OHCOW
Occupational Health Clinics for Ontario Workers Inc.
Centres de santé des travailleurs (ses) de l'Ontario Inc.

Silica Exposure and Tools of the Trade

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Presentation Overview

- Introduction to Silica (Respirable Crystalline Silica)
- How Silica Exposures Occur
- Silica Exposures in the Past
- Tools of the Trade – Controlling Silica Dust

Introduction to Silica – A quick review

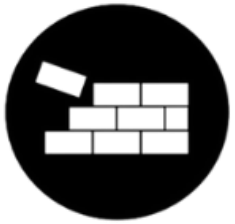
Silica (SiO_2) is composed of one atom of silicon and two atoms of oxygen

Major component of sand, rock, and mineral ores

It is the second most common mineral in the earth's crust

Crystalline and amorphous (also known as non-crystalline) forms of silica

Where is silica found



BRICKS

GRAVEL/STONE/ ASPHALT

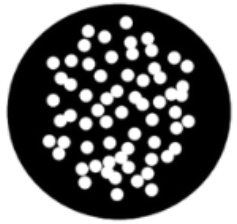
CONCRETE/ CEMENT

MORTAR

GLASS

SOME TYPES OF FIBREGLASS

ARTIFICIAL STONE (e.g. countertops)



SOME ABRASIVES/ CLEANSERS

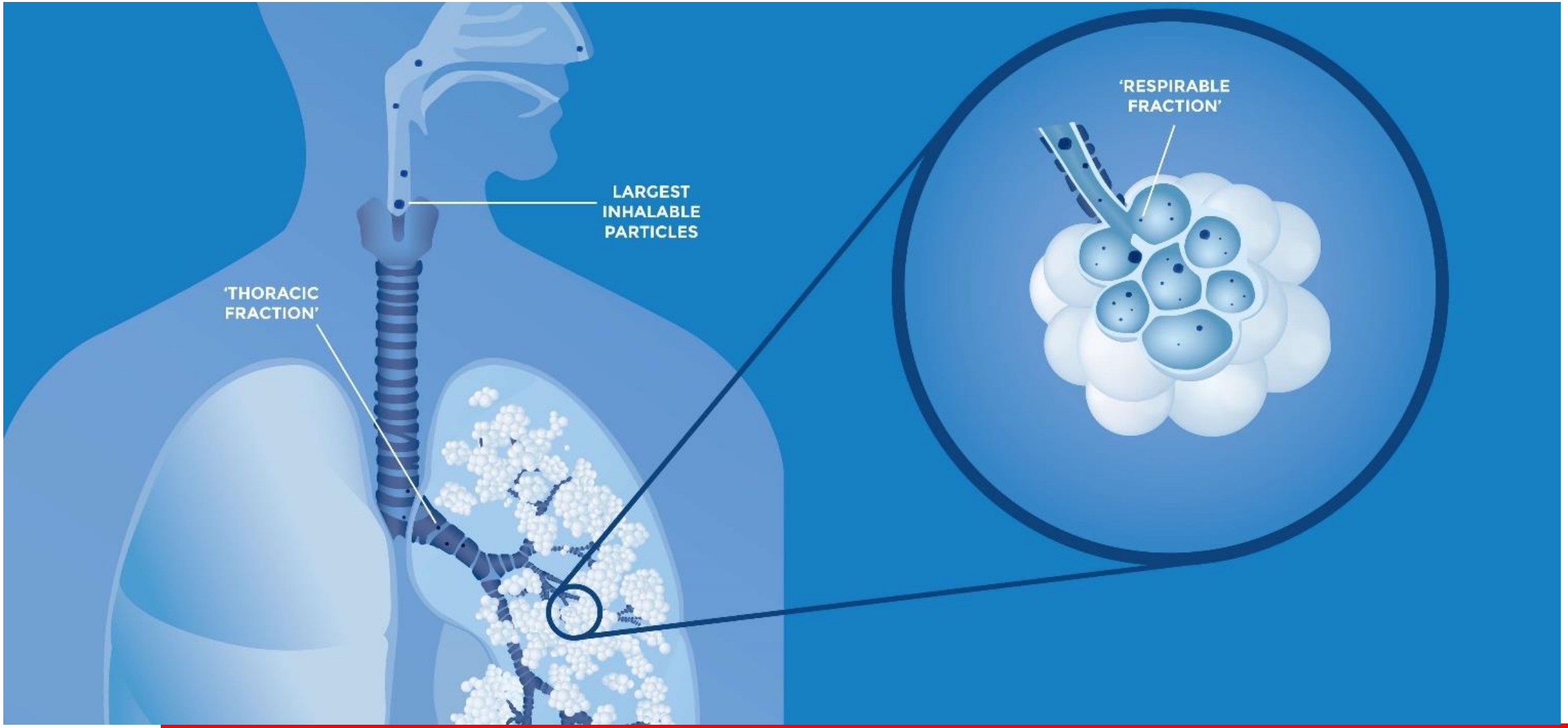
GRANITE

SAND/ FILL DIRT/ TOPSOIL

CERAMICS

FILLERS

Respirable crystalline silica



WorkSafeBC – Silica Exposure

How silica exposures occur

SAWING/ CUTTING

DRILLING

CRUSHING

CHIPPING

BLASTING

EARTH MOVING

GRINDING/ SANDING / DRESSING

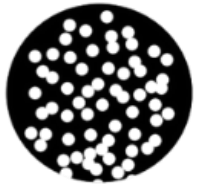
LOADING / HAULING / DUMPING

DEMOLISHING RENOVATING

SWEEPING / BLOWING

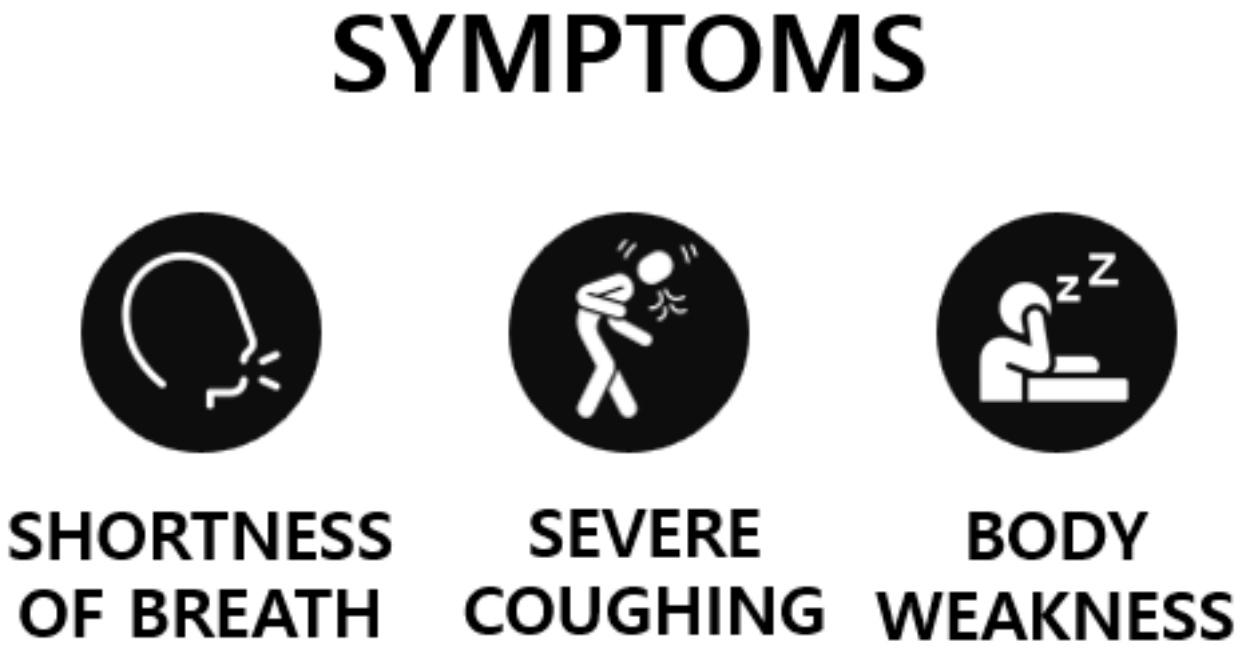
TUNNELING / EXCAVATING

or when the process involves silica being applied, such as:



