



Occupational Health
Clinics for Ontario
Workers Inc.

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des travailleurs (ses)
de l'Ontario Inc.

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April is Cancer Awareness Month

Cancer is a disease that develops when cells in the body grow in an uncontrolled and abnormal way. Our bodies are made up of millions of cells which are the structural and functional unit of all living organisms and are continuously growing and dividing¹. When cells start to grow in an abnormal way, they create masses of tissue called tumours. These tumours can be benign (non cancerous) or malignant (cancerous). Malignant tumour cells invade the tissues around them and spread to other parts of the body (metastasize).

Each type of cancer has different risk factors, however the general risk factors for cancer include but are not limited to^{2,3}.

- smoking
- an inactive lifestyle
- a diet low in vegetables and fruits
- a body mass index (BMI) of 25 or higher
- family history of cancer
- over-exposure to radiation/sunlight
- occupational and environmental exposures
- personal characteristics such as age, gender, and race
- biological agents
- perinatal (the period occurring around the time of birth) effects/growth

Occupational Cancer

We are all exposed to a wide variety of cancer-causing substances (carcinogens) in the workplace and the environment on a daily basis. Carcinogens can be chemical (e.g. benzene), physical (e.g. ionizing radiation) or biological (e.g. Hepatitis C) in nature². Workers in certain industries or performing certain jobs are more at risk than the general population to certain carcinogens. Hundreds of newly developed chemicals are introduced into workplaces each year. Many of these chemicals have not been adequately tested to determine if they cause cancer⁴. Table 1 presents the occupational exposures that have been identified by the International Agency for Research on Cancer (IARC) as definite (group 1) human carcinogens.

Many cancers caused by a carcinogen at work appear 20 years or more after the first exposure. This is referred to as a *latency period*. Sufficient latency is required from the time of exposure to the development of cancer. Reliable historical exposure information is often minimal, which increases the difficulty in attributing the development of cancer with a specific exposure(s). Many workers who get cancer from their jobs have either retired or left the jobs where they were exposed to cancer-causing substances⁵.

Table 1. Known occupational carcinogens, as defined by IARC (Source: Siemiatycki et al.⁶)

| Substance or mixture | Occupation or industry in which the substance is found ^a | IARC Monograph volume (year) ^b | Human evidence ^c | Animal evidence ^c | Site(s) |
|---|--|---|-----------------------------|------------------------------|--|
| Physical agents | | | | | |
| Ionizing radiation and sources thereof, including, notably, X rays, γ rays, neutrons, and radon gas | Radiologists; technologists; nuclear workers; radium-dial painters; underground miners; plutonium workers; cleanup workers following nuclear accidents; aircraft crew | Vol. 75 (2000a) Vol. 78 (2001a) | Sufficient | Sufficient | Bone ^d Leukemia ^d Lung ^d Liver ^d Thyroid ^d Others ^d |
| Solar radiation | Outdoor workers | Vol. 55 (1992b) | Sufficient | Sufficient | Melanoma ^d Skin ^d |
| Respirable dusts and fibers | | | | | |
| Asbestos | Mining and milling; by-product manufacture; insulating; shipyard workers; sheet-metal workers; asbestos cement industry | Suppl. 7 (1987) | Sufficient | Sufficient | Lung ^d Mesothelioma ^d Larynx ^e GI tract ^e |
| Erionite | Waste treatment; sewage; agricultural waste; air pollution control systems; cement aggregates; building materials | Suppl. 7 (1987) | Sufficient | Sufficient | Mesothelioma ^d |
| Silica, crystalline | Granite and stone industries; ceramics, glass, and related industries; foundries and metallurgical industries; abrasives; construction; farming | Vol. 68 (1997b) | Sufficient | Sufficient | Lung ^d |
| Talc containing asbestiform fibers | Manufacture of pottery, paper, paint, and cosmetics | Suppl. 7 (1987) | Sufficient | Inadequate | Lung ^d Mesothelioma ^d |
| Wood dust | Logging and sawmill workers; pulp and paper and paperboard industry; woodworking trades (e.g., furniture industries, cabinetmaking, carpentry and construction); used as filler in plastic and linoleum production | Vol. 62 (1995b) | Sufficient | Inadequate | Nasal cavities and paranasal sinuses ^d |
| Metals and metal compounds | | | | | |
| Arsenic and arsenic compounds | Nonferrous metal smelting; production, packaging, and use of arsenic-containing pesticides; sheep dip manufacture; wool fiber production; mining of ores containing arsenic | Suppl. 7 (1987) | Sufficient | Limited | Skin ^d Lung ^d Liver (angiosarcoma) ^e |
| Beryllium | Beryllium extraction and processing; aircraft and aerospace industries; electronics and nuclear industries; jewelers | Vol. 58 (1993a) | Sufficient | Sufficient | Lung ^d |
| Cadmium and cadmium compounds | Cadmium-smelter workers; battery production workers; cadmium-copper alloy workers; dyes and pigments production; electroplating processes | Vol. 58 (1993a) | Sufficient | Sufficient | Lung ^d |
| Chromium compounds, hexavalent | Chromate production plants; dyes and pigments; plating and engraving; chromium ferro-alloy production; stainless-steel welding; in wood preservatives; leather tanning; water treatment; inks; photography; lithography; drilling muds; synthetic perfumes; pyrotechnics; corrosion resistance | Vol. 49 (1990a) | Sufficient | Sufficient | Lung ^d Nasal sinuses ^e |
| Selected nickel compounds, including combinations of nickel oxides and sulfides in the nickel refining industry | Nickel refining and smelting; welding | Vol. 49 (1990a) | Sufficient | Sufficient | Lung ^d Nasal cavity and sinuses ^d |
| Wood and fossil fuels and their by-products | | | | | |
| Benzene | Production; solvents in the shoe production industry; chemical, pharmaceutical, and rubber industries; printing industry (rotogravure plants, bindery departments); gasoline additive | Suppl. 7 (1987) | Sufficient | Limited | Leukemia ^d |
| Coal tars and pitches | Production of refined chemicals and coal tar products (patent-fuel); coke production; coal gasification; aluminum production; foundries; road paving and construction (roofers and slaters) | Suppl. 7 (1987) | Sufficient | Sufficient | Skin ^d Lung ^e Bladder ^e |

