



Welding and Welding Fumes

Burden of Occupational Cancer Fact Sheet



WHAT ARE WELDING AND WELDING FUMES?

Welding is the process of joining materials, usually metals or thermoplastics. Workers who operate production welding, brazing, and soldering equipment are also included in this classification. **Welding fumes are a mixture of very fine particles** of metallic oxides, silicates, and fluorides that come from both the electrode (welding rod) and the material being welded. This mixture can also contain known and suspected carcinogens such as nickel, chromium VI, cadmium, polycyclic aromatic hydrocarbons (PAHs), benzene, and particulate matter. Significant levels of ultraviolet (UV) radiation are also produced during electric arc welding operations.

The International Agency for Research on Cancer classifies welding fumes and UV radiation from welding as **known carcinogens** (IARC 1).

WHAT ARE ITS HEALTH EFFECTS?

- Lung cancer (welding fumes)
- Chronic bronchitis
- Metal fume fever
- Ocular melanoma (UV radiation from welding)
- Irritation to eyes, nose, throat, and bronchi
- Allergies and other respiratory problems

THE BURDEN OF CANCERS FROM WORKPLACE EXPOSURE TO WELDING AND WELDING FUMES

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.

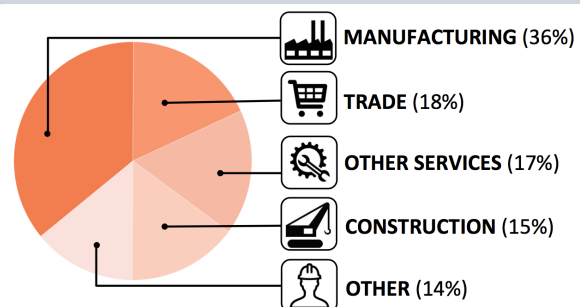
310

Lung cancers caused by workplace exposure to welding fumes

Results show that approximately **310 lung cancers** and **15 ocular melanomas** are attributed respectively to occupational exposure to welding fumes and welding each year in Canada, based on 2011 cancer statistics. This amounts to **1.3% of lung cancer cases** and **5.4% of ocular melanomas** diagnosed annually.

WHAT WORKERS ARE MOST AFFECTED?

Most occupational lung cancers associated with welding fumes occur among workers in the **manufacturing sector** (see pie chart on right). These cancers also occur among workers in the trade, other services, and construction sectors. Some of the other sectors affected include mining and oil and gas extraction, and transportation and warehousing.



ESTIMATE OF THE NUMBER OF WELDERS AND RELATED MACHINE OPERATORS IN CANADA

Inhalation is the most important route of occupational exposure to welding fumes.

According to the 2011 Canadian census, there were approximately 89,200 welders and related machine operators in Canada.

Industries with the largest number of welders in Canada include:

- **Fabricated Metal Product Manufacturing (16,500 welders)**
- **Repair and Maintenance (16,200 welders)**
- **Machinery Manufacturing (10,000 welders)**

Other occupations that involve occasional welding operations are those of sheet metal workers, boilermakers, structural metal and platework fabricators and fitters, and iron workers.

To learn more about the carcinogens associated with welding operations, visit the [CAREX Canada website](#).

HOW CAN EXPOSURE BE REDUCED?

The present occupational exposure limit for welding fumes does not take into account their carcinogenic effect and there are currently no occupational exposure limits for UV radiation emitted during welding. However, cancers related to welding fumes can be prevented by reducing the number of workers exposed and ensuring that the levels of exposure 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.

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