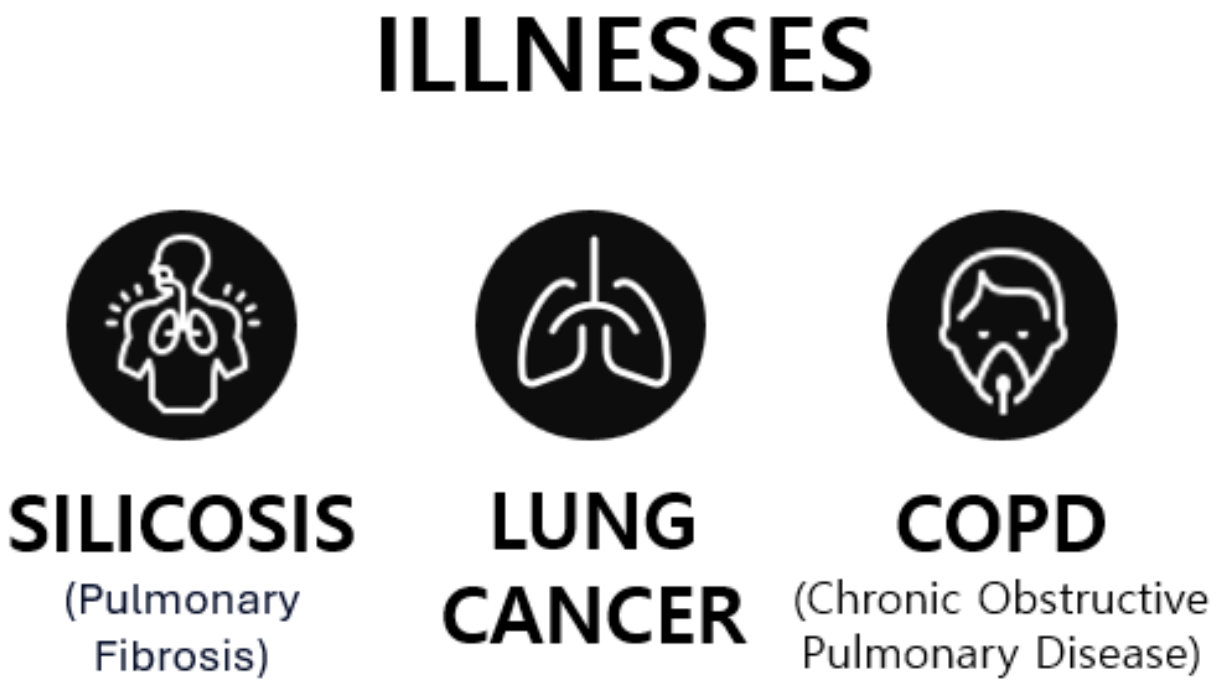
ABRASIVE/ SAND BLASTING

What are the symptoms



What are the health effects

- Lung Cancer
- Silicosis
  - Acute
  - Chronic
- Chronic obstructive pulmonary disease
- Idiopathic pulmonary fibrosis
- Chronic kidney disease
- Rheumatoid Arthritis



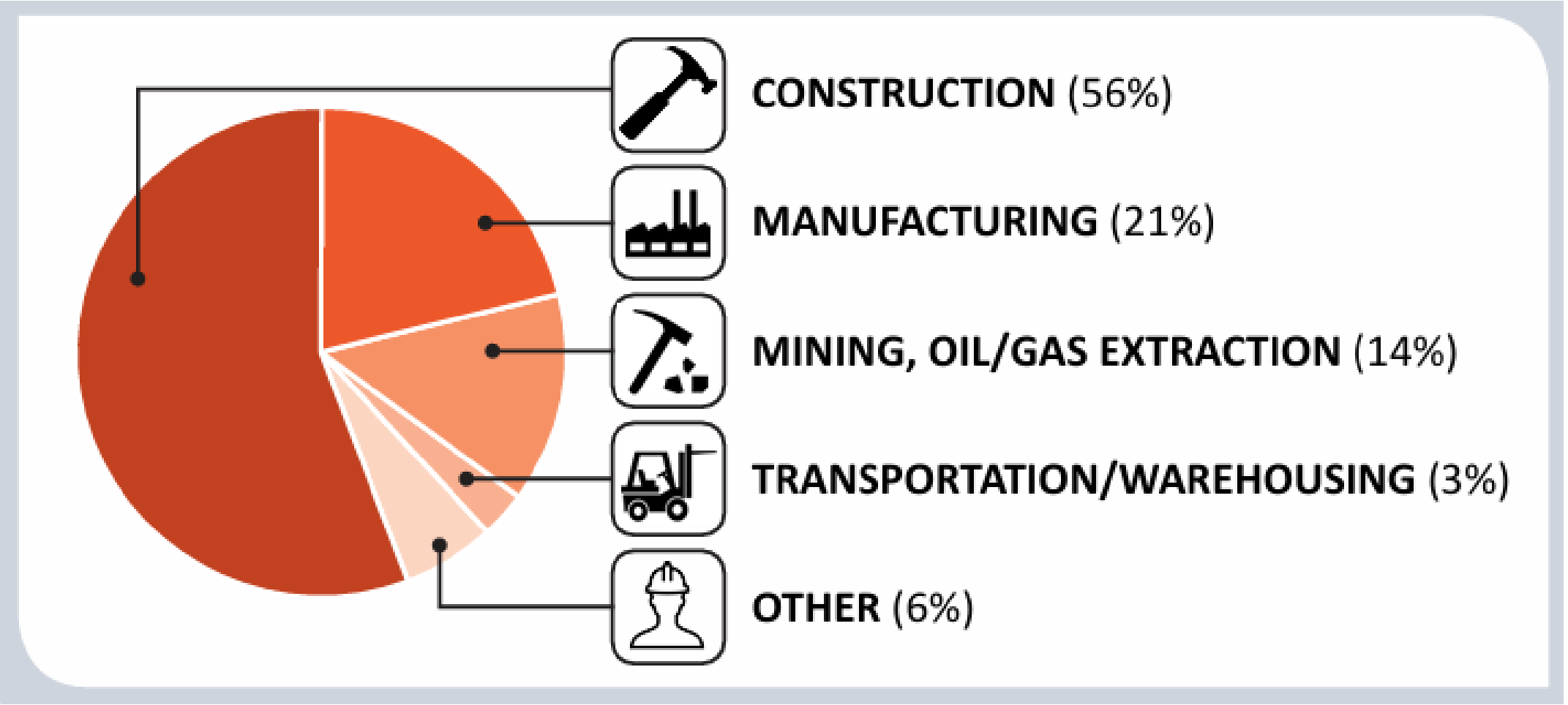
Silica in the news

CALIFORNIA

California workers who cut countertops are dying of an incurable disease

Australia makes world-first decision to ban engineered stone following surge in silicosis cases

Which workers are the most affected



CAREX_OCRC_Burden_of_Occupational_Cancer_Silica_factsheet.pdf

Exposure Data

- 429,000 Canadian workers are exposed to silica
- 153,000 Ontario workers are exposed to silica
- Construction is the largest single exposed sector in Ontario
  - Construction trades helpers/labourers
  - Heavy equipment operators
  - Plasterers, drywallers, plumbers

