

This fact sheet answers the most frequently asked health questions (FAQs) about benzidine. 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. It is important you understand this information 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.

**HIGHLIGHTS:** Benzidine is a manufactured chemical that was used to produce dyes. Most people are not exposed to benzidine in the environment. Occupational exposure has been associated with increased risk of urinary bladder cancer. This substance has been found in at least 28 of the 1,585 National Priorities List sites identified by the Environmental Protection Agency (EPA).

## What is benzidine?

Benzidine is a manufactured chemical that does not occur naturally. It is a crystalline solid that may be grayish-yellow, white, or reddish-gray. In the environment, benzidine is found in either its "free" state (as an organic base), or as a salt. Benzidine was used to produce dyes for cloth, paper, and leather. It is no longer produced or used commercially in the U.S.

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

- ❑ Benzidine in the air exists as a vapor or attached to very small particles. The benzidine in air will eventually settle over land and water.
- ❑ Only very small amounts of free benzidine will dissolve in water; benzidine salts can dissolve more readily in water. Benzidine released into waterways will sink and become part of the bottom sludge.
- ❑ Benzidine in soil is likely to be strongly attached to soil particles and will not easily pass into underground water.
- ❑ Benzidine is not likely to accumulate in the food chain.

## How might I be exposed to benzidine?

- ❑ The general population is not likely to be exposed to benzidine through contaminated air, water, soil, or food.
- ❑ People living near uncontrolled hazardous waste sites may be exposed to benzidine.

## How can benzidine affect my health?

Except for the cancer discussed next, benzidine has not been definitely shown to cause major adverse health effects in humans. If it comes in contact with your skin it may cause a skin allergy. Liver, kidney, immune, and neurological effects have been observed in laboratory animals given relatively high amounts of benzidine. We do not know if these effects would also occur in humans.

## How likely is benzidine to cause cancer?

It is known that long term occupational exposure to benzidine can increase the risk of developing cancer in people. The main type of cancer found in workers is cancer of the urinary bladder.

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

The Department of Health and Human Services (DHHS), the World Health Organization (WHO), and the EPA have determined that benzidine is a human carcinogen.

In addition dyes made from benzidine, such as Direct Blue 6, Direct Black 38, and Direct Brown 95, have been shown to cause cancer in humans. The DHHS has determined that Direct Blue 6 and Direct Black 38 cause cancer in animals and WHO determined that Direct Blue 6, Direct Black 38, and Direct Brown 95 cause cancer in animals.

### **How can benzidine affect children?**

There are no studies on health effects on children exposed to benzidine. It is likely that health effects seen in children exposed to high levels of benzidine will be similar to the effects seen in adults.

We do not know if exposure to benzidine will result in birth defects or other developmental effects in people.

### **How can families reduce the risk of exposure to benzidine?**

- Most families will not be exposed to benzidine.
- Children should avoid playing in soils near uncontrolled hazardous waste sites where benzidine may have been discarded.

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

Benzidine and its breakdown products can be detected in your urine, but only within about 2 weeks after your last exposure. Benzidine and its breakdown products can also bind to proteins within your red blood cells, and this can be detected for up to 4 months. These tests are not usually available at your doctor's office, but your doctor can send the samples to a laboratory that can perform the tests. None of these tests, however, can predict whether you will experience any health effects.

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

The EPA recommends that the amount of benzidine in drinking water be less than 1 part benzidine in a trillion parts of water (1 ppt).

The Food and Drug Administration (FDA) allows a maximum of 1 part benzidine per billion parts of some color additives for food.

### **References**

Agency for Toxic Substances and Disease Registry (ATSDR). 2001. Toxicological Profile for Benzidine 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.

