

## Optimal Iodine-131 Dose in Graves' Disease

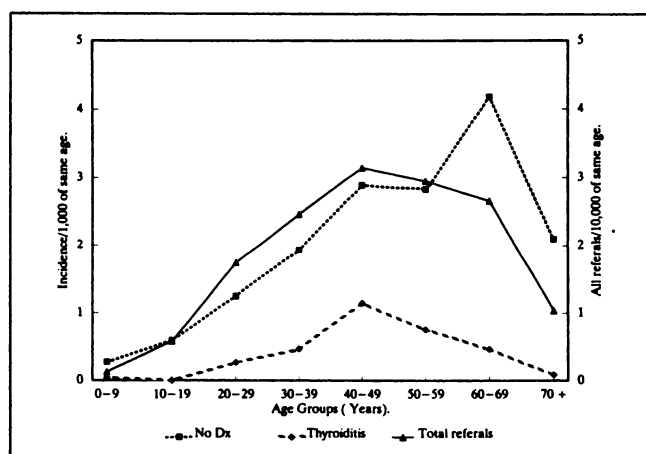
**TO THE EDITOR:** Nordyke and Gilbert (1) propose a compromise between the extreme goals of radioiodine treatment of Graves' disease, which are either to achieve euthyroidism or outright ablation of the gland (i.e., to make the patient hypothyroid without total ablation). To find predictors for this outcome, they analyzed 605 patients treated with fixed activities of  $^{131}\text{I}$  ranging from 3 to 10 mCi (111–370 MBq). Without wishing to enter a discussion of the treatment of Graves' disease, the following plea is made and suggestions are offered apropos of this important and well-referenced study:

1. Nuclear physicians should use the correct term which is "activity" and not a misnomer such as "dose" for an administered amount of radionuclide. In radiobiology, "dose" is reserved for the energy deposited by radioactive decay, called "dose proper" by Nordyke et al. This custom is particularly misleading when looking for predictors of treatment efficacy. The administered activity has little relation to the dose (2,3). This is evident from the large confidence intervals for activities up to 10 mCi (370 MBq) in their Figure 1. Of course it is true that estimates of dose are very approximate. They are, however, improving steadily. Whether they will ever approach the precision of say the measurement of length is very doubtful. Yet, even the yardstick served a purpose in its time. The use of "dose" instead of activity makes the discussion difficult to follow. As the authors have most of the necessary estimates needed for the calculation of the absorbed doses, a reprocessing of the data might be indicated.
2. Due to errors in estimating the size of, uptake in, and residence time in the gland, the absorbed dose is a very rough estimate. This is compounded by uncertainties in microdosimetry through the tissues of the gland. However,

even if the tissue dose were much better known it might not predict correctly the outcome of treatment. What has been termed the "individual radiosensitivity" of the gland, referred to by the authors (1), also has to be taken into account.

3. It is true that most patients with Graves' disease treated with radioiodine sooner or later become hypothyroid as do patients treated surgically. Surveys indicate that hypothyroidism increases with age in the general population probably due to many different causes. After all, the thyroid, like any other organ, must fail sooner or later with increasing age. An unpublished survey of thyroid function of patients in Vancouver referred from 1971 to 1974 to the thyroid unit of Vancouver General Hospital shows that incidence of hypothyroidism of unstated cause increases in both sexes steadily up to age 69 yr when compared per 1,000 to Vancouver's population of the same age. At this period, the population of Vancouver was ethnically more homogeneous. The trend is more striking for women (Fig. 1). The decline after age 70 is probably spurious, since at this age fewer people see a physician because symptoms of hypothyroidism are so similar to those due to aging. However, hypothyroidism due to thyroiditis, including Hashimoto's syndrome, peaks at age 49, especially in females (as does hyperthyroidism of unstated cause—data not shown).
4. Nordyke and Gilbert's paper does not take into account transient hypothyroidism seen quite often following radioiodine treatment of Graves' disease. One year after treatment is probably too short an interval at which to be sure that permanent hypothyroidism has been achieved.
5. We hope that the ample data of this study are being further analyzed by additional statistical methods and that the assumption of linear relations is being tested.

In summary, the debate about the optimal treatment of Graves' disease should continue and this paper (1) is a stimulating contribution to that debate. We wish merely to reflect upon some of the constraints to be considered in designing and reporting future studies.



**FIGURE 1.** Female referrals and incidence of hypothyroidism by age. Thyroid referrals at Vancouver General Hospital 1971–1974.

## REFERENCES

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B. Schober  
P. Cohen  
B. Lentle

Lions Gate Hospital, North Vancouver  
Vancouver General Hospital  
The University of British Columbia  
Vancouver, Canada