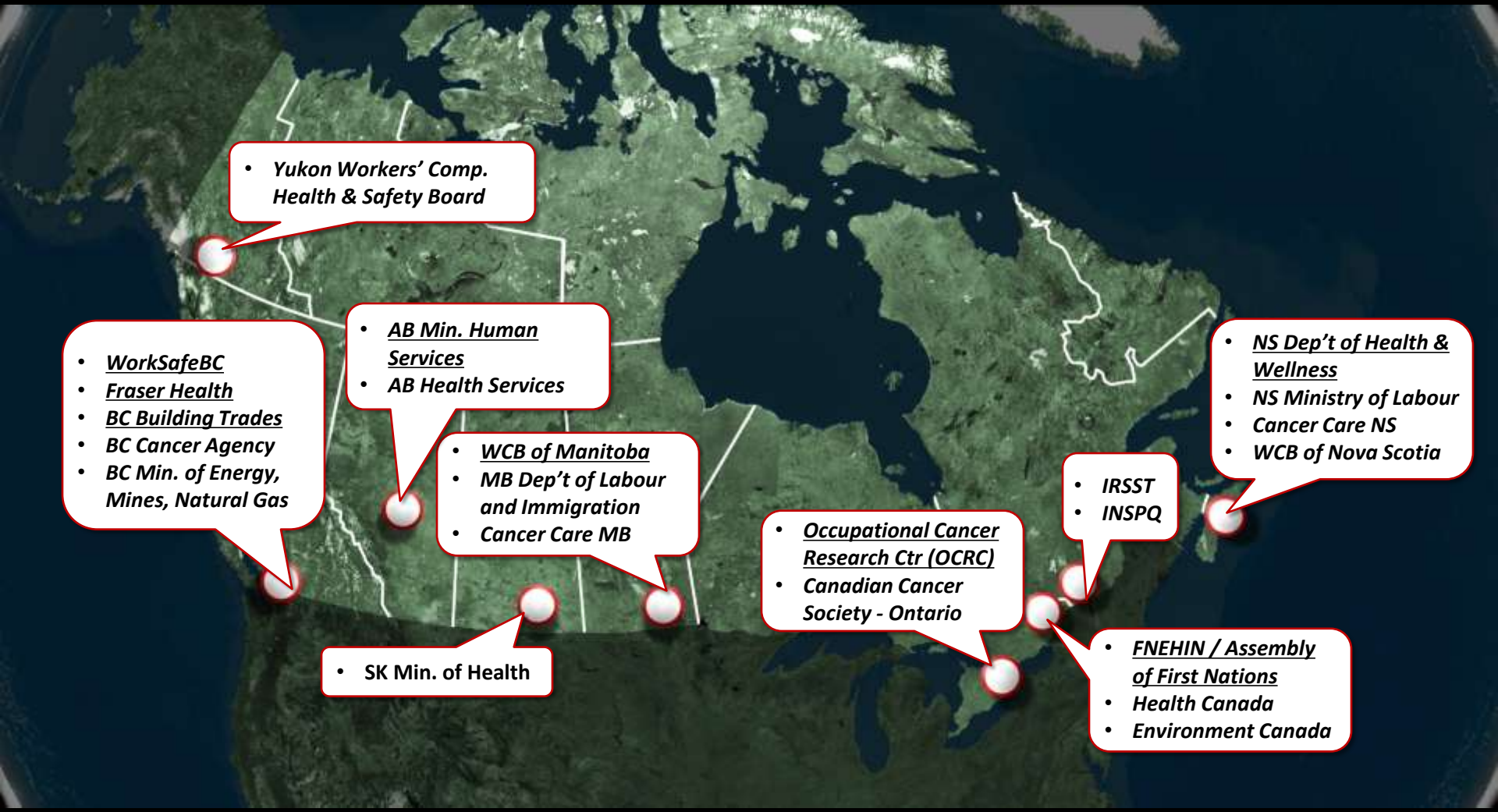
COMPONENT	IDENTIFYING NEEDS **Develop and refine resources and tools based on target audience needs and cancer prevention priorities**	DATA MAINTENANCE **Maintain estimates of exposure to known and suspected carcinogens in workplaces and communities**	KNOWLEDGE TRANSFER + EXCHANGE **Mobilize CAREX resources and tools to support evidence-informed decision-making via creation of actionable knowledge and capacity building**	MONITORING + EVALUATION **Track and evaluate impact of CAREX through a continuous improvement cycle**
ACTIVITIES	↓ • Identify knowledge gaps • Identify specific resource and tool needs and gaps • Collaborate with experts • Engage stakeholders • Develop partnerships	↓ • Data retrieval, integration and quality assurance • Compliance with international evaluations/classification • Literature reviews • Consult with experts	↓ • Knowledge product development • Dissemination of knowledge products • Capacity building activities • Provide expert advice to stakeholders	↓ • Develop evaluation plan and framework • Develop data collection tools • Collect and analyze data • Report on impact and progress
OUTPUTS	↓ • Consultation meetings • Needs assessments • Stakeholder maps, KTE plans • Working groups • MOUs, joint grant applications	↓ • Databases maintained • Online tools maintained • Timely responses to requests	↓ • Online O+E exposure estimates, tools • eBulletins, Twitter • Peer-reviewed and non-peer-reviewed publications • Training modules, webinars Tailored workshops, webinars • Scientific presentations • Responses to data and/or information inquiries	↓ • Evaluation framework and plan • Data collection tools • Evaluation reports • Knowledge user case studies
STOs	↓ ↑access to occupational + environmental carcinogen exposure estimates in Canada (CPAC: improved access to evidence-based prevention strategies) ↑knowledge among stakeholders of occupational + environmental carcinogen exposures ↑awareness of CAREX Canada initiative and knowledge products			
MTOs	↓ ↑ skills to apply occupational + environmental carcinogen exposure estimates to work (capacity strengthened) ↑use of CAREX's occupational + environmental exposure estimates to guide and evaluate decisions about cancer prevention research, programs and policies			
LTOs	↓ ↑ programs, policies, and practices related to occupational + environmental carcinogen exposures informed by CAREX Canada's data and tools (includes agenda-setting)			
IMPACT	↓ Enhanced population-based cancer prevention ↓ Reduced incidence of cancer			

Knowledge Translation and Exchange Strategy

Applying a combination of approaches:

- **Diffusion**: keeping resources updated, credible, accessible
  - website, publications, videos, tools
- **Dissemination**: engaging users, building capacity
  - webinars, workshops, package summaries
- **Application**: collaboration, partnership
  - working groups (e.g. WorkSafeBC)
  - spinoff projects (e.g. OCRC burden grant, FNEHIN training)
  - user networks (future)

Performing annual needs assessments, rigorous evaluation


• Yukon Workers' Comp. Health & Safety Board
• WorkSafeBC
• Fraser Health
• BC Building Trades
• BC Cancer Agency
• BC Min. of Energy, Mines, Natural Gas
• AB Min. Human Services
• AB Health Services
• WCB of Manitoba
• MB Dep't of Labour and Immigration
• Cancer Care MB
• SK Min. of Health
• Occupational Cancer Research Ctr (OCRC)
• Canadian Cancer Society - Ontario
• IRSST
• INSPQ
• NS Dep't of Health & Wellness
• NS Ministry of Labour
• Cancer Care NS
• WCB of Nova Scotia
• FNEHIN / Assembly of First Nations
• Health Canada
• Environment Canada

CAREX CANADA

Surveillance of environmental & occupational exposures for cancer prevention

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CAREX Canada is a national surveillance project that estimates the number of Canadians exposed to substances associated with cancer in workplace and community environments. These estimates provide significant support for targeting exposure reduction strategies and cancer prevention programs.

