



# 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 CANCER 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 due to workplace exposure to welding fumes

Approximately **310 lung cancers** and **15 ocular melanomas** are due to occupational exposure to welding fumes and welding each year in Canada respectively, based on past exposures (1961-2001). This amounts to **1.3% of lung cancer cases** and **5.4% of ocular melanomas** diagnosed annually.

### WHAT IS THE ECONOMIC IMPACT?

Work-related exposure to welding fumes resulted in approximately **\$308 million in costs for newly diagnosed lung cancer cases** in 2011.

This includes approximately:

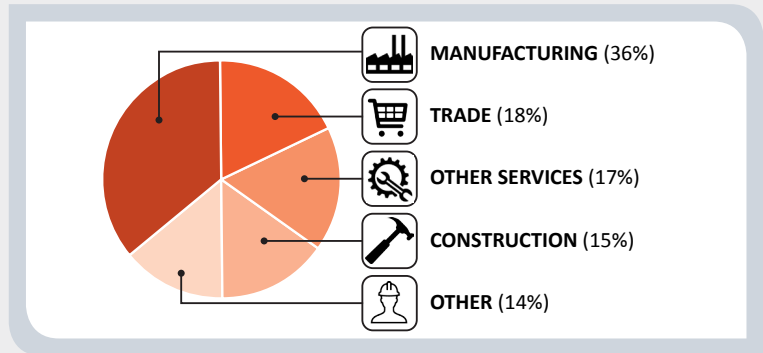
- 66% in health-related quality of life losses
- 7% in direct costs including health care, out of pocket expenses, family care giving, and workers' compensation administration
- 27% in indirect costs including output and productivity losses

**\$308 million**

Estimated yearly cost of lung cancer due to workplace exposure to welding fumes

## 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.



## CAREX CANADA ASSESSMENT OF OCCUPATIONAL EXPOSURE TO WELDING FUMES\*

Inhalation is the most important route of occupational exposure to welding fumes. Approximately 333,000 Canadians are exposed to welding fumes at work.

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

- **Machinery and equipment repair and maintenance** (26,000 people exposed)
- **Building equipment contractors** (25,000 exposed)
- **Automotive repair and maintenance** (22,000 exposed)

Occupations with the largest number of exposed workers include:

- **Welders and related machine operators** (102,000 exposed)
- **Construction trades helpers and labourers** (25,000 exposed)
- **Automotive service technicians, truck & bus mechanics, and mechanical repairers** (23,000 exposed)

*\*Note: CAREX Canada estimates of exposure were not used to develop the burden of occupational cancer estimates for welding fumes.*

## HOW CAN EXPOSURE BE REDUCED?

Local exhaust ventilation is a common engineering control for welding fumes. Other strategies include choosing materials or welding processes that generate lower amounts of gases and fumes, and isolation to reduce exposure to nearby workers. New occupational exposure limits are needed in Canada to reflect the International Agency for Research on Cancer's classification of all welding fumes as carcinogenic. For more details, visit the [OCRC exposure controls webpage](#).

## ABOUT THE BURDEN OF OCCUPATIONAL CANCER STUDY

The Burden of Occupational Cancer Study quantified the number of cancers that are caused by exposure to carcinogens in the workplace in order to identify priority areas for prevention. It was a collaboration between researchers at OCRC, CAREX Canada, the Institute for Work & Health (who led the economic analyses), 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](http://www.occupationalcancer.ca) or CAREX Canada at [www.carexcanada.ca](http://www.carexcanada.ca).

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