Occupational Cancers in Ontario, Canada

- Ontario had ~95,000 cancer cases diagnosed, 2022
- Occupational Cancer Research Centre (OCRC), 2020
  - 16 most common occupational carcinogens caused ~3,000 cancer cases per year in Ontario
- Workplace Safety and Insurance Board (WSIB), 2020:
  - Average of ~400 occupational cancer claims submitted per year
  - Average of ~170 occupational cancer claims accepted per year
  - Cancer claims rate of 2.9 per 100,000 workers

Past exposures & information collection

- Job titles and dates
- Job descriptions
- Process description
- Workplace conditions

How can we measure the past

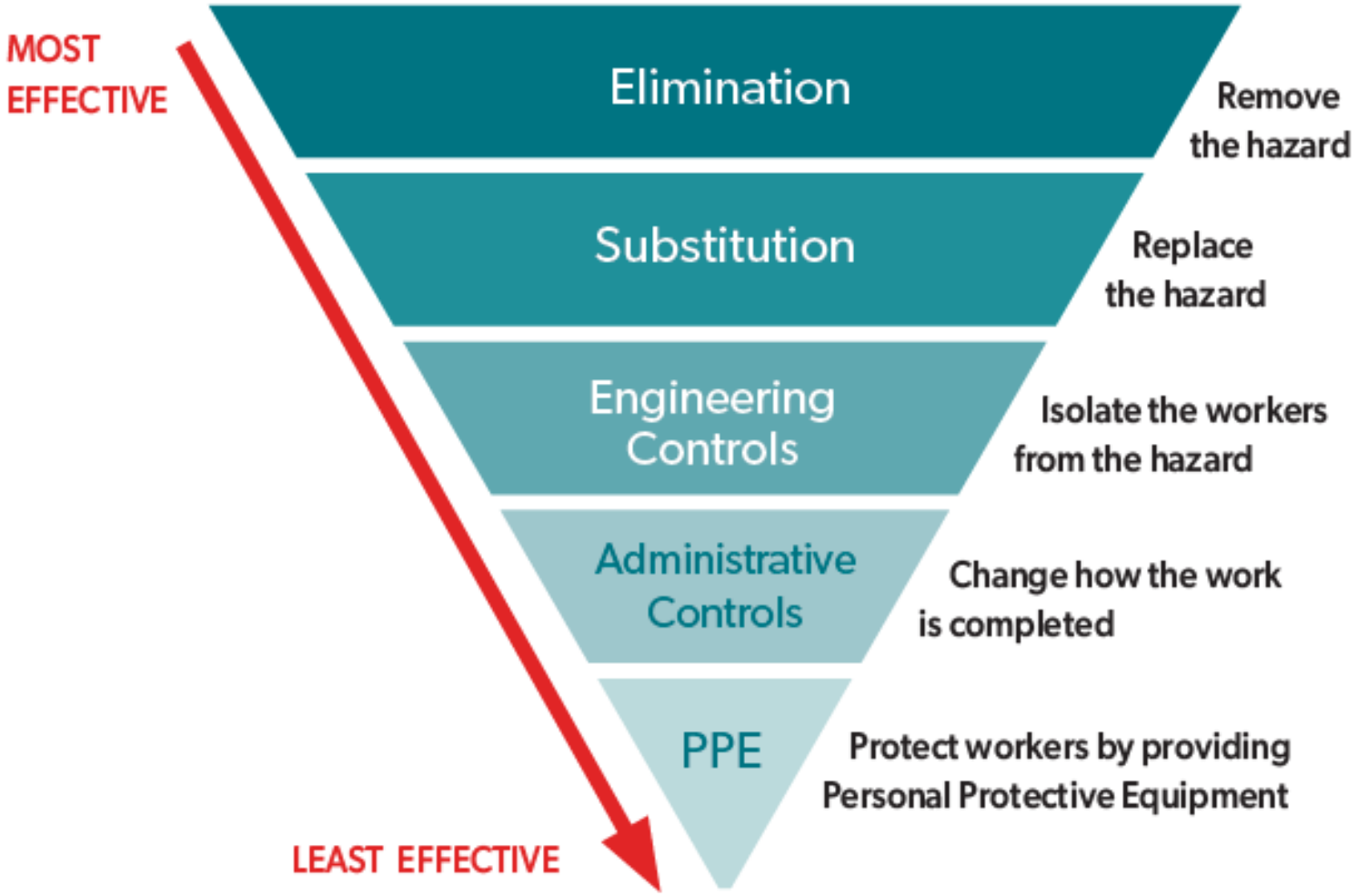
- Employer-produced occupational hygiene data (e.g. unions)
- Ontario-specific databases of Ministry-produced occupational hygiene data
- Peer-reviewed published occupational hygiene literature
- White papers, such as reports published by NIOSH (U.S.A.), IRSST (Quebec, Canada), BCCSA (British Columbia, Canada), etc.