Continued on next page.

| Substance or mixture | Occupation or industry in which the substance is found ^a | IARC Monograph volume (year) ^b | Human evidence ^c | Animal evidence ^c | Site(s) |
|---|---|---|-----------------------------|------------------------------|---|
| Mineral oils, untreated and mildly treated | Production; used as lubricant by metal workers, machinists, engineers; printing industry (ink formulation); used in cosmetics, medicinal and pharmaceutical preparations | Suppl. 7 (1987) | Sufficient | Inadequate | Skin ^d Bladder ^e Lung ^e Nasal sinuses ^e |
| Shale oils or shale-derived lubricants | Mining and processing; used as fuels or chemical-plant feedstocks; lubricant in cotton textile industry | Suppl. 7 (1987) | Sufficient | Sufficient | Skin ^d |
| Soots | Chimney sweeps; heating-unit service personnel; brick masons and helpers; building demolition workers; insulators; firefighters; metallurgical workers; work involving burning of organic materials | Vol. 35 (1985) | Sufficient | Inadequate | Skin ^d Lung ^d Esophagus ^e |
| Monomers | | | | | |
| Vinyl chloride | Production; production of polyvinyl chloride and co-polymers; refrigerant before 1974; extraction solvent; in aerosol propellants | Suppl. 7 (1987) | Sufficient | Sufficient | Liver (angiosarcoma) ^d Liver (hepatocellular) ^e |
| Intermediates in plastics and rubber manufacturing | | | | | |
| Bis(chloromethyl) ether and chloromethyl methyl ether (technical grade) | Production; chemical intermediate; alkylating agent; laboratory reagent; plastic manufacturing; ion-exchange resins and polymers | Suppl. 7 (1987) | Sufficient | Sufficient | Lung (oat cell) ^d |
| Aromatic amine dyes | | | | | |
| 4-Aminobiphenyl | Production; dyestuffs and pigment manufacture | Suppl. 7 (1987) | Sufficient | Sufficient | Bladder ^d |
| Benzidine | Production; dyestuffs and pigment manufacture | Suppl. 7 (1987) | Sufficient | Sufficient | Bladder ^d |
| 2-Naphthylamine | Production; dyestuffs and pigment manufacture | Suppl. 7 (1987) | Sufficient | Sufficient | Bladder ^d |
| Pesticides | | | | | |
| Ethylene oxide | Production; chemical industry; sterilizing agent (hospitals, spice fumigation) | Vol. 60 (1994) | Limited | Sufficient | Leukemia ^d |
| 2,3,7,8-Tetrachlorodibenzo- <i>para</i> -dioxin (TCDD) | Production; use of chlorophenols and chlorophenoxy herbicides; waste incineration; PCB production; pulp and paper bleaching | Vol. 69 (1997a) | Limited | Sufficient | All sites combined ^d Lung ^e Non-Hodgkin lymphoma ^e Sarcoma ^e |
| Others | | | | | |
| Aflatoxin | Feed production industry; workers loading and unloading cargo; rice and maize processing | Vol. 82 (2002b) | Sufficient | Sufficient | Liver ^d |
| Involuntary (passive) smoking | Workers in bars and restaurants; office workers | Vol. 83 (2004) | Sufficient | Sufficient | Lung ^d |
| Mustard gas | Production; used in research laboratories; military personnel | Suppl. 7 (1987) | Sufficient | Limited | Larynx ^d Lung ^e Pharynx ^e |
| Strong inorganic-acid mists containing sulfuric acid | Pickling operations; steel industry; petrochemical industry; phosphate acid fertilizer manufacturing | Vol. 54 (1992a) | Sufficient | Not available | Larynx ^d Lung ^e |

^aNot necessarily an exhaustive list of occupations/industries in which this agent is found; not all workers in these occupations/industries are exposed. The term "production" is used to indicate that this substance is man-made and that workers may be exposed in the production process. ^bMost recent IARC evaluation; for those referenced to Supplement 7 (IARC 1987), it is possible that the 1987 review was quite perfunctory and that the essential evidence was cumulated at an earlier date. ^cAs judged by the IARC working group; we added the notation "not available" to signify those substances for which there was no evidence at all. ^dWe judged that evidence for an association with this site was strong. ^eWe judged that evidence was suggestive.

