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REPORT

Protecting Yourself in a Nuclear Emergency with Potassium Iodide

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The possibility of radioactive contamination from a device detonated by terrorists within the country's borders is a frightening scenario. In such an emergency, exposure to radioactive iodine is a haunting specter that could see many individuals succumb to thyroid cancer.¹

Fortunately, a readily available, stable compound called potassium iodide can help protect you and your family against the dangerous radioactive iodine that can permeate the environment after a nuclear catastrophe. Safe, inexpensive, and highly effective, potassium iodide should be an essential part of every family's anti-terrorist emergency preparation strategy.

NUCLEAR ATTACK: TERRORIST THREAT

Evidence is mounting that terrorist organizations worldwide are aggressively working to obtain military-style nuclear weapons² through the black market and from terrorism-sponsoring governments around the world.

Alarmingly, these devices could end up in the US or Europe through a number of potential schemes whereby various state sponsors of terrorism could distribute nuclear weapons to groups such as Al Qaeda. The detonation of these larger nuclear weapons could cause cataclysmic devastation in large urban areas, whereas those living in the periphery of such cities could receive radiation exposure that is less than lethal. In the short run, this type of exposure could lead to radiation sickness, while in the long run, it could contribute to a variety of diseases, such as thyroid cancer.

How would radiation released by a terrorist attack or a nuclear accident affect your health? A nuclear or radiological event can generate radioactive iodine, among other contaminants. Once released into the air, this radioactive element can be inhaled into the lungs. Radioactive iodine can also penetrate the food and water supply, leading to further contamination and potential exposure. Any of these pathways into the body can lead to what is called internal contamination. Once internal contamination with radioactive iodine occurs, the body immediately begins to absorb this compound. Nearly all of the absorption of radioactive iodine occurs in the thyroid gland, leading to thyroid damage and a dramatic increase in cancer risk, particularly for young children.¹

THE THYROID GLAND: ESSENTIAL TO HEALTH

Preventing damage to the thyroid gland is critical to the short-term and long-term health of those exposed to radioactive iodine. Positioned at the base of the neck, the thyroid gland produces thyroid hormone, which has effects on every organ, tissue, and cell in the body. These effects include a variety of functions and mechanisms that impact on energy levels, heart rate, muscle strength, skin health, menstrual cycles, cognition, and cholesterol metabolism.

The thyroid gland is especially important to growing children. Not surprisingly, children are believed to be more vulnerable to the effects of radiation. Studies suggest that exposure to radioactive iodine during childhood is associated with a greatly increased risk of thyroid cancer in later life.³ Children not only have greater susceptibility to radiation-induced cancer, they also have a longer life span than adults, giving latent cancer a longer time frame in which to develop.



POTASSIUM IODIDE OFFERS PROTECTION

Is there any way to protect against a less-than-lethal-exposure to nuclear radiation? Many experts believe that the compound potassium iodide can protect individuals from some of the harmful effects of radiation exposure. This protective effect occurs because potassium iodide blocks radioactive iodine from being absorbed by the thyroid gland.⁴ The thyroid cannot distinguish between radioactive iodine and potassium iodide. Once the potassium iodide is taken and the thyroid gland becomes saturated

with the compound, no more radioactive iodine or potassium iodide can be absorbed for the next 24 hours.

Potassium iodide is therefore highly effective in protecting against the effects of radioactive iodine exposure.⁵ The rate at which potassium iodide is absorbed into the blood helps determine the effectiveness of the compound. It is critical how much time elapses between exposure or contamination with radioactive iodine and the use of potassium iodide. Clearly, the most rapid use of potassium iodide possible allows for the maximum protection against radioactive iodine. Its efficacy is greatest when administered immediately before the exposure, and it has greatly diminished clinical value when administered 12 hours or more after radiation exposure.

Potassium iodide cannot provide a protective effect once the thyroid gland has been destroyed by radioactive iodine.⁴ In addition, potassium iodide cannot protect other parts of the body from exposure to radioactive iodine nor can it protect against elements other than radioactive iodine.⁴



The thyroid gland.

Potassium iodide is a salt of the stable form of iodine, which is a naturally occurring chemical element that is used in the body to make thyroid hormones. The source of most of the iodine used in the body is from food. Potassium iodide is also a stable form of iodide that is used for medicinal purposes.

Potassium iodide is often added to table salt, known as “iodized” salt. Although this iodized salt contains sufficient iodine to keep most people healthy in most situations, it does not contain enough iodine to prevent radioactive iodine from entering the thyroid gland. Iodized table salt is therefore not a replacement for potassium iodide.

USING POTASSIUM IODIDE

Potassium iodide is approved by the Food and Drug Administration (FDA) and is available as an over-the-counter drug in liquid and tablet forms. The recommended doses usually range from 65 to 130 milligrams (mg), and potassium iodide tablets are available in 65 mg and 130 mg tablets. The liquid form provides 65 mg of potassium iodide in each milliliter (mL) of liquid.