Case Study – Silicosis and COPD

- Worker diagnosed with silicosis and COPD
- Time periods, employers, job description and potential exposures:
  - Era worked: 1970-2010
  - Worked as an equipment operator (10 years)
  - Worked as a miner (30 years)
  - Wood dust, respirable dust, nickel dust, crystalline silica dust, diesel exhaust

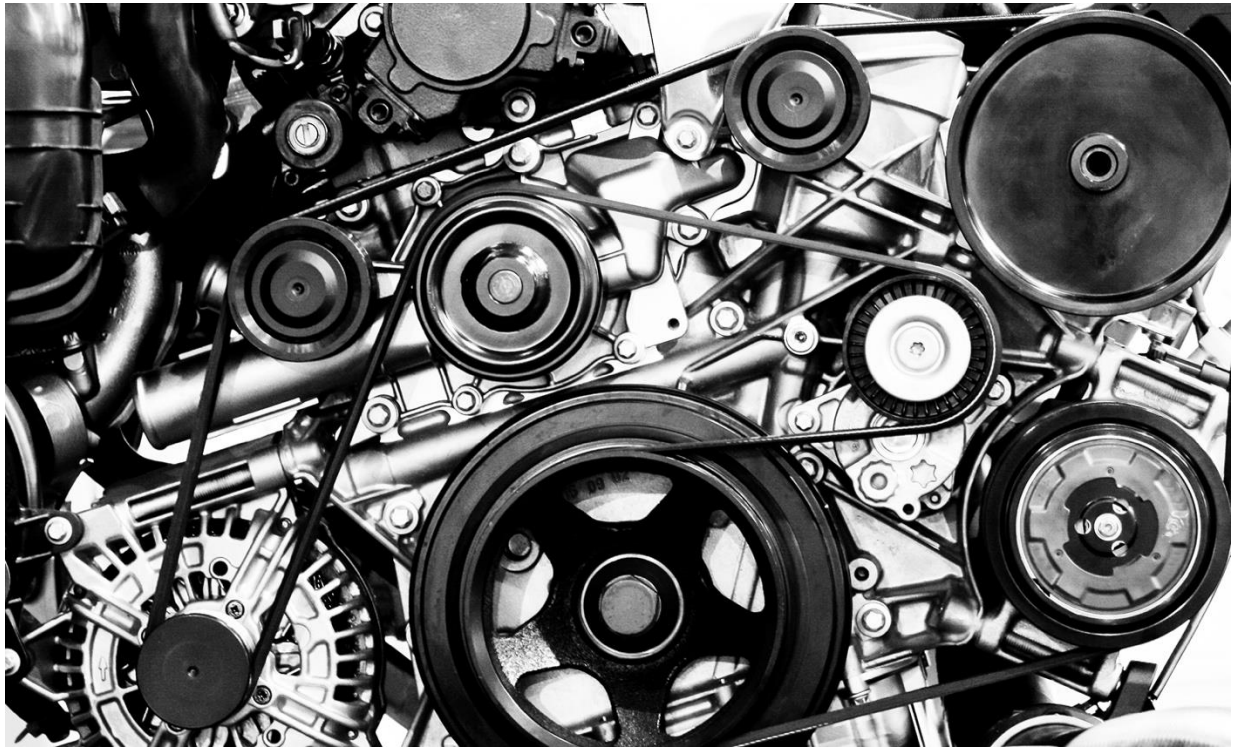
https://im-mining.com/2018/07/03/vale-says-future-battery-electric-vendors-keep-pace/

Hierarchy of Controls



Tools of the Trade

- Ontario Silica Control Tool : Exposure Assessment & Control
- Occupational Exposure Limits (OEL) Adjust Tool
- eWORK | CAREX Canada's occupational exposure estimates
- Ontario Occupational Disease Statistics



https://www.ohcow.on.ca/occupational-illness/silica-control-tool-ontario/

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Already have an account?

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Already have a WSIB number...

CREATE AN ACCOUNT

DON'T have a WSIB number...

REGISTER WITH OHCOW

SILICA CONTROL TOOL

TAKE ACTION • REDUCE RISK • PROTECT WORKERS

OHCOW

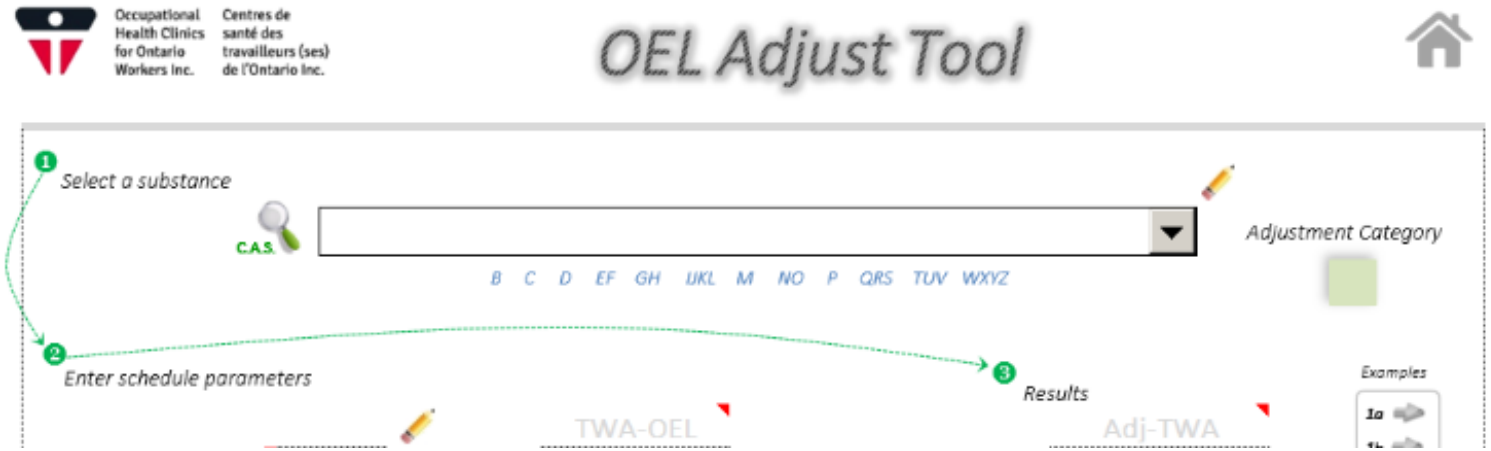
How does the Tool work

- It uses general information about work conditions to estimate the amount of silica being produced
- Using the information, it generates a plan to reduce exposure, so the worker can do the job safely
- The program that powers the tool is based on real existing data.

