Diesel Engine Exhaust

Burden of Occupational Cancer Fact Sheet

WHAT IS DIESEL ENGINE EXHAUST?

The combustion of diesel fuel in engines produces diesel engine exhaust, a complex mixture of gases and particulates. This mixture can contain other known and suspected carcinogens such as benzene, polycyclic aromatic hydrocarbons (PAHs), metals, and particulate matter.

The composition of the mixture depends on a number of factors including the type of engine (heavy or light duty), the type of fuel and oil, sulphur levels, speed and load of operation, and emission control systems.

The International Agency for Research on Cancer classifies diesel engine exhaust as a known carcinogen (IARC 1).

WHAT ARE ITS HEALTH EFFECTS?

- Lung cancer
- Irritation to eyes, throat, and bronchi
- Light-headedness, nausea, cough, and phlegm
- Allergic reactions

THE BURDEN OF LUNG CANCER FROM WORKPLACE EXPOSURE TO DIESEL EXHAUST IN CANADA

The term ‘burden’ refers to the human impact (deaths, illness, years of life lost) and the economic costs (health care, productivity) associated with a cause or group of causes of disease.

Results show that approximately 560 lung cancers and 200 suspected bladder cancers are attributed to occupational exposure to diesel engine exhaust each year in Canada, based on 2011 cancer statistics. This amounts to 2.4% of lung cancer cases diagnosed annually.

WHAT WORKERS ARE MOST AFFECTED?

Most occupational lung cancers associated with diesel engine exhaust occur among workers in the mining and oil and gas extraction sector (see pie chart on right). These cancers also occur among workers in the transportation and warehousing, wholesale and retail trade, and manufacturing sectors. Some of the other sectors affected include construction, forestry and logging, and public administration.
Diesel Engine Exhaust

CAREX CANADA ASSESSMENT OF OCCUPATIONAL EXPOSURE TO DIESEL ENGINE EXHAUST

Inhalation is the most common route of occupational exposure to diesel engine exhaust. Approximately 897,000 Canadians are exposed to diesel engine exhaust at work.

Industries with the largest number of exposed workers in Canada include:
- **Truck transportation** (206,000 people exposed)
- **Transit and ground passenger transportation** (110,000 exposed)
- **Public administration** (42,000 exposed)

Occupations with the largest number of exposed workers include:
- **Truck drivers** (305,000 exposed)
- **Heavy equipment operators** (83,000 exposed)
- **Transit operators** (79,000 exposed)

Results show the majority of workers exposed to diesel engine exhaust are in the low exposure level category, with a significant number at risk for moderate to high exposure (see pie chart above). To learn more about how these exposure levels are defined, visit the CAREX Canada website.

HOW CAN EXPOSURE BE REDUCED?

There is currently no appropriate occupational exposure limit for diesel engine exhaust, apart from a few provinces where diesel particulate matter is regulated in underground mines. However, diesel-related cancers can be prevented by reducing the number of workers exposed and ensuring that the levels of exposures are as low as reasonably achievable (ALARA). Organizations should evaluate the risk of exposure in the workplace and implement the hierarchy of controls to address the safety needs of workers.

ABOUT THE BURDEN OF OCCUPATIONAL CANCER STUDY

The Burden of Occupational Cancer Study aims to quantify the number of cancers that are caused by exposure to carcinogens in the workplace in order to identify priority areas for prevention. It is a collaboration between researchers at OCRC, CAREX Canada, the Institute for Work & Health, University of British Columbia, Université de Montréal, Institut de recherche Robert-Sauvé en santé et en sécurité du travail, and Imperial College London.

For more information, please visit OCRC at www.occupationalcancer.ca or CAREX Canada at www.carexcanada.ca.

This fact sheet was produced by CAREX Canada in partnership with OCRC. The Burden of Occupational Cancer Study is led by OCRC and is supported by the Canadian Cancer Society. CAREX Canada is hosted at Simon Fraser University and supported by the Canadian Partnership Against Cancer. Acknowledgments for header photos: Helen Wilkinson, Roy Luck, KOMUnews.
Silica is a naturally occurring mineral found in soil, sand, and rocks. Work processes such as breaking, grinding, or sawing these materials releases crystalline silica dust into the air. Workplace exposure to crystalline silica is common in several trades due to its presence in many handled materials such as concrete, mortar and brick.

