

# Radioprotection Using Iodine-131 for Thyroid Cancer and Hyperthyroidism: A Review

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Radioiodine (iodine-131, or I-131) therapy has been used successfully for thyroid therapy for more than 50 years. Protocols for treatment with I-131 differ from country to country and even from hospital to hospital in the same country. Daily area surveys of hallways, stairwells, and rooms adjacent to isolation rooms must be conducted and documented to ensure that doses to any individuals in unrestricted areas do not exceed 20 mSv (2 mrem) in one hour. Nursing and housekeeping staffs must realize that once therapy has begun, no items are to be removed from the room unless first cleared by nuclear medicine or radiation safety personnel. With proper education and instructions for patients and their family members, radiation exposure to healthcare professionals and the general public can be minimized. The objectives of this article are to review (a) practical radiation safety concerns associated with hospitalized patients receiving I-131 therapy, (b) preventive measures to minimize potential exposure and contamination problems, and (c) radiation safety precautions and preventive measures to minimize radiation exposure to family members and helpers living with patients receiving outpatient I-131 therapy.

**R**adioiodine (iodine-131, or I-131) therapy is one of three major strategies for the treatment of papillary or follicular thyroid cancer and hyperthyroidism, used successfully for more than 50 years. For hyperthyroidism, the other two methods are surgery and treatment with antithyroid drugs. I-131 is usually the method of choice because the benefits far outweigh the risks, it is relatively inexpensive, it is easily tolerated by patients, and, except for occasional hypothyroidism, the therapy is almost without side effects (Shapiro, 1993). Regardless of the aim of treatment, the best strategy from a protection point of view is to use as small an amount of radioactivity as possible to get the desired effects and benefits for patients (International Commission on Radiological Protection [ICRP], 1991). This is in accordance with the ALARA principle (all exposure shall be kept *as low as reasonably achievable*), which is recommended by the ICRP (1977). The use of radiation is restricted and controlled. The council of the European Union, in a directive on health protection of individuals from dangers of ionizing radiation in relation to medical exposures (European Communities, 1997), stated that “for all medical exposure of individuals for radiotherapeutic purposes, exposures of target volumes shall be individually planned; taking into account that doses of non-target volumes and tissues shall be as low as reasonably achievable and consistent with the intended radiotherapeutic purpose of the exposure.” The directive has been implemented into the legislation of each member country (Swedish Radiation Protection Authority, 2000). The Office of Nuclear Regulatory Research (ONRR) regulates I-131 in the United States.

## At a Glance

- ◆ Practical radiation safety concerns are associated with hospitalized patients receiving radioiodine therapy.
- ◆ Preventive measures can be taken to minimize potential exposure and contamination problems.
- ◆ Nurses should learn radiation safety precautions and preventive measures to minimize radiation exposure to family members and helpers living with outpatients receiving radioiodine therapy and the general public.

The first report of radioiodine therapy for metastatic thyroid carcinoma was in 1945 (Seilini & Marinelli). The efficacy of radioiodine therapy is directly related to tumor uptake and retention. Effective tumor uptake is achieved with a concentration of 0.5% of the dose per gram of tumor tissue with an effective

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