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Health Effects of Dioxin Exposure

For Service members

Important Facts:

- Dioxins are chlorine-containing chemicals that are considered environmental pollutants. While often associated with burning, dioxins are produced by a wide variety of industrial processes. Dioxins can be found in the air, water, soil, and foods throughout the world.
- Incomplete combustion resulting from low burning temperatures and reduced oxygen availability is a primary source of dioxins. Open-pit burning of trash, especially plastics, can produce dioxins. Dioxins are also found in tobacco smoke and car exhaust.
- Foods we consume are the main source of our exposure to dioxins. Foods high in saturated fats tend to have higher levels of dioxins. Dioxins can also enter the body through the air we breathe (for example, in smoke).
- All people are exposed to small amounts of dioxins. The health effects, if any, associated with these low levels of exposure are not fully understood.



What are dioxins?

Dioxins are complex, toxic chemicals containing carbon, hydrogen, oxygen, and chlorine. They tend to stay in the environment for long periods. Although dioxins are released by volcanic eruptions and forest fires, most dioxins are unwanted by-products of human activity including industrial processes. These include smelting, bleaching of paper pulp, manufacturing of herbicides/ pesticides, and exhaust from internal combustion engines used in most vehicles. Open burning of trash and other materials is a primary source of dioxins throughout the world -- especially low temperature/low oxygen fires that burn materials (such as plastics) containing chlorine. Incinerators usually are better for burning waste, because they increase the temperature

and oxygen levels for more complete and efficient burning, thus reducing the amount of dioxins produced. Dioxins vary in their ability to cause harm to people. While some dioxins are very potent, others are less so, or are not harmful at all.

How can I be exposed to dioxins?

Because dioxins are found widely throughout the environment in the air, water, and soil, nearly everyone is exposed to dioxins in small amounts. People living near incinerators that are not operating correctly or who live or work close to hazardous waste sites that contain dioxins could have greater exposures. Dioxins can be absorbed through food, air (inhalation), or through the skin.

Most of the dioxins in our bodies come from our food. Because dioxins easily dissolve in fat, foods high in fats tend to be higher in dioxins. The saturated fats in dairy products, meat, and some fish and other seafoods are major sources of dioxins. Dioxin levels in foods vary according to where the foods were grown or raised (more dioxins are in the foods where levels were higher in the environment). Although rumors have circulated that dioxins could migrate into foods from plastic containers used in microwave ovens, the FDA reports that this does not occur.

(http://www.fda.gov/fdac/features/2002/602_plastic.html).

What health effects can be associated with exposure to dioxins?

The amount (or dose) of dioxins people are exposed to determines the amount in their bodies. The amount of and the specific types of dioxins present, determines the potential health effects. As levels of dioxins in the body rise, the risk of health effects increases. Because dioxins dissolve in fats, they are often deposited in fatty tissues in our bodies and stay in place for long periods. Although rare, people who have been exposed to very high levels of dioxins may develop skin rashes or a severe acne-like condition called "chloracne," which can be a serious disfiguring condition. Chemical workers, who have had high exposures and therefore large amounts of dioxins stored in their bodies, appear to be at increased risk of developing cancer. Many forms of dioxin are considered to be carcinogens by the US Environmental Protection Agency (EPA) and the World Health Organization (WHO).

Your Suggestions: http://deploymenthealthlibrary.fhp.osd.mil/product_feedback.jsp

Visit the Deployment Health and Family Readiness Library: <http://deploymenthealthlibrary.fhp.osd.mil>

A collaborative effort between the Air Force Institute for Operational Health, the Deployment Health Clinical Center, Force Health Protection and Readiness, the Navy Environmental Health Center, the U.S. Army Center for Health Promotion and Preventive Medicine, and the OUSD(P&R)/Military Family and Community Policy



Laboratory animal studies involving both low and high dioxin exposures have identified developmental and reproductive problems. There are also indications of problems with the immune and nervous systems, but human studies are not conclusive. More research in laboratory animals, including studies involving long-term, low-level exposures to dioxins, is needed in order to better understand the risks dioxin exposures pose to people.

Studies of military veterans who were exposed to herbicide orange (also referred to as Agent Orange), which was contaminated with dioxins, have reported a variety of health problems, some of which have been attributed to exposure to dioxins. Herbicide orange was used during the Vietnam War to kill foliage and make it harder for the enemy to wage war without being seen. (For more information, see <http://www.vba.va.gov/bln/21/benefits/herbicide/>).

How can exposure to dioxins be prevented?

Because dioxins can be released during low temperature burning, open burning of trash should be avoided whenever

possible. Sometimes this is not possible during deployments. When open burning is required, measures should be taken to reduce individuals' exposures to smoke and potentially to dioxins. These steps include eliminating certain types of materials (like plastics) to be burned; using properly operating incinerators; and locating burn operations downwind so the smoke blows away from areas where people are located.

The amount of dioxins in one's body can be gradually reduced by choosing to eat foods less likely to contain dioxins. For example, one can limit consumption of high-fat foods and liver, since they tend to contain higher levels of dioxins, and also reduce the amount of foods that are eaten that come from locations known to contain higher levels of dioxins, such as seafood from certain bodies of water.

There is also recent research that suggests that consuming some natural chemicals in vegetables might block the effects of dioxins. In general, following Federal Dietary Guidelines may also reduce dioxin levels in your body. People should also stop smoking, or never start, to ensure better overall health and to reduce dioxin exposures.

Where Do I Get More Information?

DoD Force Health Protection & Readiness (FHP&R) Program
Phone: (800) 497-6261
<http://www.deploymentlink.osd.mil>

U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM)
Phone: (800) 222-9698
<http://chppm-www.apgea.army.mil>

Air Force School for Aerospace Medicine (USAFSAM) formerly AFIOH
Phone: (888) 232-3764

Navy & Marine Corps Public Health Center
Phone: (757) 953-0700
<http://www.mncphc.med.navy.mil>

DoD Deployment Health Clinical Center (DHCC)
Phone: (866) 559-1627
<http://www.pdhealth.mil/>

Agency for Toxic Substances and Disease Registry
"Toxicological Profile for Chlorinated Dibenzo-*p*-Dioxins"
<http://www.atsdr.cdc.gov/toxprofiles/tp104.pdf>

Department of Veterans Affairs
<http://www1.va.gov/agentorange/>

The Institute of Medicine
"Dioxins and Dioxin-like Compounds in the Food Supply: Strategies to Decrease Exposure"

National Research Council
"Health Risks from Dioxin and Related Compounds: Evaluation of the EPA Reassessment"
<http://www.ejnet.org/dioxin/nas2006.pdf>

World Health Organization
"Dioxins and their effects on human health"

U.S. Environmental Protection Agency (EPA)
<http://www.ejnet.org/dioxin/>

U.S. Food and Drug Administration (FDA)
"Plastics and the Microwave"
http://www.fda.gov/fdac/features/2002/602_plastic.html
"Questions and Answers"
<http://www.cfsan.fda.gov/~lrd/dioxinqa.html>



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