

This fact sheet answers the most frequently asked health questions (FAQs) about 4,4'-methylenebis(2-chloroaniline) (MBOCA). For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**SUMMARY:** Exposure to 4,4'-methylenebis(2-chloroaniline) (MBOCA) happens mostly in the workplace by touching it or by breathing contaminated air. MBOCA is suspected of causing bladder cancer in people and animals. This chemical has been found in at least 4 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

### What is 4,4'-methylenebis(2-chloroaniline) (MBOCA)?

(Pronounced 4,4-měth'ə lēn bīs' 2-klôr' ō ān'əlīn)

MBOCA is a synthetic chemical used primarily to make polyurethane products. Pure MBOCA is a colorless, crystalline solid, but the commonly used form is usually yellow, tan, or brown pellets. It has no smell or taste.

Examples of these products include gears, gaskets, sport boots, roller skate wheels, shoe soles, rolls and belt drives in cameras, computers and copy machines, wheels and pulleys for escalators and elevators, components in home appliances, and various military applications. It is also used as a coating in chemical reactions to "set" glues, plastics, and adhesives. Because plastics have many uses, MBOCA is widely used.

Other names for MBOCA include 4,4'-methylenebis(2-chloroaniline), methylene-bis-ortho-chloro-aniline, bis-amine, DACPM, MCA, and MOCA.

### What happens to MBOCA when it enters the environment?

- It enters the environment from the disposal of solid waste from manufacturing plants that use MBOCA.
- It doesn't dissolve in water easily.

- MBOCA sticks strongly to soil particles.
- It is not likely to enter groundwater.
- MBOCA is not likely to evaporate from soil or water.
- It is broken down by sunlight in air and by microscopic organisms in soil or water.
- Levels of MBOCA can build up in the roots of vegetables grown in contaminated soil.

### How might I be exposed to MBOCA?

- People who work with MBOCA may get it on their skin and breathe it in air. Skin contact is the most common way to be exposed.
- It is sometimes found in root crops (such as carrots and beets) that people eat if the plants were grown in soil containing MBOCA.
- People may be exposed through skin contact with soil contaminated with MBOCA or near waste sites or landfills.
- It is not usually found in drinking water.

### How can MBOCA affect my health?

There is not much information on how MBOCA can affect people's health. Studies of human exposure suggest that the small amounts of MBOCA usually found in the air or on surfaces in or near factories do not cause toxic effects.

**ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>**

Exposure to large amounts of MBOCA may cause harm, but no such exposures have been reported. We do not know if there are any other long-term health effects in people caused by MBOCA, other than cancer.

One man was accidentally sprayed in his face with hot MBOCA. He felt nauseated and his kidneys were affected, but these effects lasted less than one day. MBOCA is harmful to blood cells and the liver in dogs and rats.

Researchers do not know if MBOCA causes birth defects in people.

### **How likely is MBOCA to cause cancer?**

The Department of Health and Human Services has determined that MBOCA may reasonably be anticipated to be a carcinogen.

MBOCA is suspected of causing bladder cancer in people. Information is being gathered to determine whether bladder cancer in people may result from short-, medium-, or long-term exposures to MBOCA. A few studies have found an above-normal number of bladder tumors in workers exposed to MBOCA for several years. It caused lung, liver, breast, and bladder cancer in rats, mice, and dogs that ate MBOCA for over a year.

### **Is there a medical test to show whether I've been exposed to MBOCA?**

Laboratory tests can measure MBOCA in urine. The test must be done within a short period after you are exposed because it is broken down quickly by your body. The test does not tell how much MBOCA you've been exposed to or if harmful effects will occur. The test is not routinely available at your doctor's office, but a sample taken in the doctor's office can be shipped to a special laboratory if necessary.

### **Has the federal government made recommendations to protect human health?**

The Environmental Protection Agency (EPA) has classified MBOCA as a hazardous waste that must meet specific disposal requirements. The EPA requires that spills or accidental releases of MBOCA into the environment of 10 pounds or more must be reported to EPA.

The American Conference of Governmental Industrial Hygienists (ACGIH) set a maximum level of 0.11 milligrams of MBOCA per cubic meter (0.11 mg/m<sup>3</sup>) of workplace air for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends an exposure limit of 3 micrograms of MBOCA per cubic meter of air (3 µg/m<sup>3</sup>) over a 10-hour day.

These agencies advise avoiding eye and skin contact because this may be a route of significant exposure.

### **Glossary**

**Carcinogen:** A substance that can cause cancer.

**Microgram (µg):** One millionth of a gram.

**Milligram (mg):** One thousandth of a gram.

**Tumor:** An abnormal mass of tissue.

### **References**

Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological profile for 4,4'-methylenebis(2-chloroaniline) (MBOCA). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

