

This fact sheet answers the most frequently asked health questions (FAQs) about iodine. 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:** Iodine is a naturally occurring element that is required for good health. Exposure to high levels of stable or radioactive iodine can cause damage to the thyroid. This chemical has been found in at least 9 of the 1,636 National Priorities List sites identified by the Environmental Protection Agency (EPA).

### What is iodine?

Iodine is a naturally occurring element found in sea water and in certain rocks and sediments. There are non radioactive and radioactive forms of iodine.

Iodine is used as a disinfectant for cleaning surfaces and storage containers and is used in skin soaps and bandages, and for purifying water. Iodine is also added to some table salt to ensure that all people in the United States have enough iodine in their diet.

Most radioactive iodine is manmade. It is used in medical tests and to treat certain diseases. Most radioactive forms of iodine change very quickly (seconds to days) to stable elements that are not radioactive. However, <sup>129</sup>I (read as iodine 129) changes very slowly (over millions of years).

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

The primary source of nonradioactive iodine is the ocean. It enters the air from sea spray or as iodine gas. Once in the air, iodine can combine with water or with particles in air and can enter the soil and surface water, or land on vegetation when these particles fall to the ground or when it rains. Iodine can remain in soil for a long time. It can also be taken up by some plants that grow in the soil, but plants are considered a poor source of dietary iodine.

Small amounts of radioactive iodine are produced from the operation of nuclear power plants, which can release minor

amounts to air and water. Large amounts have been released during rare power plant accidents. Iodine is also released from atomic bomb explosions. Very large amounts are made in nuclear power plants for medical use. Once given to the patient, most iodine decays in the body. The rest is exhaled or excreted in the urine and decays naturally in the environment.

### How might I be exposed to iodine?

- The general population is exposed to low levels of iodine in air, some food, and some beverages. Food (iodized salt, salt water, bread, and dairy products) is the largest source of exposure to iodine.
- The general population is rarely exposed to radioactive iodine, unless they undergo certain medical tests or are given it for the treatment of thyroid disease.
- People who work at facilities using radioactive iodine may be exposed to higher than normal levels.

### How can iodine affect my health?

Iodine has both beneficial and harmful effects on human health. Iodine is needed by your thyroid gland to produce thyroid hormones. However, exposure to unnecessarily high levels of nonradioactive and radioactive iodine can damage the thyroid. Damage to the thyroid gland can result in effects in other parts of your body, such as your skin, lung, and reproductive organs.

Radioactive iodine can be used by doctors to check your thyroid for medical problems, and to cure thyroid cancer.

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

### How likely is iodine to cause cancer?

Some human studies have found an increased risk of thyroid cancer in certain populations, particularly populations with iodine deficient diets receiving iodine supplements. Other human studies have not found an association between exposure to high levels of iodine and cancer risk. Exposure to high levels of radioactive iodine may also increase the risk of thyroid cancer. However, the evidence is inconclusive for exposures in the United States.

### How can iodine affect children?

Iodine is essential for the growth and development of children. However, children are more sensitive to the harmful effects of excessively high levels of stable and radioactive iodine than adults because their thyroid glands are still growing. If babies and children receive too much iodine, they can develop an enlarged thyroid gland (called a goiter), which does not produce enough thyroid hormone for normal growth.

Radioactive iodine in food can be more harmful to babies and children than to adults. Because a child's thyroid gland is smaller than that of an adult, a child's thyroid gland will receive a higher radiation dose than the adult exposed to the same amount of iodine.

### How can families reduce the risk of exposure to iodine?

We need iodine to maintain growth and health, but we want to prevent exposure to too much iodine. Foods are not normally expected to have enough iodine to harm your health. Unless you are exposed to radioactive waste or emissions, you generally do not have to worry about excessive exposure.

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

There are reliable tests that can measure iodine in the blood, urine, and saliva. These tests are not available at your

doctor's office, but your doctor can send the samples to a laboratory that can perform the tests. However, these tests cannot predict whether you will experience any health effects.

Two types of tests are available for radioactive iodine. One is to see if you have been exposed to a large dose of radiation, and the other is to see if iodine is in your body. The first looks for changes in blood cell counts or in your chromosomes that occur at 3 to 5 times the annual occupational dose limit. It cannot tell if the radiation came from radioactive iodine. The second type of test involves examining your blood, feces, saliva, urine, and even your entire body. It is to see if iodine is being excreted from or remains inside your body. Either the doctor's office collects and sends the samples to a special lab for testing, or you must go to the lab for testing.

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

The National Research Council has established a recommended dietary allowance (RDA) for iodine of 150 micrograms per day (150 µg/day), with additional allowances of 25 µg/day during pregnancy and 50 µg/day during nursing. These dietary intake levels are sufficient to satisfy the metabolic needs of the body.

The Nuclear Regulatory Commission (NRC) has set limits for radioactive iodine in workplace air of  $2 \times 10^{-8}$  microcurie per milliliter (µCi/mL) for <sup>131</sup>I. EPA has set an average annual drinking water limit of 3 pCi/L for <sup>131</sup>I so the public radiation dose will not exceed 4 millirem.

### Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2004. Toxicological Profile for Iodine 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.

