

Comments Regarding Practice Recommendations of the American Thyroid Association for Radiation Safety in the Treatment of Thyroid Disease with Radioiodine

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Dear Editor:

The authors of the recently published "Radiation Safety in the Treatment of Patients with Thyroid Diseases by Radioiodine (¹³¹I): Practice Recommendations of the American Thyroid Association" (1) are to be commended for creating a document that reflects the result of countless hours of literature review, survey compilation, discussion, and compromise. This study has systematically applied techniques to achieve as low as reasonably achievable (ALARA) exposure to radiation, and this represents a significant step forward in the protection of those coming in contact with individuals treated with ¹³¹I. It effectively communicates newer approaches to assessing the likely maximum dose to another person (usually family) that are not only based on total administered doses but also estimates of clearance and retention. For example, an individual with Graves' disease with high radioactive iodine uptake who received 10 millicurie (mCi) of ¹³¹I may expose others to more radiation than someone with thyroid cancer post-total thyroidectomy, stimulated with rhTSH and ablated with 100 mCi. We have already modified our institution's protocols by adapting some of the committee's recommendations.

However, we would like to share our concerns about some of the committee's recommendations regarding the following.

In regard to the section titled "Post-therapy living situations," the recommendation about sleeping in separate beds, the committee should consider the dynamic clearance of the ¹³¹I as predicted by the expected pharmacokinetics of ¹³¹I. For example, the amount of radioiodine delivered to and retained in the thyroid gland of a patient with Graves' disease who receives 10 mCi is often greater than the radiation exposure of someone with a multinodular goiter who is either euthyroid or only mildly hyperthyroid receiving 30 mCi. Yet, the former patient would be advised to sleep alone for 3 days, while the latter patient would be told to do so for 11 days.

The section entitled "Personal hygiene" contains instructions on the disposal of radioactive trash that cannot be flushed or washed in a routine fashion which require several considerations. First of all, just how much contamination will there be? Highly conscientious, environmentally aware, in-

dependently living people are unlikely to generate much radioactive trash. On the other hand, a debilitated, dependent patient, who wears incontinence diapers, is quite likely to produce a significant amount of contamination. Recommendations should, therefore, be based on likely levels of contamination. For example, when considering the use of disposable versus washable utensils, we recommend using washable utensils—as opposed to disposable ones. We instruct patients to wash them separately from the family dishes whenever possible. This minimizes the amount of material that must be stored. When counseling patients about transporting radioactive trash, the recommendation states, "Bring your specified trash bag back to the treatment facility." We feel that it is not feasible for many urban dwellers who are dependent on public transportation, which should not be used for this purpose, to comply with this recommendation. Further, in regard to the home storage of radioactive trash, it is recommended that, "After 80 days the bag may be removed as other trash bags." We believe that holding biohazard trash for 80 days poses a hygienic risk and storage challenge for those living in small apartments in multi-unit dwellings. Seeking alternative storage options may force them to compromise their right to privacy and expose others to unnecessary radiation. We recommend landfill disposal after a shorter period for continent patients, such as 4 weeks depending on the sensitivity of local landfill detectors. Incontinent patients should be treated as inpatients. Willegaignon *et al.*'s (2) experience in Brazil indicates that patient home waste contamination levels were a third of the International Atomic Energy Agency (IAEA) concentration limit for release criteria. We propose that our professional societies request that the Nuclear Regulatory Commission (NRC) adopt IAEA limits as reasonable alert levels for waste site monitors.

Driving an automobile while potentially impaired by the effects of hypothyroidism has led us to carefully consider our recommendations to patients undergoing thyroid hormone withdrawal procedures. We routinely instruct patients who are overtly hypothyroid *not* to drive. Consider, for example, the case of a school bus driver with severe hypothyroidism who caused a fatal collision, cited by Rosenthal (3). First and foremost this tragedy could have been prevented by not

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allowing an impaired driver to perform his duties. It is unclear who would be held responsible, including the physician, if school authorities were not notified that an overtly hypothyroid individual would be driving a school bus. Case law seems to indicate that physicians who fail to warn their hypothyroid patients against driving are negligent. Also, that physicians who fail to warn third parties about an impaired hypothyroid patient's driving, that places the public in peril, may be negligent (3). Anticipating how well a euthyroid patient will drive when he or she is rendered overtly hypothyroid is not possible. Additionally, assessing the ability to drive safely, when the patient is overtly hypothyroid, is neither feasible nor objective as suggested in the section on "Post-therapy travel." We therefore recommend that patients who are overtly hypothyroid be transported by a family member to their appointments.