Occupational Exposure Limits (OEL) Adjustment Tool

(based on the model and guide developed by the Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST))

Brought to you by OHCOW, and the Occupational Disease Action Plan Contributors, this tool* allows the calculation of the adjusted workplace exposure limit for an unusual or extended work shift which has been adapted using the methodology set out in the Guide for the Adjustment of Permissible Exposure Values for Unusual Work Schedules (March 2015), published by Quebec's Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST).



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OEL Adjust Tool

Compliance

1 Select a substance

B C D EF GH IJKL M NO P QRS TUV WXYZ

C.A.S.

Silica, Crystalline, Quartz/Tripoli

1317-95-9; 14808-60-7

Adjustment Category

3

2 Enter schedule parameters

Daily schedule	12
Week schedule	48

Adjustment Factor

0.833

3 Results

	TWA-OEL	Adj-TWA
Québec Model	0.1 mg/m³	0.0833 mg/m³

Examples

- 1a
- 1b
- 1c
- 2
- 3
- 4

eWORK

- Home
- Industry
- Occupation
- Province

eWORK Online

eWORK Online is an interactive tool for exploring CAREX Canada's occupational exposure estimates to known and suspected carcinogens. Results show the number of workers exposed to these carcinogens nationally, by province, by industry, and by occupation for 2016. Visit our occupational approach page to learn more about the methods and data sources used to produce these estimates. For an overview of how to use eWORK Online, refer to our videos page.

All carcinogens nationwide

The table below summarizes the total number of Canadian workers exposed to known or suspected carcinogens in 2016, as well as the sex* of exposed workers and estimated levels of exposure (where available). Click the carcinogen name to visit the substance's profile and learn more about its evidence of carcinogenicity, main uses, regulation, trade and production, and exposures. Workplace exposure visuals, additional estimates, exposure level definitions, and more are available via the profile's occupational exposures tab.

Download this table

Detailed breakdowns

To view our estimates of workplace exposure by industry, occupation, or province in the tabs below. The industry and occupation tabs allow you to view the number of workers exposed to a particular carcinogen in each industry or occupation (when sorted "by carcinogen"), or the number of workers exposed to each carcinogen in a particular industry/occupation (when sorted "by industry/occupation"). The province tab allows you to explore the total number of workers exposed to each carcinogen by province, as well as a regional breakdown by industry and occupation.

Industry

Occupation

Province

Industry breakdown

Visit the Carcinogen Profiles page to learn more about the carcinogens in our database. Workplace exposure visuals, additional estimates, exposure level definitions, and more are available via the profile's occupational exposures tab.

Industry: 23-Construction Carcinogen: Silica, crystalline

Download these results

	Workers Exposed			Exposure Level		
Industry ▲	Total ▼	Male ▲	Female ▲	Low ▲	Moderate ▲	High ▲
2383-Building finishing contractors	**63,456**	60,231	3,219	7,172	496	55,788
2381-Foundation, structure, and building exterior contractors	**55,286**	53,926	1,361	762	415	54,109
2361-Residential building construction	**43,295**	40,992	2,302	2,425	41	40,829
2389-Other specialty trade contractors	**39,337**	37,785	1,529	1,561	320	37,456
2382-Building equipment contractors	**35,703**	34,515	1,201	23,937	159	11,607
2373-Highway, street and bridge construction	**30,874**	28,795	2,089	1,008	-	29,866

Occupational Cancer Research Centre

Ontario Occupational Disease Statistics

Sectors CHOOSE

- Construction
- Food and Beverage
- Healthcare
- Metal Manufacturing
- Mining
- Plastic Products
- Protective Services
- Rubber Products
- Transportation

Exposures CHOOSE

- Asbestos
- Cleaning agents
- Diesel engine exhaust
- Grain and flour dust
- Nickel
- Polycyclic aromatic hydrocarbons
- Silica
- UV radiation
- Welding Fumes
- Wood dust