OUR TOOLS:

eWORK EMISSIONS MAPPING PROJECT eRISK

LATEST UPDATES:

- View our January e-Bulletin, featuring exposures via outdoor air, our new exposure reduction resources page, and more
- Our team is part of an international partnership recently funded by the IDRC
- We've enhanced our resources with a new tool called eWORK Online - please test and share your feedback
- Our environmental exposures team has released a new report on data priorities

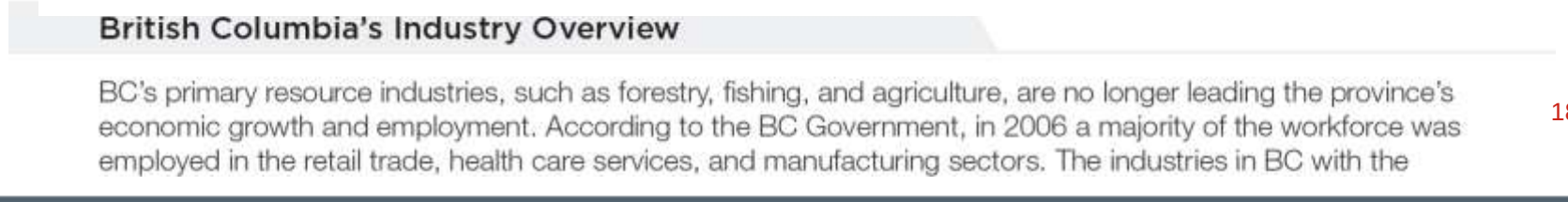
New resource: Package summaries

Intent: respond to user needs for specific information

Summarizes results, profiles, tools, methods, references

Prototypes developed and currently being tested:

- Occupation (O): welder
- Industry (O): wood product manufacturing, mining
- Cancer site (O): lung
- Exposure pathway (E): outdoor air, indoor air
- Province: Nova Scotia (O&E), BC (O), Quebec (E)



British Columbia's Industry Overview

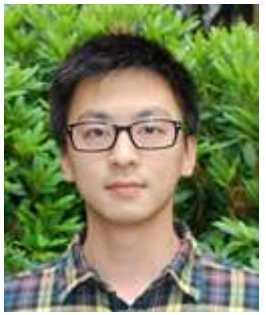
BC's primary resource industries, such as forestry, fishing, and agriculture, are no longer leading the province's economic growth and employment. According to the BC Government, in 2006 a majority of the workforce was employed in the retail trade, health care services, and manufacturing sectors. The industries in BC with the

CAREX Canada – Occupational estimates

CAREX Staff:

Cheryl Peters

Calvin Ge



- 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?

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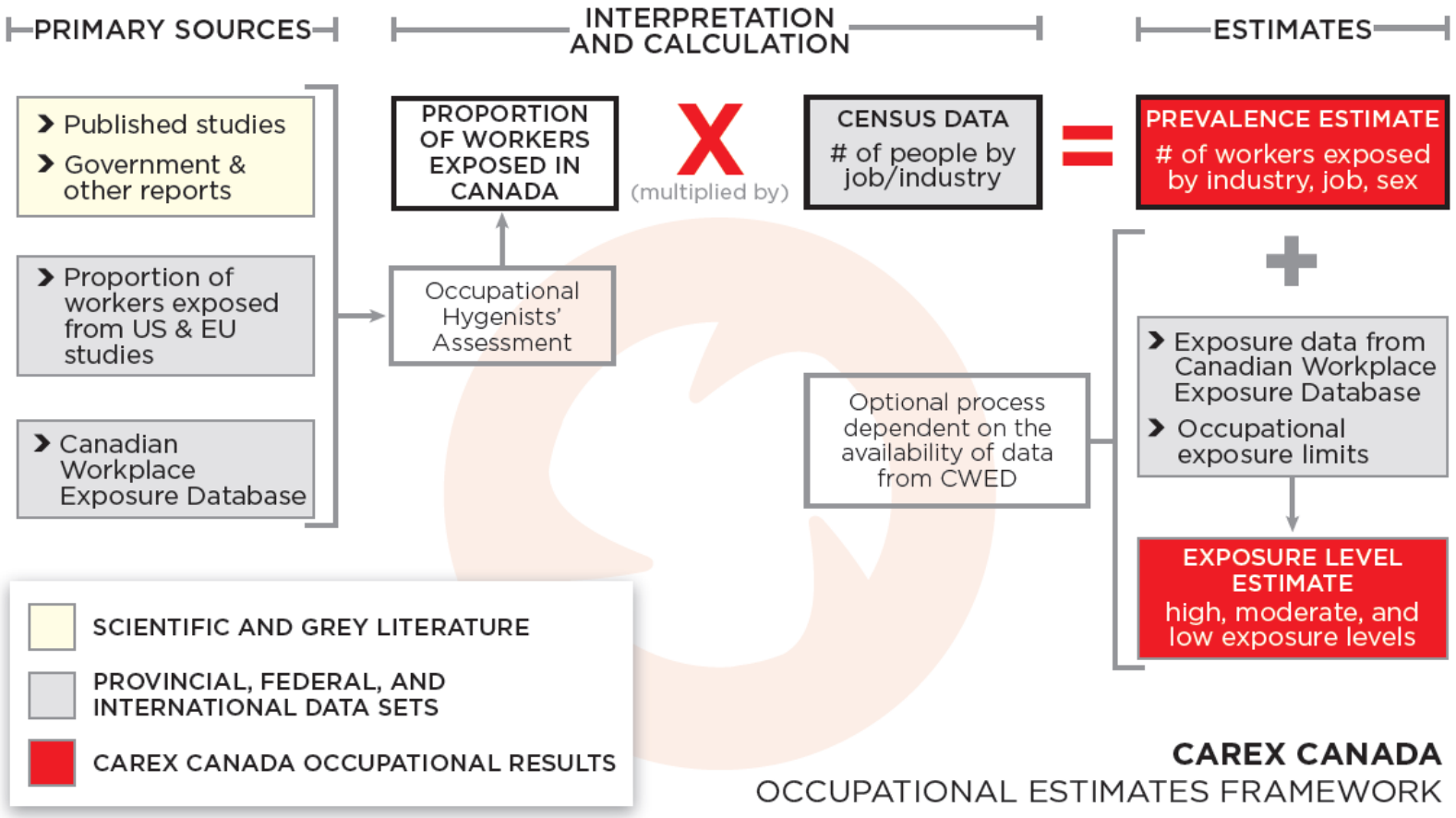
Occupational approach – overview



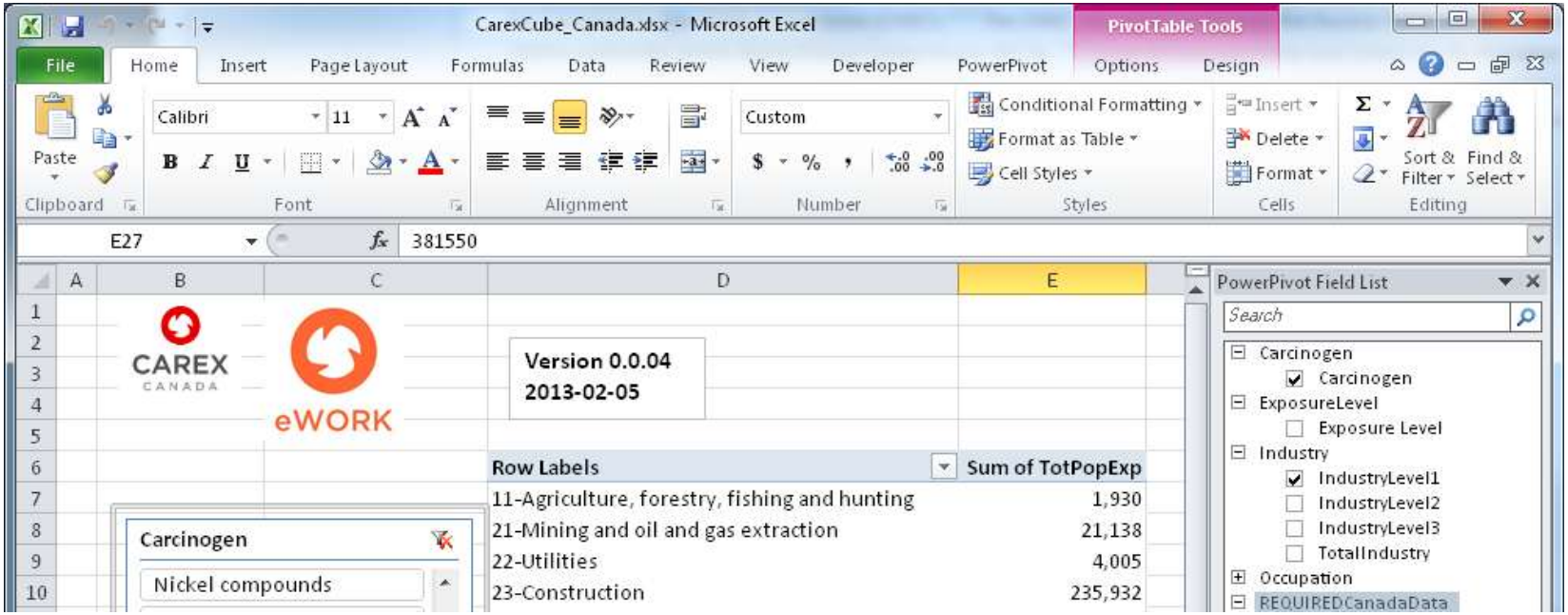
Who is at risk?
exposed and cancer sites (Canada)

