RADIOISOTOPE BRIEF
Iodine-131 (I-131)

Half-life: 8.06 days
Mode of decay: Beta particles and gamma radiation
Chemical properties: I-131 can change directly from a solid into a gas, skipping the liquid phase, in a process called sublimation. I-131 dissolves easily in water or alcohol. I-131 readily combines with other elements and does not stay in its pure form once released into the environment.

What is it used for?
I-131 is used in medicine to diagnose and treat cancers of the thyroid gland.

Where does it come from?
I-131 is produced commercially for medical and industrial uses through nuclear fission. It also is a byproduct of nuclear fission processes in nuclear reactors and weapons testing.

What form is it in?
In medicine, I-131 is supplied in capsules or liquid of a specific activity designed to be swallowed by patients. As a product of nuclear fission, it is a dark purple gas that can be inhaled, or absorbed through the skin. I-131 in fallout from nuclear weapons or reactor accidents can occur in particle form, which can be ingested in food or water.

What does it look like?
Pure I-131 is a non-metallic, purplish-black crystalline solid. However, because it readily binds with other elements, I-131 usually is found as a compound rather than in its pure form. For medical purposes, the I-131 capsules contain small granules of I-131 sodium iodide that are designed to be swallowed by patients. Liquid I-131 sodium iodide used to diagnose and treat thyroid disease is a clear liquid.

How can it hurt me?
External exposure to large amounts of I-131 can cause burns to the eyes and on the skin. Internal exposure can affect the thyroid gland, a small organ located in the neck near the Adam’s apple. The thyroid gland uses iodine to produce thyroid hormones and cannot distinguish between radioactive iodine and stable (nonradioactive) iodine. If I-131 were released into the atmosphere, people could ingest it in food products or water, or breathe it in. In addition, if dairy animals consume grass contaminated with I-131, the radioactive iodine will be incorporated into their milk. Consequently, people can receive internal exposure from drinking the milk or eating dairy products made from contaminated milk. Once inside the body, I-131 will be absorbed by the thyroid gland exposing it to radiation and potentially increasing the risk for thyroid cancer or other thyroid problems.
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For more information about I-131, see the Public Health Statement by the Agency for Toxic Substances and Disease Registry at http://www.atsdr.cdc.gov/toxprofiles, or visit the Environmental Protection Agency at http://www.epa.gov/radiation/radionuclides/iodine.htm.

For more information on protecting yourself before or during a radiologic emergency, see CDC’s fact sheet titled “Frequently Asked Questions (FAQs) About a Radiation Emergency” at http://www.bt.cdc.gov/radiation/emergencyfaq.asp, and “Sheltering in Place During a Radiation Emergency,” at http://www.bt.cdc.gov/radiation/shelter.asp.

The Centers for Disease Control and Prevention (CDC) protects people’s health and safety by preventing and controlling diseases and injuries; enhances health decisions by providing credible information on critical health issues; and promotes healthy living through strong partnerships with local, national, and international organizations.

For more information, visit www.bt.cdc.gov/radiation, or call CDC at 800-CDC-INFO (English and Spanish) or 888-232-6348 (TTY).