What are the typical doses of potassium iodide? The FDA recommends the following doses before or following exposure and contamination with radioactive iodine:⁶

- Newborns up to one month of age: 16 mg of potassium iodide, which would be one-fourth of a 65 mg tablet or a one-fourth dose of liquid
- Infants between the ages of one month and three years: 32 mg, which would be one-half of a 65 mg tablet or a one-half dose of liquid
- Children between the ages of 3 and 18 years: one 65 mg tablet or one mL solution
- Adults: 130 mg, which could be one 130 mg tablet, two 65 mg tablets, or two mL of liquid
- Breastfeeding mothers: 130 mg
- Children who weigh more than 150 pounds: 130 mg.

These doses described protect the thyroid gland for 24 hours. A one-time dose will likely be sufficient in most situations. If high levels of radioactivity persist in the environment or food supply, public health officials may recommend daily dosing as outlined above. Newborn infants, pregnant women, and breastfeeding mothers should be evacuated if radioactivity persists in the environment, and should not receive additional doses of potassium iodide unless other protective measures (such as evacuation, sheltering, and control of the food supply) are unavailable.

Potassium iodide has generally been found to be safe when administered in recommended doses. Higher doses of potassium iodide do not increase protection against radioactive iodine. In adults and children at risk for exposure to radioactive iodine, the overall benefits of potassium iodide far exceed the risks of overdosing. Closely monitoring the dose in infants, however, is particularly important.⁶

Administration of potassium iodide to newborns has been associated with changes in thyroid hormone levels, so their thyroid function should be monitored.⁶ Individuals who are allergic to iodine and those who have certain skin, kidney, or thyroid conditions should consult a physician before using potassium iodide.⁷

- The threat of a nuclear attack is ever present in the United States. Those who survive a nuclear attack may succumb to the short-term and long-term effects of radiation exposure, such as radiation sickness and thyroid cancer.
- One dangerous contaminant released by a nuclear event is radioactive iodine. Radioactive iodine can enter the body through food, water, or air. Once in the body, radioactive iodine accumulates in the thyroid gland, where it contributes to harmful processes such as thyroid cancer.
- You can protect yourself against radioactive iodine by using a salt called potassium iodide. By saturating the thyroid gland, potassium iodide prevents the gland's uptake of dangerous radioactive iodine.
- Potassium iodide is most effective when used before or immediately after exposure to radioactive iodine. Potassium iodide does not protect against other radioactive agents.
- Potassium iodide is FDA-approved and may be used by children and adults. Maintaining a supply of potassium iodide is an essential component of a radiological emergency plan.



CHERNOBYL DEMONSTRATES SAFETY OF POTASSIUM IODIDE

One of the best evaluations of the safety of potassium iodide use occurred following the Chernobyl nuclear power plant accident in 1986. Some 16 million persons living in nearby Poland were given single doses of potassium iodide as a preventive measure following the accident.⁸ Researchers investigating the accident found that potassium iodide supplementation reduced the dose of radiation in the thyroid by at least 40%. Furthermore, they found only rare instances of side effects in this population. In general, the side effects associated with the proper use of potassium iodide included mild gastrointestinal symptoms and rashes.

EMERGENCY PREPARATION WITH POTASSIUM IODIDE

Whether radioactive release is from a nuclear power plant accident, a terrorist attack on a nuclear power plant, or from the detonation of a nuclear bomb, potassium iodide plays a key role in emergency preparedness.

Rapid evacuation is the best way to prevent whole-body exposure to radiation from these sources. Evacuation protects the entire body rather than specific areas of the body. However, when radioactive emergencies occur, rapid evacuation or protective sheltering is not always possible, and this is when access to potassium iodide supplementation becomes so important. In these circumstances, potassium iodide supplementation is an inexpensive, safe, and logical preventive measure against radioactive iodine. It should be noted that potassium iodide is ineffective for other radionuclide exposures.



The United States Nuclear Regulatory Commission has developed a policy that ensures adequate stockpiles of potassium iodide for populations within a 10-mile radius of every nuclear power plant in the United States. In general, government distribution of potassium iodide and emergency preparedness involving its use have been less than ideal. A recent study found that potassium iodide distribution was poor in an area near two nuclear power plants.⁹ These researchers also found that the New Jersey community in question had highly variable knowledge about how to use potassium iodide prophylactically following a nuclear accident.

FDA approval of over-the-counter potassium iodide opens the door for individuals and communities to acquire this agent to provide for their own emergency planning. This planning should include knowledge of the proper prophylactic use of potassium iodide among all those concerned with emergency preparedness, including local public health authorities, physicians, emergency personnel, and individuals.

If you have any questions about the scientific content of this article, please call one of our Health Advisors at 1-800-226-2370.

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