Known or suspected carcinogen	# Exposed	Confirmed	Suspected
Shiftwork with potential circadian disruption	1,900,000		Breast, prostate
Solar radiation	1,500,000	Skin	
Diesel engine exhaust	804,000	Lung	
Silica (crystalline)	380,000	Lung	Others?
Benzene	375,000	Acute non-lymphatic leukemia	ALL, multiple myeloma, NHL
Wood dust	340,000	Sinonasal, nasopharynx	
Polycyclic aromatic hydrocarbons (PAHs)	307,000	Lung, skin, bladder	
Lead	277,000		Lung, stomach
Asbestos	152,000	Lung, mesothelioma, larynx, ovary	Pharynx, colon, rectum, stomach
UV radiation (artificial sources)	141,000	Skin, eye	

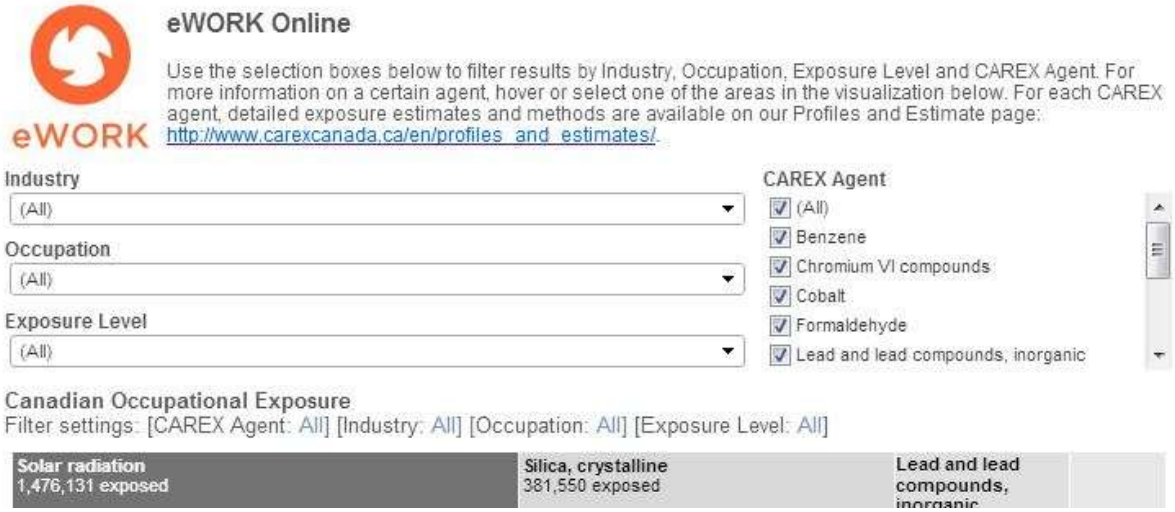
Who is at risk?
exposed and cancer sites (Ontario)

Known or suspected carcinogen	# Exposed	Confirmed	Suspected
Shiftwork with potential circadian disruption	845,000		Breast, prostate
Solar radiation	449,000	Skin	
Diesel engine exhaust	263,000	Lung	
Benzene	147,000	Acute non-lymphatic leukemia	ALL, multiple myeloma, NHL
Silica (crystalline)	142,000	Lung	Others?
Polycyclic aromatic hydrocarbons (PAHs)	120,000	Lung, skin, bladder	
Lead	102,000		Lung, stomach
Wood dust	92,000	Sinonasal, nasopharynx	
Ethylbenzene	77,000		Lung, liver, kidney
Formaldehyde	63,000	Nasopharynx, leukemia	Sinonasal

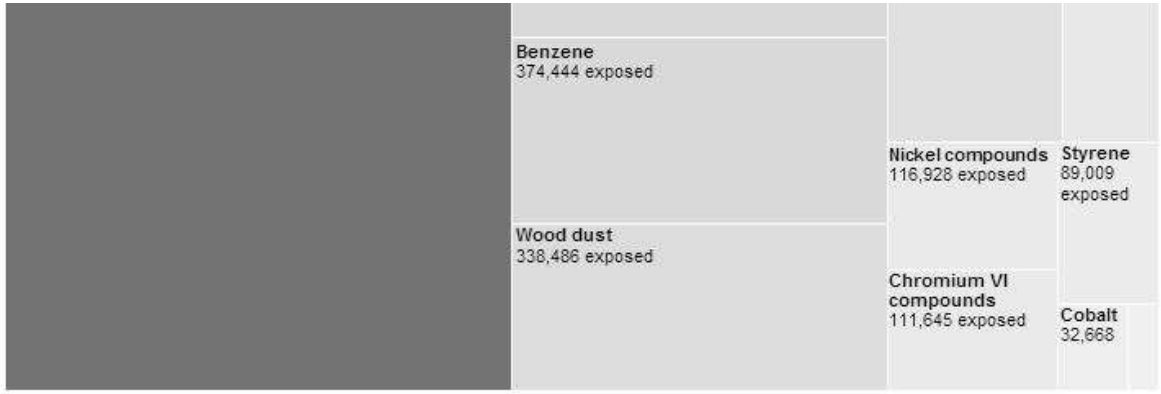
eWORK Excel


CarexCube_Canada.xlsx - Microsoft Excel
PivotTable Tools
File
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
PowerPivot
Options
Design
Paste
Clipboard
Calibri
11
Font
Alignment
Custom
Number
Conditional Formatting
Format as Table
Cell Styles
Styles
Insert
Delete
Format
Cells
Sort & Filter
Find & Select
Editing
E27
381550
CAREX CANADA
eWORK
Version 0.0.04
2013-02-05
Row Labels
Sum of TotPopExp
11-Agriculture, forestry, fishing and hunting
1,930
21-Mining and oil and gas extraction
21,138
22-Utilities
4,005
23-Construction
235,932
Carcinogen
Nickel compounds
PowerPivot Field List
Search
Carcinogen
Carcinogen
ExposureLevel
Exposure Level
Industry
IndustryLevel1
IndustryLevel2
IndustryLevel3
TotalIndustry
Occupation
REQUIREDCanadaData

eWORK Online



Visit www.carexcanada.ca/en/tableau to test this new tool.



Package sample – Lung cancer

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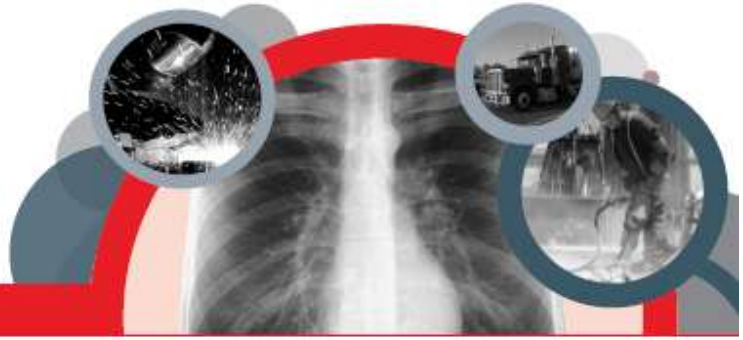
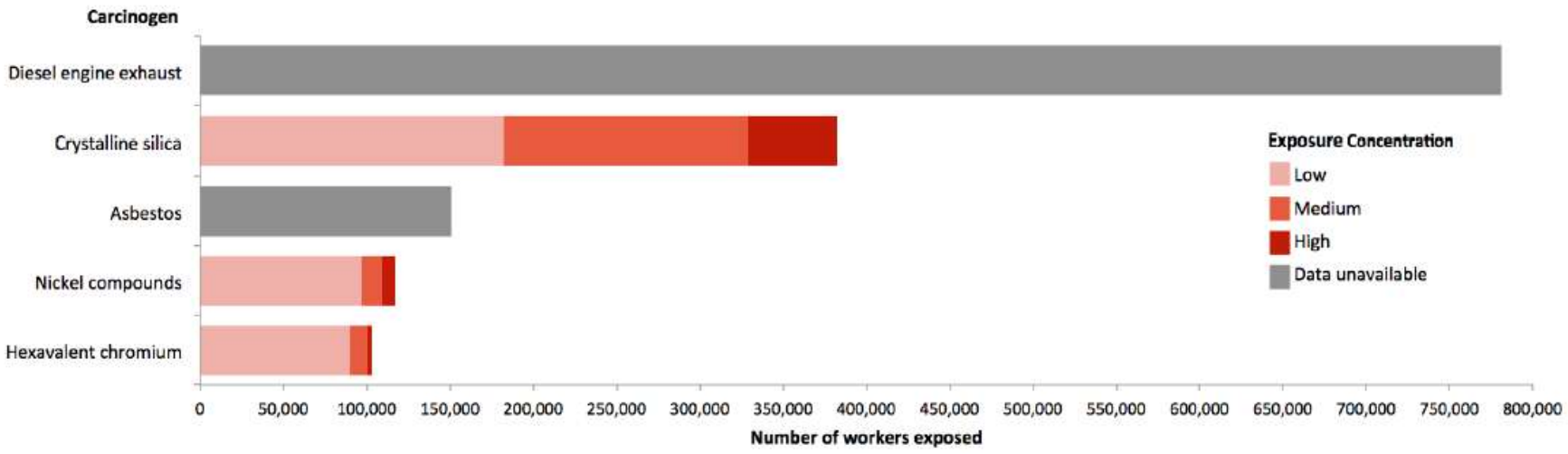
Surveillance of environmental and occupational exposures for cancer prevention