Constructio

Who is in this s

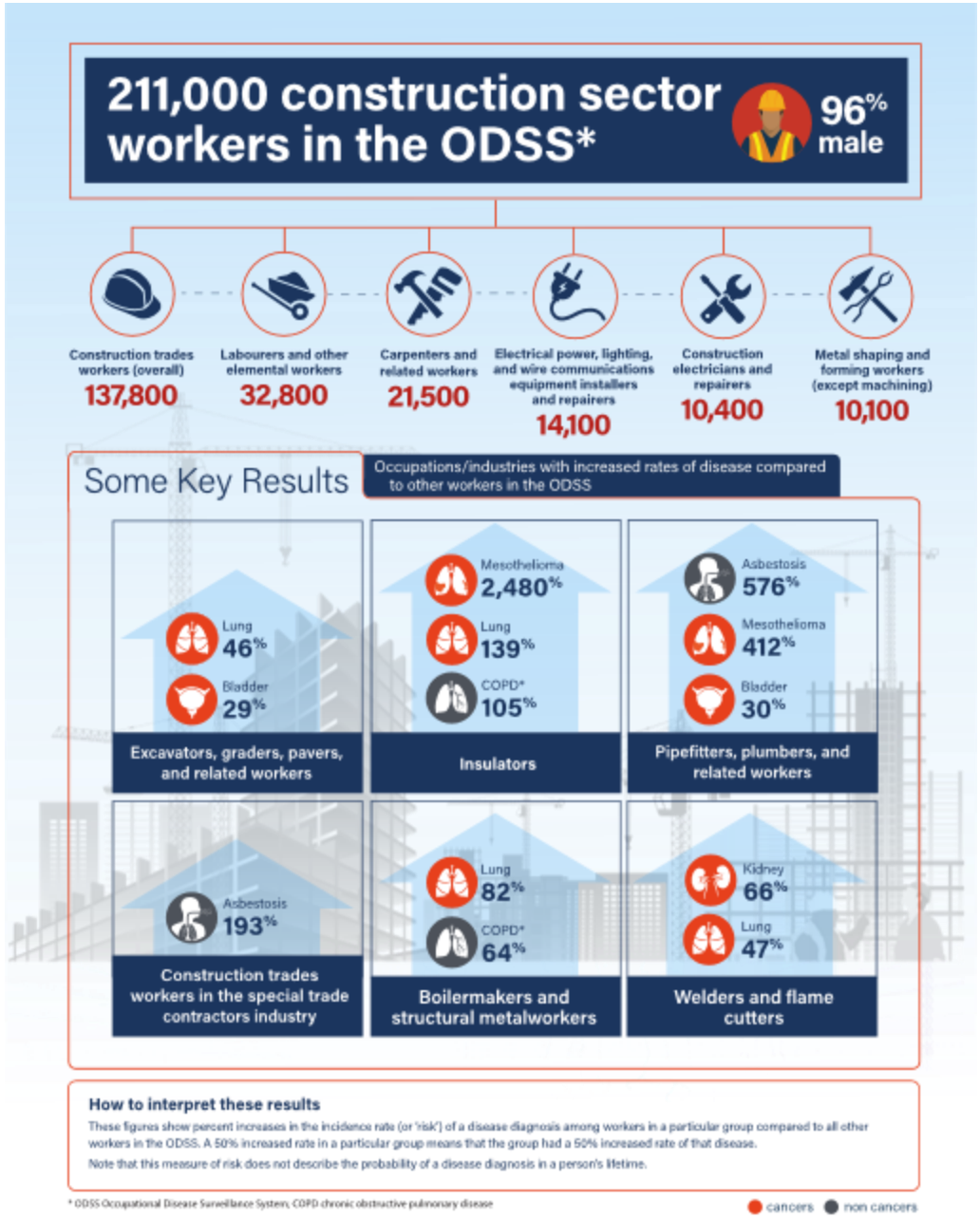
This sector includes general ontractors primarily engaged ir
construction work. Occupatio h constructing, renovating, an
maintaining buildings and oth ways, railways, airports, electr
and communication lines, tow vices.