Cancer is a disease of multiple causes, which do not compete but rather interact. Interactions between two or more carcinogens in the workplace are poorly understood. Exposure to more than one potentially cancer-causing agent could result in no interaction, an additive effect, or a synergistic effect². In addition, most occupational exposures are also found in the general environment and/or in consumer products; including medications, foods, and others⁶. All of these factors make the association of occupational exposures and the development of cancer difficult.

Cancer clusters in the workplace

A cancer cluster is defined as a greater than expected number of cancer cases that occurs within a group of people, in a geographic area, or over a period of time⁷. When there is a greater than expected number of cancers at a particular workplace, workers may begin to suspect the presence of a cancer cluster. However, what is thought to be a cluster may actually reflect the expected number of cancers within that group of workers or area⁷. Certain criteria must be satisfied for identification of a cancer cluster, including^{8,9,10}:

- a large number of cases of a specific type of cancer, rather than several different types (when there are cancers of different sites and tissues present among workers at a particular workplace, they are not likely to be linked by a common exposure);
- sufficient latency from occupational exposure to development of cancer;
- a rare type of cancer (rather than common types);
- an increased number of cases of a certain type of cancer in an group that is not usually affected by that type of cancer; and
- a sufficient latency period.

Cancer is more common than most people realize; 38% of Canadian women and 44% of Canadian men will develop cancer during their lifetimes.¹¹

PREVENTION

The presence of a cancer-causing agent in the workplace does not automatically mean that a worker is exposed. However, it does obviously increase the risk. There are three main routes of exposure to carcinogenic agents; inhalation (breathe in), ingestion (through eating, smoking), absorption (through the skin).

Occupational cancer can be prevented by removing or reducing exposures to probable and known carcinogens. Substitute less hazardous substances for cancer-causing substances. If substitution is not feasible, employers should reduce workers' exposure to a cancer-causing substance to an absolute minimum through engineering or administrative controls (see sidebar). Personal protective equipment (PPE) should be provided to workers to limit exposure only as a last resort if engineering and administrative controls are not feasible.

Ensure Material Safety Data Sheets (MSDS) are available for all products in the workplace and that they are up to date. Known carcinogens should be identified on these sheets. MSDS' also provide information on associated health effects and required protective equipment.

Occupational Hygiene Controls

Substitution (as discussed already).

Engineering controls include general and local exhaust ventilation, enclosing or isolating exposures or equipment and process or equipment modifications.

Administrative controls can be utilized when engineering controls are not feasible, or can be used in conjunction with engineering controls to limit worker exposure. They include modifying work practices to minimize exposure (i.e. job rotation, wet sweeping vs. dry sweeping), good housekeeping, hygiene practices and worker education and training.

Personal protective equipment should not be used as a substitute for controls noted above. PPE can include respirators, protective clothing, footwear and face and eye shields.

What workers can do to minimize exposure?

- **Ask questions.** Request information about your workplace from your Joint Health and Safety Committee (JHSC), including types of chemicals that you are working with, their MSDS, the types of control methods in place, and their effectiveness. Insist that your workplace be designed to *prevent* exposure to toxic substances.
- Ensure that you educate yourself and participate in training and monitoring programs offered in your workplace.
- Work with your labour union towards improved standards in the workplace and testing of substances before they are used.
- Keep a list of all the industries, jobs, and exposures that you have worked in/with; it may be helpful in the future, if you need to file an occupational disease claim.
- Wear appropriate PPE as provided and ensure that you are trained on its proper use.
- Report every spill, leak, and accident to your supervisor immediately.
- Ensure that you follow good hygiene procedures such as washing your hands before eating, drinking, or smoking.
- Try not to bring your work home with you; shower and remove work clothes as soon as possible after finishing work and preferably before going home.

Guidelines for Employers

Employers are responsible for training and protecting their workers. Ensure that you are familiar with the substances used in your workplace and the regulations and guidelines that pertain to those contaminants (such as the Occupational Health and Safety Act¹² and the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values¹³). JHSCs should be conducting regular inspections of the workplace, to identify all potential hazards and recommending controls. Employers need to ensure that adequate control methods are in place, as per the above noted controls.

Please contact the Occupational Health Clinics for Ontario Workers, Inc. for additional information on this or other occupational health issues.

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