In summary, the newly published recommendations of the American Thyroid Association regarding radiation safety for those being treated with radioactive iodine provide clinically understandable guidance to assure the safety of family and the general public. We trust that the authors will address our concerns and consider incorporating or referring to our practice in future versions of these practice recommendations.

References

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Response to Hennessey *et al.*

James C. Sisson

Dear Editor:

I, and I am sure my co-authors, appreciate the kind words of Drs. Hennessey, Parker, and Garber and Radiation Safety Officer Kennedy in their comments on our publication, "Radiation Safety in the Treatment of Patients with Thyroid Diseases by Radioiodine (^{131}I): Practice Recommendations of the American Thyroid Association" (1). They raised three important concepts that deserve discussion.

Patients whose thyroid glands and tissues exhibit differing fractional uptakes and effective half-lives of ^{131}I will expose other people to varying levels of radiation after radioiodine treatments. In Table 2A-1 of our article (1), we provided examples of restriction durations for hyperthyroid patients in whom the assumed uptake was 50% at 24 hours and the effective half-life was 5 days, but the administered activities of ^{131}I were varied. The footnote for Table 2 states that "Examples

should be modified to meet local and specific needs." Inherent in this explication is the assumption that radiation treatment teams will calculate radiation exposure according to the variables found in a given patient. The values for the variables that are commonly encountered are included in Table 2A-1 and with minor adjustments may be applied to the majority of patients. However, for some, the variables will be skewed from the usual. In appraisals of unusual patients, measurements of effective half-lives may be difficult to accomplish in a busy clinic, but a literature search should be helpful. For example, although effective half-lives in patients with nodular thyroid glands are especially difficult to assess, useful data can be gleaned from a publication by Nielsen *et al.* (2). For patients with nontoxic and toxic nodular goiters, this article reports that effective half-lives were estimated from 24- and 96-hour thyroid uptakes. The extremes recorded can be used to calculate the maximum durations of retained activities over time

for patients with similar disorders. Then, with measurements of thyroid uptake and the proposed treatment in megabecquerel (millicuries), maximum levels of radiation exposure to others can be reasonably determined over subsequent days.

Disposal of radioactive trash can be vexing. The concerns are not solely for the risk of radiation exposure to others, but also for the possibility that terrorists may be using radioactivity. In our publication (1), in Table 4, Step 4, under "Outside the Home," the possibility of setting off radiation detectors at national borders, airports, and elsewhere is addressed: radiation treatment teams should issue a letter or card that explains the low levels of radioactivity involved. Although, this action was not proposed in Table 4 for disposing radioactive trash, it offers a reasonable solution. If the radiation treatment team projects that the level of radiation in the trash of a patient at a given time is unlikely to threaten others, then a letter stating this conclusion should be given to the patient; copies can then be provided to the company that picks up the trash and to the disposal site.

The general status and disabilities of a patient should be assessed before any treatment is given. Limitations in activities should be advised not only for patients with hypothyroidism, but also for those with hyperthyroidism, Graves' eye disease, stroke, dementia, etc. Whereas disabilities must be taken into account when administering ^{131}I , these should have previously been confronted by physicians responsible for overall care of the patient. Nevertheless, because of its importance, our recommendations (1) discuss the concept of disability. In Table 3 see: under "Consider inpatient ^{131}I

therapy ...," 2. The patient is unable to comply ...; and under "Information gathering for radiation precaution planning, travel." More instruction appears in Table 4, Step 2 under "For your travel."

Again, we are pleased to hear from readers of *Thyroid* and to have the opportunity to discuss their perturbations. We hope that the above information allays their concerns.

References

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