Lung Carcinogens

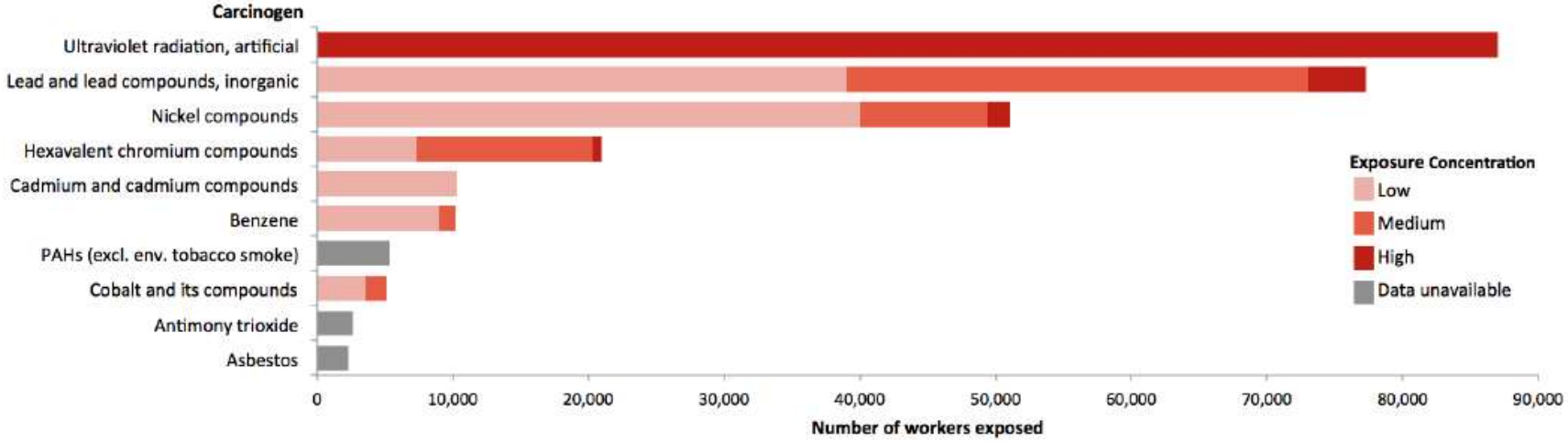
Occupational Exposure Summary Package



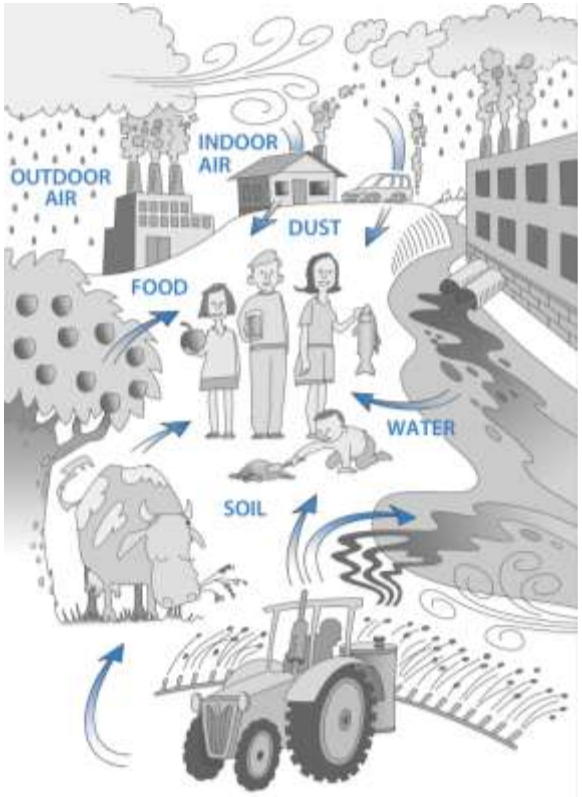
Package sample - Welder

Welders and Related Machine Operators

Industry Summary Package



CAREX Canada – Environmental Estimates



CAREX Staff:
Eleanor Setton
Karla Poplawski

- How many people are exposed or potentially exposed, and where are they?
- What levels are they exposed to?
- Which exposure pathways are important?

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Environmental Indicators

Working with two types of data:

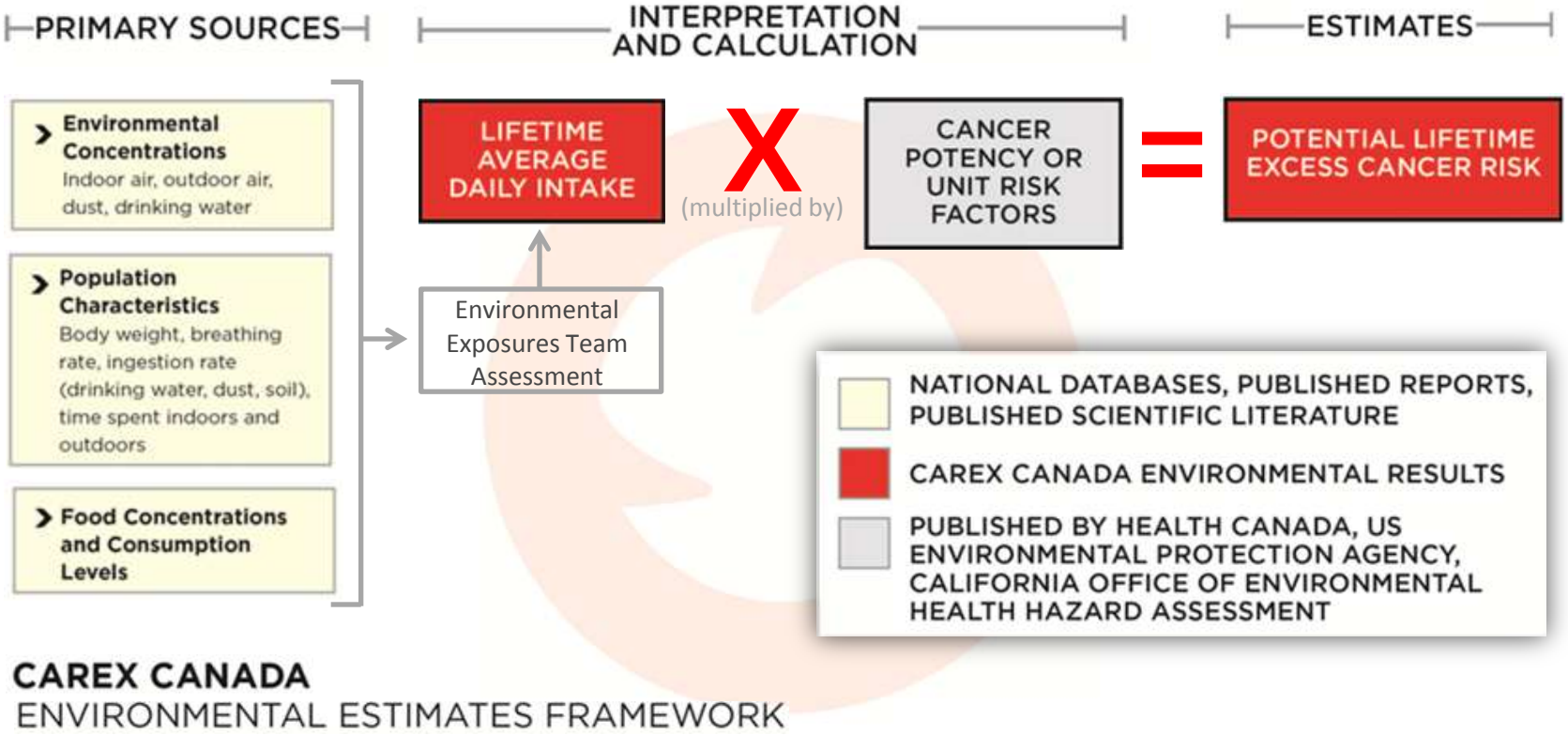
1) Measured levels in exposure pathways:

