



DIOXINS AND FURANS

The Issue

Dioxins and furans are common names for toxic chemicals that are found in very small amounts in the environment, including air, water and soil. As a result of their presence in the environment, they are also present in some foods.

Exposure to dioxins and furans has been associated with a wide range of adverse health effects in laboratory animals and humans. The type and occurrence of these effects typically depend on the level and duration of exposure.

Background

There are 210 different dioxins and furans. All dioxins have the same basic chemical "skeleton," and they all have chlorine atoms as part of their make-up. Furans are similar, but have a different "skeleton". These substances vary widely in toxicity. The one considered most toxic is referred to as 2,3,7,8-tetra-chlorodibenzo-p-dioxin, or simply TCDD.

The biggest source of dioxins and furans in Canada is the large-scale burning of municipal and medical waste. Other major sources include:

- the production of iron and steel
- backyard burning of household waste, especially plastics
- fuel burning, including diesel fuel and fuel for agricultural purposes and home heating
- wood burning, especially if the wood has been chemically treated

- electrical power generation
- tobacco smoke

Dioxins can also be produced from natural processes, such as forest fires and volcanic eruptions. Most dioxins are introduced to the environment through the air. The airborne chemical can attach to small particles that can travel long distances in the atmosphere, which means that Canadians may also be exposed to dioxins and furans created in other countries.

These substances work their way up the food chain by moving into and remaining stored in body fat. Because of this, people actually take more dioxins and furans into their bodies through food than through air, water or soil. Ninety per cent of people's overall exposure to dioxins is estimated to be from the diet. Meat, milk products and fish have higher levels of dioxins and furans than fruit, vegetables and grains.

The Health Effects of Dioxins and Furans

Scientists have studied the effects of dioxins and furans on laboratory animals. They have also researched the health effects on people exposed to dioxins through industrial accidents, contaminated food, and occupational exposure to certain herbicides prior to improved manufacturing processes that have reduced these contaminants.

The studies show that dioxins and furans have the potential to produce a range of effects on animals and humans. Health



effects associated with human exposure to dioxins include:

- skin disorders, such as chloracne
- liver problems
- impairment of the immune system, the endocrine system and reproductive functions
- effects on the developing nervous system and other developmental events
- certain types of cancers

It is important to remember that with all toxic substances, including dioxins, the risk of health effects depends on many factors, including:

- the way a person is exposed (e.g., through food, air, water, etc.)
- how much a person is exposed to, and when (e.g., whether it is a large amount on one occasion, or daily exposure to small amounts, etc.)
- individual susceptibility, including general state of health
- whether the person is also exposed to other substances that may be associated with health effects

These issues are very complex. Scientists do not have all of the answers, but they agree that exposures to dioxins and furans should be kept as low as possible.

Dietary Exposure to Dioxins and Furans

For most people, about 90% of overall exposure to dioxins comes through diet. The Joint Expert Committee on Food Additives, an expert group of the World Health Organization and the Food and Agriculture Organization of the United Nations, has set a “tolerable monthly intake” level for dioxins, furans and similar substances.

The “tolerable” level (meaning no serious health effects are expected) is 70 picograms per kilogram of body weight / month. This is roughly 2.3 picograms per kilogram of body weight / day. A picogram is one-trillionth of a gram.

Studies done between 1998 and 1999 in two Canadian cities showed that the average dietary intake of dioxins, furans and similar substances was 0.62 picograms per kilogram of body weight /day. This is well within the level considered tolerable by Joint Expert Committee on Food Additives.

Minimizing Your Risk

If you are concerned about exposure to dioxins and furans, consider taking the following steps:

- Prepare meat and fish in a way that minimizes your exposure by trimming visible fat from food. Bake, broil, roast, barbecue or microwave instead of frying, and drain off extra fat after cooking.

- Follow the advice in Canada's Food Guide to Healthy Eating, and enjoy a variety of foods. Vegetables, fruit and grains contain fewer dioxins and furans than meat, milk products and fish.
- Follow provincial/territorial government advisories about eating certain types of fish.
- Do not burn garbage, especially construction materials that might contain wood preservatives or plastic.
- Limit the amount of wood you burn in your fireplace or stove, and learn about wood-burning techniques that release fewer dioxins. For more information about safer wood burning techniques go to the Need More Info section below.
- Do not smoke, and keep your family away from second-hand smoke as much as possible.

By taking these steps, you can reduce your family's exposure to dioxins and furans, and help to limit the overall release of these substances into the environment.

The Government of Canada's Role

The Government of Canada is working to control, and if possible eliminate, releases of these substances into the environment to help protect Canadians against harm from dioxins and furans. Actions to date include:

- Guidelines to minimize the release of dioxins and furans from municipal solid waste



and hazardous waste incinerators.

- Regulations requiring the virtual elimination of dioxin and furan releases from pulp mills.
- Virtual elimination of dioxins and furans from pest control products used in Canada.
- Active support for international agreements to reduce releases of these substances on a global basis.

These efforts are working. The latest inventory shows a 60 percent decrease since 1990 in the overall release of dioxins and furans from sources within Canada. Also, the levels of dioxins and furans in Canadian human milk, which were already low, went down by roughly 50 percent between the 1980s and the 1990s. It is expected that levels of dioxins in various sources in Canada will continue to decline in conjunction with ongoing pollution prevention and control activities.

The Government's work to control sources of dioxins and furans in Canada continues. A federal-provincial task force has updated the inventory of sources for these substances, and Canada-wide standards are being established to address releases from remaining manufactured sources. In addition, the Government is continuing to carry out food monitoring activities to identify, control and if possible, eliminate previously unknown sources of dioxin contamination.

Also, Health Canada is doing a comprehensive reassessment of the risks posed by dioxins. In the meantime, Health Canada has adopted the Joint Expert

Committee on Food Additives' tolerable monthly intake for dioxins as a guideline for Canadians.

Need More Info?

For more information, contact: Health Canada's Management of Toxic Substances Division Room A724, Jeanne Mance Building #19 Tunney's Pasture Ottawa, ON K1A 0K9 (613) 957-3127

Health Canada's Food Program Web site at: http://www.hc-sc.gc.ca/fn-an/index_e.html

Canada's Food Guide to Healthy Eating at: http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/index_e.html

Environment Canada, Persistent Organic Pollutants - POPs at: http://www.ec.gc.ca/pops/index_e.htm

For tips on safer ways to burn wood, visit Natural Resources Canada, Burn it Smart at: <http://www.burnitsmart.org/>

For more on the health effects associated with exposure to dioxins, see the following:

The World Health Organization's "Safety Evaluation of Certain Food Additives and Contaminants" at <http://www.inchem.org/documents/jecfa/jecmono/v48je20.htm>

The World Health Organization's "Dioxins and their effects on human health" <http://www.who.int/mediacentre/factsheets/fs225/en/index.html>

The U.S. Environmental Protection Agency's "Draft Dioxin Reassessment" at: <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=55265>

United States National Academy of Sciences Report, Dioxins and Dioxin-like Compounds in the Food Supply: Strategies to Decrease Exposure at: <http://www.iom.edu/report.asp?id=13097>

For information on herbicide use at National Defence, see the National Defence Web site at: http://www.forces.gc.ca/site/Reports/defoliant/index_e.asp

For additional articles on health and safety issues go to the It's Your Health Web site at: www.healthcanada.ca/iyh You can also call toll free at 1-866-225-0709 or TTY at 1-800-267-1245*