The International Agency for Research on Cancer classifies crystalline silica as a known carcinogen (IARC 1).

**WHAT ARE ITS HEALTH EFFECTS?**

- Lung cancer
- Silicosis (thickening and scarring of the lungs)
- Chronic obstructive pulmonary disease (COPD)
- Rheumatoid arthritis
- Tuberculosis

**THE BURDEN OF LUNG CANCER FROM WORKPLACE EXPOSURE TO SILICA IN CANADA**

The term ‘burden’ refers to the human impact (deaths, illness, years of life lost) and the economic costs (health care, productivity) associated with a cause or group of causes of disease.

Preliminary results show that approximately 570 lung cancers are attributed to occupational exposure to crystalline silica each year in Canada, based on 2011 cancer statistics. This amounts to 2.4% of lung cancer cases diagnosed annually.

**WHAT WORKERS ARE MOST AFFECTED?**

Most occupational lung cancers associated with crystalline silica occur among workers in the construction sector (see pie chart on right). These cancers also occur among workers in the manufacturing, mining and oil and gas extraction, and transportation and warehousing sectors. Some of the other sectors affected include wholesale trade, public administration, and utilities.
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HOW CAN EXPOSURE BE REDUCED?

Silica-related cancers can be prevented by reducing the number of workers exposed and ensuring that the levels of exposures are as low as reasonably achievable (ALARA). Organizations should evaluate the risk of exposure in the workplace and implement the hierarchy of controls to address the safety needs of workers.

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Crystalline Silica 2016
Solar Radiation
Burden of Occupational Cancer Fact Sheet

WHAT IS SOLAR RADIATION?
The sun, or solar radiation, is the main natural source of exposure to ultraviolet radiation.
Levels of exposure vary depending on geography, seasonality, time of day and meteorology, as well as time spent out of doors and the amount of skin exposed. All outdoor occupations have a potential for exposure to solar radiation.
The International Agency for Research on Cancer classifies solar radiation as a known carcinogen (IARC 1).

WHAT ARE ITS HEALTH EFFECTS?
- Skin cancer
- Sunburns
- Heat stress/stroke
- Thick, scaly skin patches
- Cataracts
- Eye lesions and cancer

THE BURDEN OF CANCER FROM WORKPLACE EXPOSURE TO SOLAR RADIATION IN CANADA
The term ‘burden’ refers to the human impact (deaths, illness, years of life lost) and the economic costs (health care, productivity) associated with a cause or group of causes of disease.

Preliminary results show that approximately 4560 non-melanoma skin cancers are attributed to occupational solar radiation each year, based on 2011 cancer statistics. This amounts to 6.3% of non-melanoma skin cancer cases diagnosed annually.

WHAT WORKERS ARE MOST AFFECTED?
Most occupational non-melanoma skin cancers associated with solar radiation occur among workers in the agricultural and construction sectors (see pie chart on right). These cancers also occur among workers in the transportation and public administration sectors. Some of the other sectors affected include forestry and logging, manufacturing, and mining and oil and gas extraction.
Exposure to solar radiation can occur via skin or eyes. Approximately 1.5 million Canadians are exposed to solar radiation at work.

Industries with the largest number of exposed workers in Canada include:

- **Construction (all types)** (343,000 people exposed)
- **Farms** (264,000 exposed)
- **Services to buildings and dwellings** (83,000 exposed)

Occupations with the largest number of exposed workers include:

- **Farmers and farm managers** (150,000 exposed)
- **Construction trades helpers** (125,000 exposed)
- **Landscaping and ground maintenance labourers** (115,000 exposed)

Results show the majority of workers exposed to solar radiation are in the high exposure level category, with a significant number at risk for low to moderate exposure (see pie chart above). To learn more about how these exposure levels are defined, visit the CAREX Canada website.

**HOW CAN EXPOSURE BE REDUCED?**

Solar radiation-related cancers can be prevented by reducing the number of workers exposed and ensuring that the levels of exposures are as low as reasonably achievable (ALARA). Organizations should evaluate the risk of exposure in the workplace and implement the hierarchy of controls to address the safety needs of workers.

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