Risk estimates
Compare substances graphs
eRISK tool
Outdoor air models

2) Emission sources and levels in outdoor environments:

Relative toxicity maps
Emissions Mapping Project

Risk estimates indicator approach – Overview



CAREX CANADA
ENVIRONMENTAL ESTIMATES FRAMEWORK

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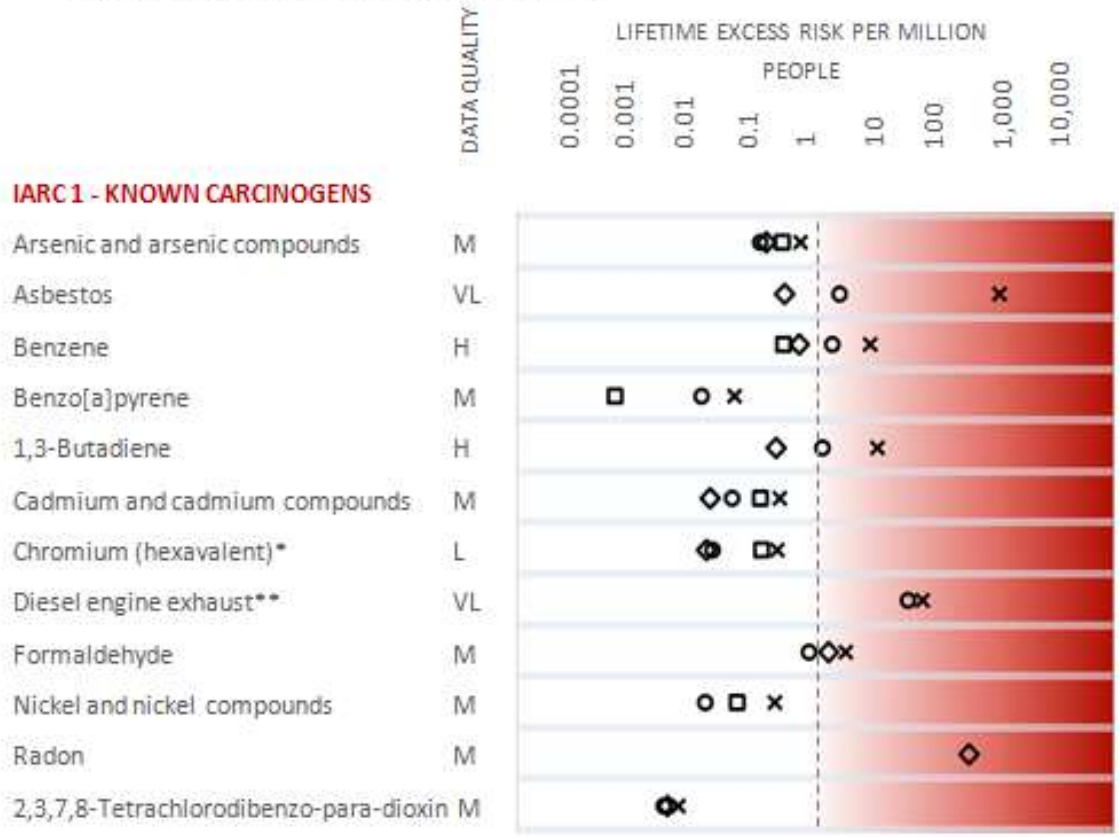
Risk estimates – Comparison tables

How many extra cancers in a population of 1 million people vs unexposed population

National average and maximum risk, based on actual measured data for each substance & exposure pathway (circa 2011)

Indicator: **Potential Lifetime Excess Cancer Risk**

(assuming no change in measured levels)



Exploring the risk estimates – eRISK tool

- MS Access application available to users on request, with supporting manual
- Contains all the input data used for the indicators
- Audience: those working in environmental health and air quality at federal, provincial, municipal, and First Nations levels
- Allows users to change cancer potency factors, measured levels, add new foods etc.

Email us at info@carexcanada.ca for access

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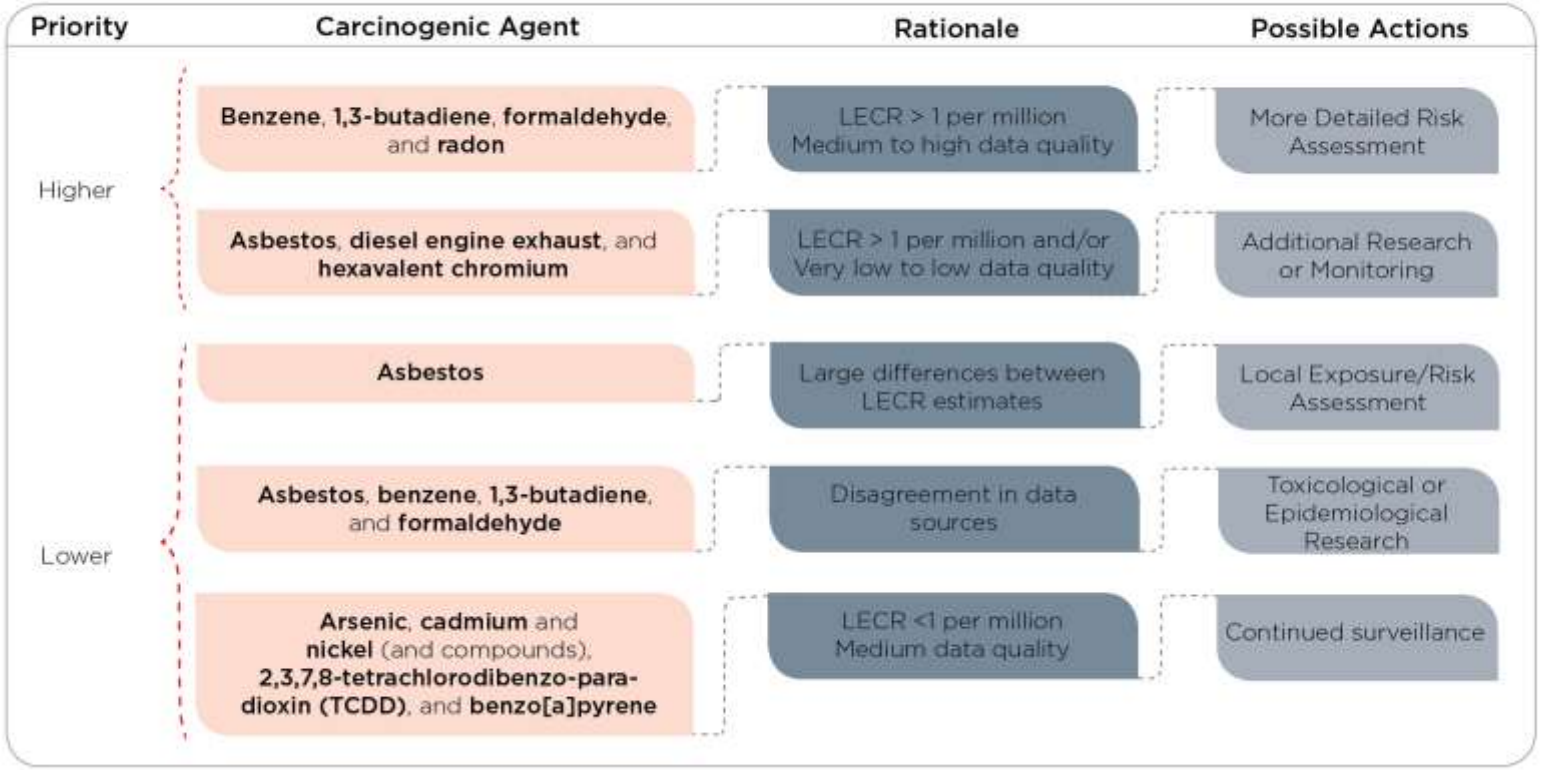
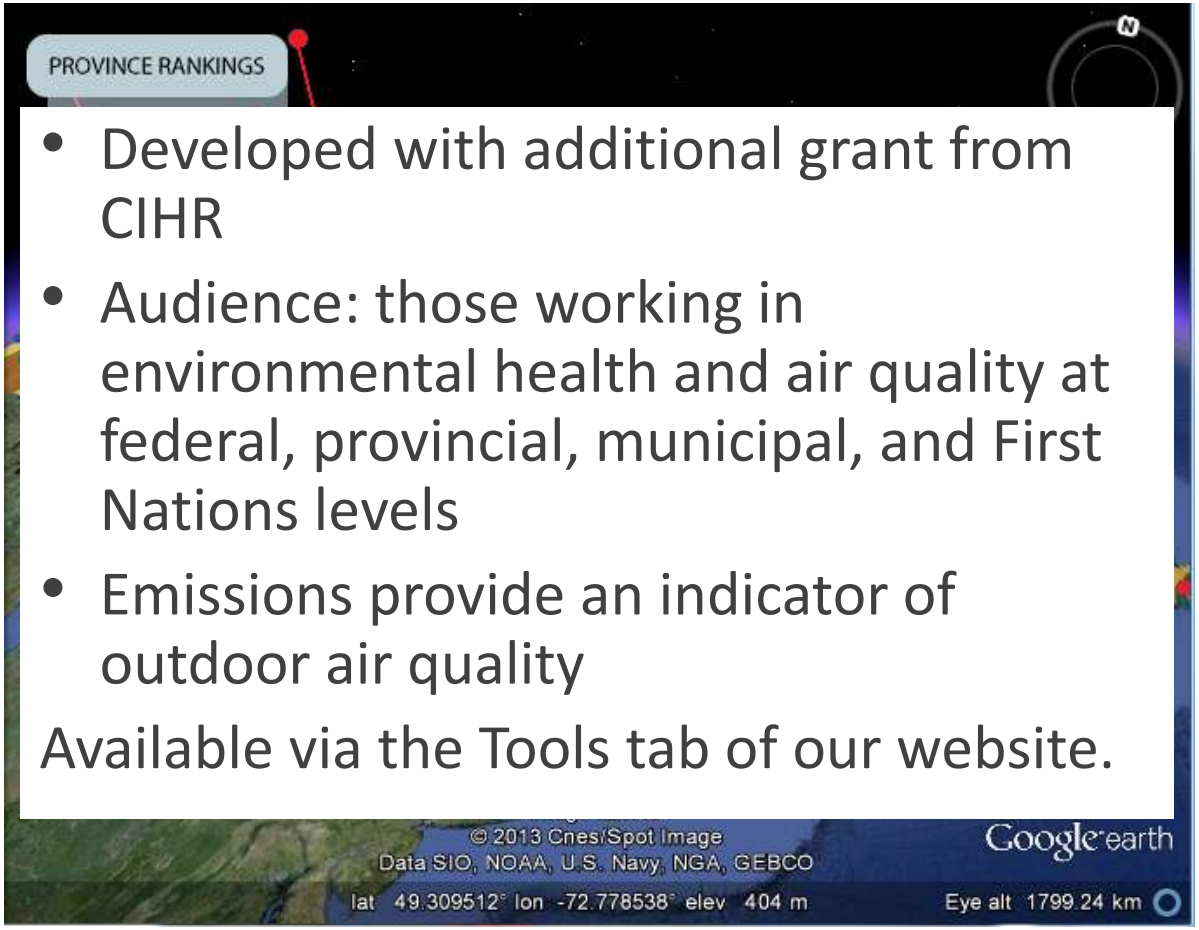
Package sample – Outdoor air