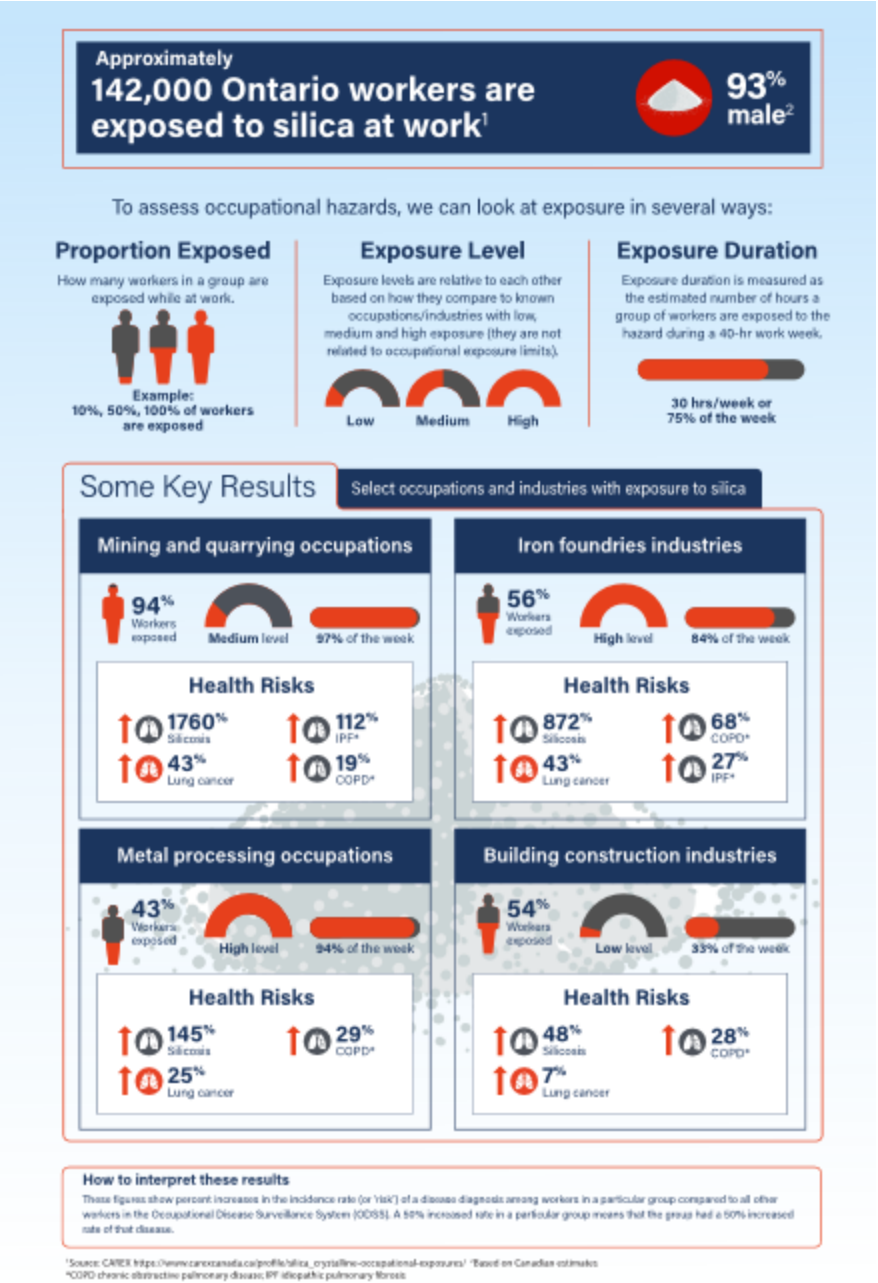
The construction sector ma ire Ontario workforce.*

* Statistics Canada. Table 14-10-0023-01 Labour force characteristics by industry, annual (x 1,000)

Some Key Occupational Exposures

Asbestos
Diesel engine exhaust
Silica dust


211,000 construction sector workers in the ODSS*
96% male
Construction trades workers (overall) 137,800
Labourers and other elemental workers 32,800
Carpenters and related workers 21,500
Electrical power, lighting, and wire communications equipment installers and repairers 14,100
Construction electricians and repairers 10,400
Metal shaping and forming workers (except machining) 10,100
Some Key Results
Occupations/industries with increased rates of disease compared to other workers in the ODSS
Lung 46%
Bladder 29%
Excavators, graders, pavers, and related workers
Mesothelioma 2,480%
Lung 139%
COPD* 105%
Insulators
Asbestosis 576%
Mesothelioma 412%
Bladder 30%
Pipefitters, plumbers, and related workers
Asbestosis 193%
Construction trades workers in the special trade contractors industry
Lung 82%
COPD* 64%
Boilermakers and structural metalworkers
Kidney 66%
Lung 47%
Welders and flame cutters
How to interpret these results
These figures show percent increases in the incidence rate (or 'risk') of a disease diagnosis among workers in a particular group compared to all other workers in the ODSS. A 50% increased rate in a particular group means that the group had a 50% increased rate of that disease.
Note that this measure of risk does not describe the probability of a disease diagnosis in a person's lifetime.
* ODSS Occupational Disease Surveillance System; COPD chronic obstructive pulmonary disease
cancers
non cancers


Approximately 142,000 Ontario workers are exposed to silica at work[1]
93% male[2]
To assess occupational hazards, we can look at exposure in several ways:
Proportion Exposed
How many workers in a group are exposed while at work.
Example: 10%, 50%, 100% of workers are exposed
Exposure Level
Exposure levels are relative to each other based on how they compare to known occupations/industries with low, medium and high exposure (they are not related to occupational exposure limits).
Low
Medium
High
Exposure Duration
Exposure duration is measured as the estimated number of hours a group of workers are exposed to the hazard during a 40-hr work week.
30 hrs/week or 75% of the week
Some Key Results
Select occupations and industries with exposure to silica
Mining and quarrying occupations
94% Workers exposed
Medium level
97% of the week
Health Risks
Silicosis 1760%
IPF* 112%
Lung cancer 43%
COPD* 19%
Iron foundries industries
56% Workers exposed
High level
84% of the week
Health Risks
Silicosis 872%
COPD* 68%
Lung cancer 43%
IPF* 27%
Metal processing occupations
43% Workers exposed
High level
94% of the week
Health Risks
Silicosis 145%
COPD* 29%
Lung cancer 25%
Building construction industries
54% Workers exposed
Low level
33% of the week
Health Risks
Silicosis 48%
COPD* 28%
Lung cancer 7%
How to interpret these results
These figures show percent increases in the incidence rate (or 'risk') of a disease diagnosis among workers in a particular group compared to all other workers in the Occupational Disease Surveillance System (ODSS). A 50% increased rate in a particular group means that the group had a 50% increased rate of that disease.
[1]Source: CAREX https://www.carexcanada.ca/profile/silica_crystalline-occupational-exposures/ [2]Based on Canadian estimates
*COPD chronic obstructive pulmonary disease; IPF idiopathic pulmonary fibrosis

Thank you.

Questions?

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