

## Information for caregivers working patients treated with radioactive iodine ( $^{131}\text{I}$ )

**Background:** In the course of routine patient care activities there is the potential for exposure to the patient's blood or body fluids. Since body fluids such as urine and emesis from recently treated patients contain  $^{131}\text{I}$ , caregivers should understand the risk of uptake of  $^{131}\text{I}$  specifically, or external beam radiation coming from the  $^{131}\text{I}$  or a radioactive implant.

Two different potential risks exist:

- Thyroid uptake of  $^{131}\text{I}$ , and
- External beam radiation from  $^{131}\text{I}$ -containing materials

### 1. Thyroid uptake of $^{131}\text{I}$ .

#### What are the health risks of $^{131}\text{I}$ ?

$^{131}\text{I}$ , if taken internally through the mouth, skin or lungs, can be taken up by the healthcare worker's thyroid gland as it is by the patient's thyroid, leading to an increased risk of **hypothyroidism** and perhaps benign thyroid adenomas. Other thyroid conditions such as **hyperthyroidism**, goiter, Grave's disease or thyroid cancer have **not** been associated with this hazard.

#### Protecting the worker from thyroid uptake of $^{131}\text{I}$ :

$^{131}\text{I}$  in the patient's body fluids could be absorbed into the healthcare worker's body if:

- fluids such as urine, emesis or blood splash directly on the healthcare worker's skin or mucus membranes. *This can be prevented by wearing a gown, gloves, and mask with eye protection when caring for the patient.*
- the healthcare worker ingests food or drink contaminated with the patient's secretions. *Do not take your own food or drink into the patient's room.*

To cause hypothyroidism, the dose of  $^{131}\text{I}$  has to exceed the permissible exposure limit. We limit exposure to healthcare workers by limiting who can go in and out of the patient's room, and by ensuring that caregivers wear the appropriate protective gear when they enter the room. Historically, Vanderbilt once had a program of performing bioassays on all the nurses who cared for  $^{131}\text{I}$  patients, and the results of that program showed that of 158 bioassays (thyroid uptake scans) performed between 12/93 and 5/98, only 2 scans had any detectable uptake at all. The highest level of  $^{131}\text{I}$  detected in these 2 scans was 2nCi, which is 0.02% of the permissible exposure limit. Based on this solid evidence that no significant exposure was occurring, mandatory testing was discontinued. However, this testing is still available upon request for caregivers who have had an exposure incident, or who simply want to be tested. This testing is performed by Environmental Health and Safety.

## **2. External beam radiation**

Since it is a radioactive material,  $^{131}\text{I}$  emits external beam radiation. The greatest exposure to this risk is to the patient him or herself. The external beam radiation risk applies to caregivers of brachytherapy patients,  $^{131}\text{I}$  patients, and patients undergoing other nuclear medicine tests and procedures, as well as radiation emitted from diagnostic imaging equipment such as portable X-rays. We all get some radiation exposure every day from the sun and from appliances used around the house.

### **What are the health risks of external beam radiation?**

The medical risk of overexposure to external beam radiation includes acute radiation sickness (for massive overexposures) and malignancies (primarily leukemia and other hematologic malignancies) from chronic overexposure.

Since the patient is ingesting the full radioactive dose, they are exposed to the most radiation. So investigators have followed these patients to learn their risk of malignancies after treatment. The Cooperative Thyrotoxicosis Therapy Follow-up Study Group followed 35,593 patients from 26 centers for cancer mortality after  $^{131}\text{I}$  therapy for hyperthyroidism. In 1968, they reported no increase in the incidence of leukemia or cancer after a mean follow-up of 8.2 years. A more recent analysis of data through 1990, representing a mean follow-up of 21 years, also revealed no increase in overall cancer mortality.

### **Protecting the healthcare worker from external beam radiation:**

Most of the radioactivity is concentrated in the patient's body fluids. To limit healthcare worker exposure to any radiation being given off by the patient's body fluids, body fluids are contained and covered to contain radiation. Staff must wear their gown and gloves when handling body secretions.

To monitor the amount of radiation exposure, all staff who have potential exposure to external beam radiation are assigned dosimetry badges to monitor their exposures. For the badges of caregivers working with radioiodine and brachytherapy patients, there has been no individual in this area with an exposure at or above the level acceptable for the lay public (the lay public limits, set for patients and visitors, is much lower than the acceptable level for occupational exposure.) Total exposure for all staff combined over 2 years was under 10% of the permissible exposure limit for one individual. Be sure to wear your badge whenever caring for a radioiodine or brachytherapy patient, and turn your badge in so the exposure levels can be measured.