at home, drinking water, and food and beverages. The risk estimates for each substance are national in scope and represent annual average measured levels for each carcinogen, which means that they don't capture the geographical variations that may exist across Canada. Some of our modeling work, however, does capture

Relative toxicity & dynamic mapping indicator

EMISSIONS MAPPING PROJECT



- Developed with additional grant from CIHR
- Audience: those working in environmental health and air quality at federal, provincial, municipal, and First Nations levels
- Emissions provide an indicator of outdoor air quality

Available via the Tools tab of our website.

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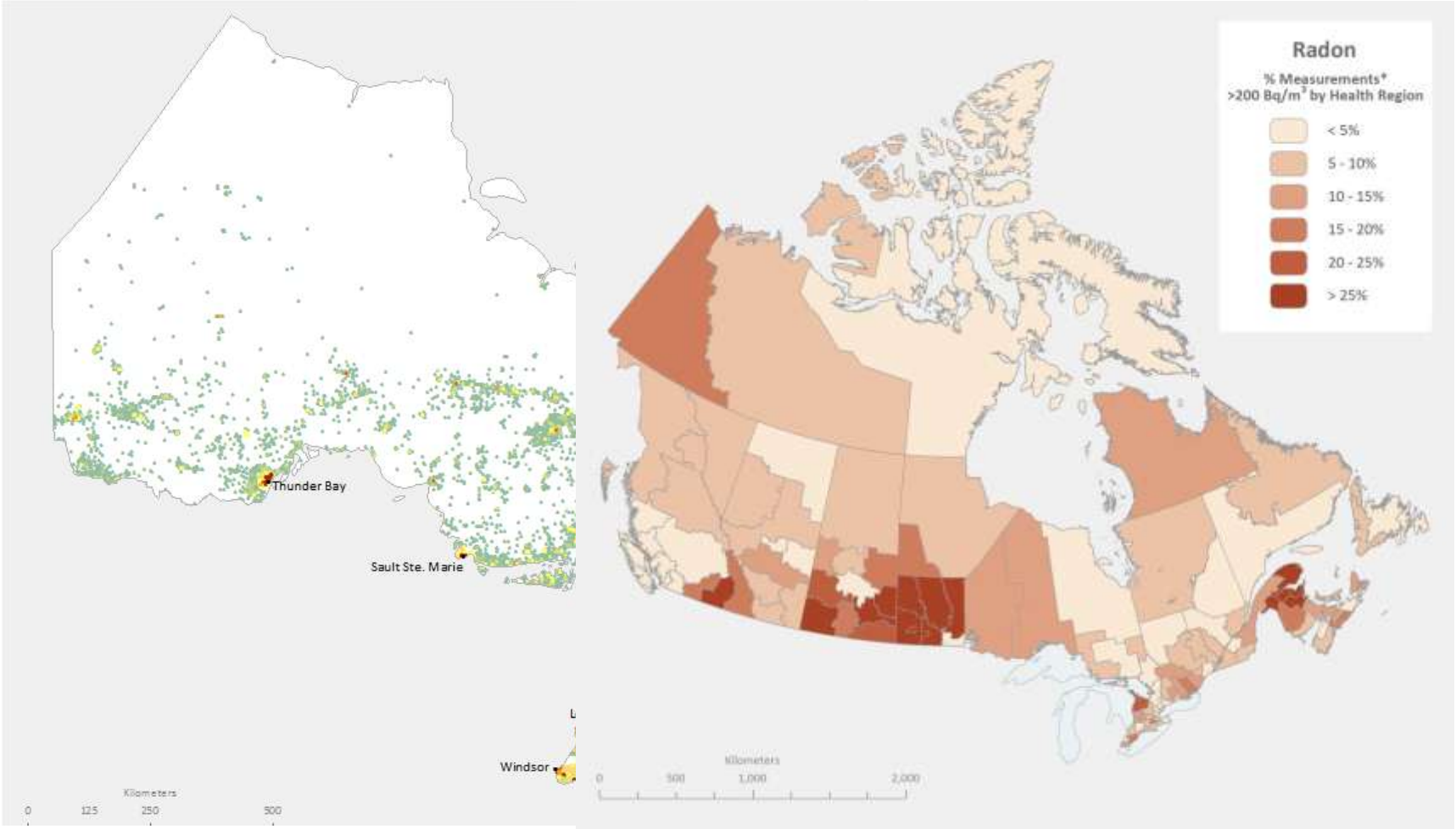
Maps – modeled outdoor air, actual indoor air (radon)



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Surveillance of environmental & occupational expos

Full Profile

Quick Summary

Radon

PROFILE | ENVIRONMENTAL ESTIMATE

RADIATION – Known Carcinogen (IARC 1)

CAS No. 10043-92-2

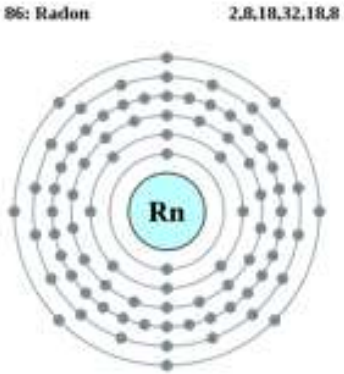
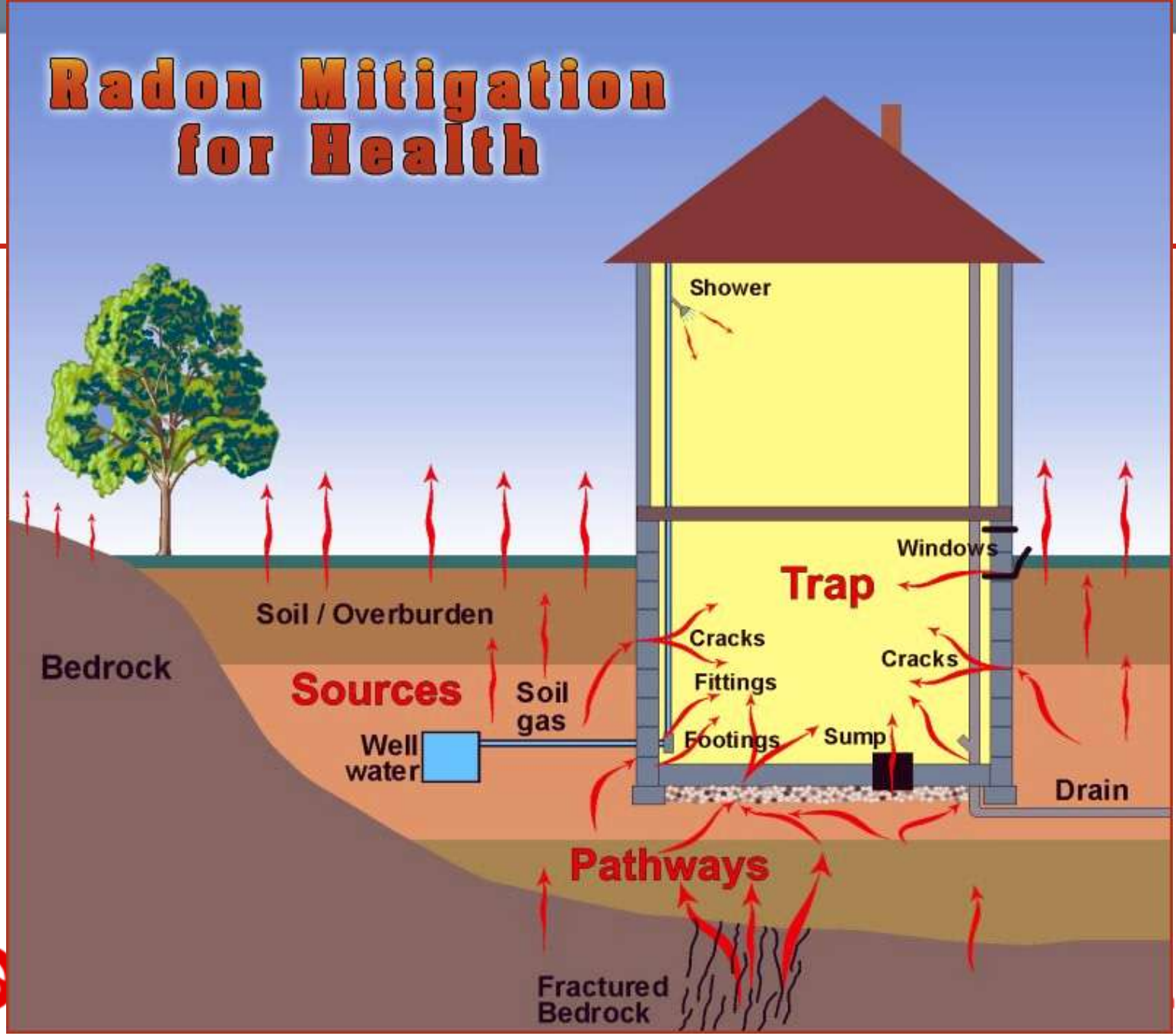


Photo: Wikimedia Commons [1]

IARC Monograph Vol. 78, 2001 (Group 1)

IARC Monograph Vol. 100D, 2012 (Group 1)

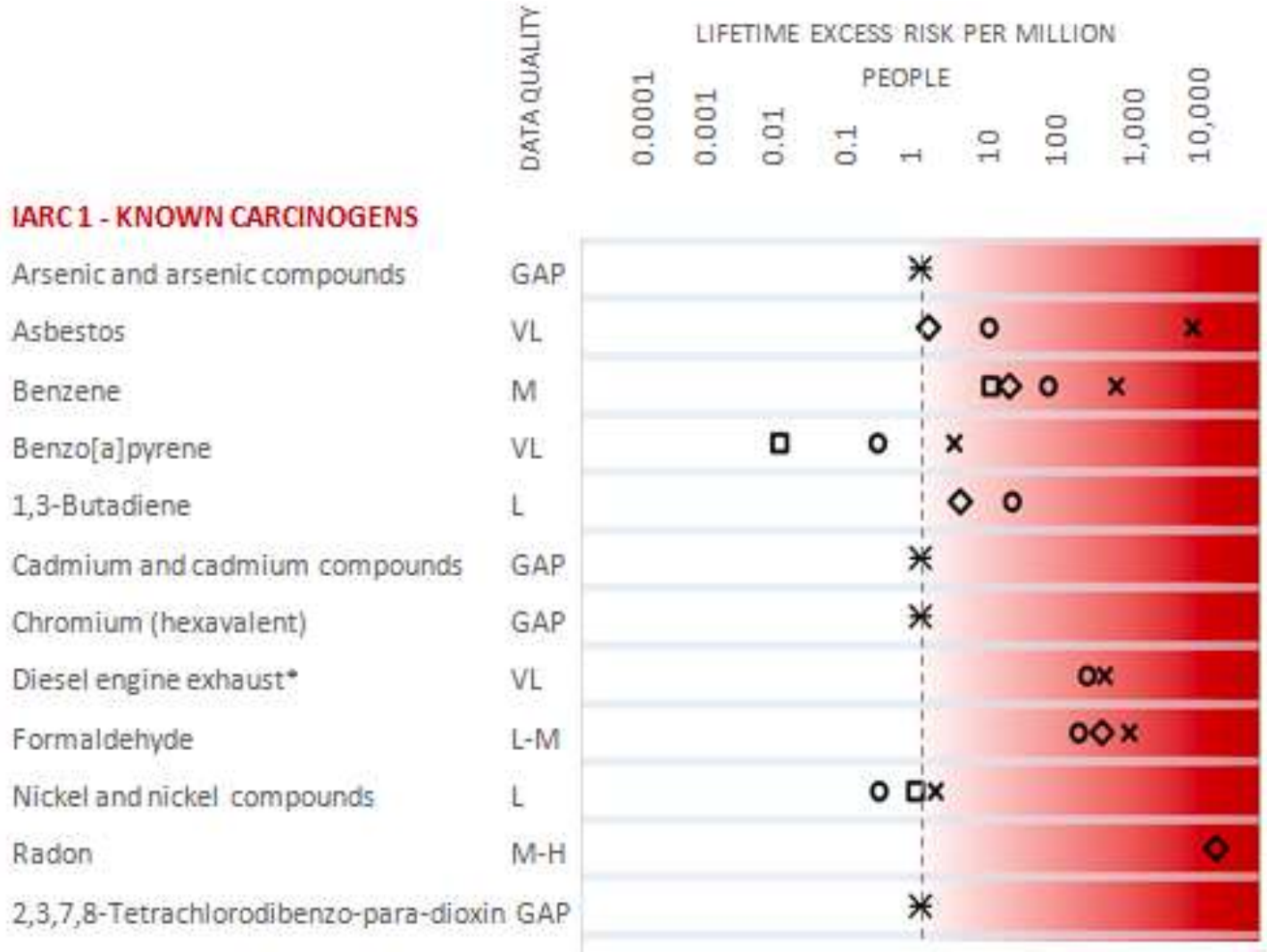

Radon Mitigation for Health
Shower
Windows
Trap
Soil / Overburden
Cracks
Cracks
Fittings
Bedrock
Sources
Soil gas
Well water
Footings
Sump
Drain
Pathways
Fractured Bedrock

Lifetime Excess Cancer Risk by Substance – Indoor Air

Average Risk:
based on average intake X cancer potency or unit risk factor from:

- Health Canada □
- CA OEHHA ○
- US EPA ◇

Maximum Risk: ×
based on maximum intake X highest cancer potency factor or unit risk factor



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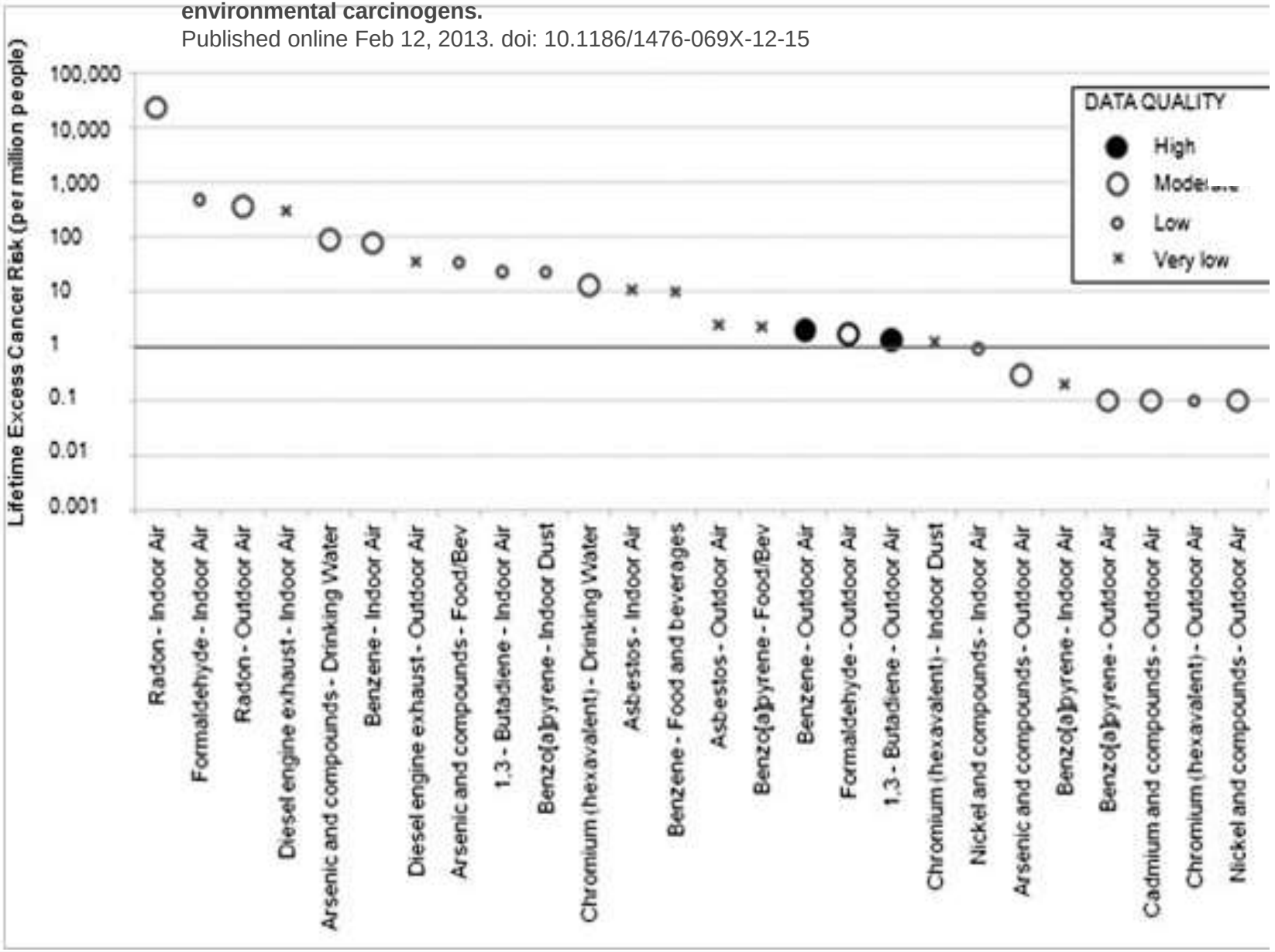
Setton E et al. Environ Health. 2013; 12: 15. **Risk-based indicators of Canadians' exposures to environmental carcinogens.**
Published online Feb 12, 2013. doi: 10.1186/1476-069X-12-15



Special Topics KT: Radon

- Radon is now recognized as a significant public health problem in Canada
  - 16% of lung cancer deaths per year (Chen 2012) ~ 3500 people
  - Leading cause of lung cancer in non-smokers
- Risk increases as exposure increases
- Preventable: Lower indoor levels will lower risk

Canadian risk awareness

Statistics Canada (HES 2009)

- "41% of Canadian had heard of radon and were aware of its impact on health"

Table 11
Household awareness and testing for radon, Canada and provinces

	Aware of radon [1]	Tested [2]
	percent	
Canada	**41**	**11**
Newfoundland and Labrador	41	F
Prince Edward Island	49	F
Nova Scotia	55	10 E
New Brunswick	48	F
Quebec	20	F
Ontario	45	14
Manitoba	51	13
Saskatchewan	54	12
Alberta	49	11
British Columbia	46	11

1. As a percentage of all households that did not live in an apartment.
2. As a percentage of all households that were aware of radon.

Source(s): Statistics Canada, Environment Accounts and Statistics Division, Households and the Environment Survey, 2007, CANSIM Table 153-0061.

Connecting agencies

Canadian Cancer Society / Société canadienne du cancer

Canadian Association of Radon Scientists and Technologists
Helping Canadians Reduce Radon Risk

THE LUNG ASSOCIATION™
British Columbia

northern health
the northern way of caring

Health Canada / Santé Canada

National Collaborating Centre for Environmental Health
Centre de collaboration nationale en santé environnementale

CAREX CANADA

Growing public and occupational health interest in Radon exposures…

Radiation Safety Institute of Canada
Institut de radioprotection du Canada

CLMR
CENTRE FOR LABOUR MANAGEMENT RELATIONS

THE LUNG ASSOCIATION™ Ontario

In collaboration with the Ted Rogers School of Management's Centre for Labour Management Relations at Ryerson University, and with the support of the Ontario Lung Association.

Ontario: Building A Comprehensive Provincial Policy on Radon

Date:
May 1, 2014

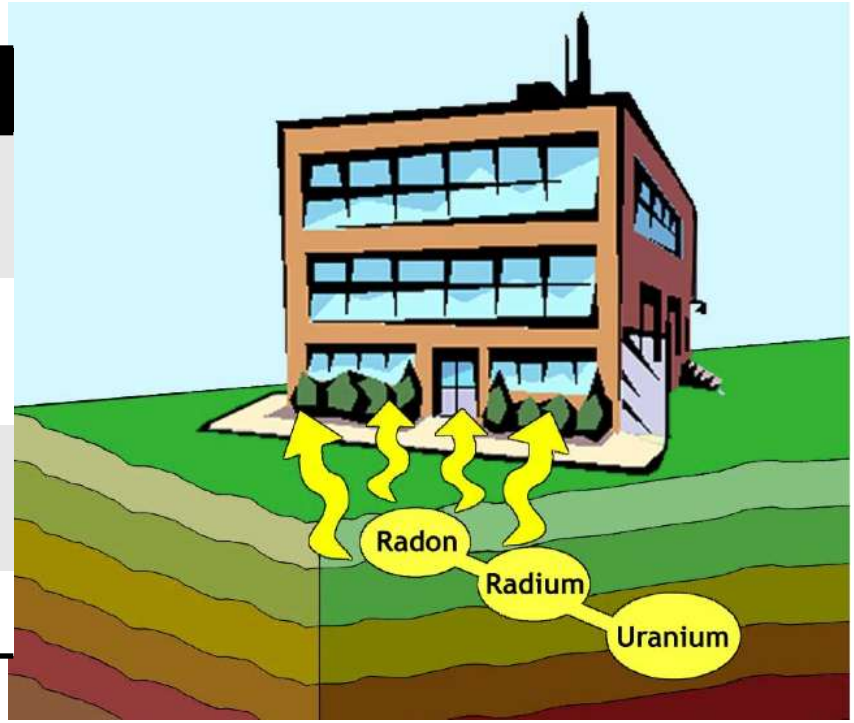
Time:
8:00 AM to 4:00 PM

Location:
Ted Rogers School of Management; 55 Dundas Street West (Suite 1-148, 7th Floor), Toronto, ON M5G 2C5

CAREX CANADA

Occupational Radon Exposure Literature Review- Canada

Industry and Code	Number of Studies
Oil and Gas extraction- 2111	2
Metal Ore Mining (uranium)-2122	5
Non-ferrous Metal Production- 3314	1
Schools – 6111	3



Underground work: non-mining

Worksites that have measured higher levels of radon include:

- Subway/tunnel/ workers
- Underground nuclear depositories
- Caving
- Telecom cabling crews
- Electrical power generation
- Excavation

CAREX CANADA

Water-related worksites reporting elevated exposures

Radon is soluble in water and can be released into air through aeration, bubbling, and mixing.

Water specific worksites that have been found to have high radon levels are:

- Spas and Thermal Baths
- Fish Hatcheries
- Water Treatment Facilities

(Copes et al. 2011)

CAREX CANADA

Thank-you

Follow-up questions can be directed to:

anicol@sfu.ca