THYROID UPTAKE OF $^{131}$I

We among others have experienced a decrease in the normal values for $^{131}$I uptake by the thyroid gland. Halpern and coworkers (1) caution that a lower uptake can result, as indeed it did in their work, when the $^{131}$I is administered by capsule (oral) liquid form. Others have re-evaluated their normal uptake values and attributed the decrease in normal values to an overall increase in dietary iodine (2,3). One of the latter papers cited $^{131}$I in capsules as the form of administration used.

Approximately 2 years ago we, too, re-established normal $^{131}$I uptake values. We used liquid (oral) dosage and found that our normals came to 8–24% uptake at 24 hr and 4–15% at 6 hr. They were down from previous values of 15–45% at 24 hr and 7–23% at 6 hr.

It cannot be too strongly recommended that each laboratory maintain ongoing evaluation of the methods and results under current operating conditions peculiar to its own situation.

THE AUTHORS’ REPLY

The authors could not agree more with Drs. Boyett, Mahler, and Jansen that each institution must establish its own normal range of values. We would also like to suggest that until the question of the variation in uptakes occurring with the different forms of administration of the radiopharmaceuticals is resolved, that one not change from capsule to liquid $^{131}$I (or vice versa) once their laboratory values have been established. We thank Drs. Boyett, Mahler, and Jansen for their communication.

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ADVERSE REACTIONS TO RADIOPHARMACEUTICALS

There was a helpful discussion of adverse reactions to radiopharmaceuticals at the 1973 annual meeting of the Society of Nuclear Medicine in Miami. To continue discussion of the subject we wish to describe the procedure which we have used in the past to deal with this problem.

When a change or worsening of a patient’s condition is observed following the injection of a radiopharmaceutical, all procedures and agents including the radiopharmaceutical should come under suspicion.

The following steps should be taken:

I. Treat the patient if necessary.
II. Begin recording vital signs at frequent intervals.
III. Remove the suspected radiopharmaceutical from further use.
IV. Notify the proper persons that an adverse reaction is suspected.
V. Attempt to establish the probability that the adverse reaction is due to the radiopharmaceutical. If there is sure evidence that the change in the patient’s status is not the radiopharmaceutical, the investigation is dropped. However, so long as it is possible that the radiopharmaceutical is at fault, the investigation continues.

A. The probability that the radiopharmaceutical is at fault increases if:

1. The time sequence of the symptoms are
not those expected in light of the patient's diagnosis.

2. The time sequence and the symptoms are similar to those of other patients who have had adverse reactions to the radiopharmaceutical.

3. Further quality-control tests indicate a possible fault in the radiopharmaceutical.

4. Other patients exhibit similar symptoms. It is often the case that increasing volumes of the radiopharmaceutical are administered as the radioactive tracer decays. In such cases, if there is a progressive increase in symptoms, such as fever, as the volume administered increases, this is strong evidence that the radiopharmaceutical is at fault.

5. The patient’s febrile response follows that expected in a pyrogen reaction. Intravenous pyrogens cause, in man, headache and an elevation in body temperature beginning no sooner than ½-hr postinjection peaking 2–3 hr postinjection. Intrathecal pyrogens in doses too low to cause a reaction when injected intravenously may cause, in man, an elevated temperature peaking 4–8 hr postinjection. Pyrogens may also cause aseptic meningitis which is manifested by an elevation in cerebrospinal fluid cell count, headache, and neck stiffness in addition to fever.

6. The nuclear medicine procedure was the only significant event that might have resulted in an adverse reaction, e.g., the patient has not been started on any new drug regimen.

B. The investigation should include:

1. Interviewing all technicians, nurses, and staff involved with the patient to document the time sequence, symptoms, and possible causes.

2. Identifying the vial which contains the suspected radiopharmaceutical.

3. Instituting any quality-control tests such as pyrogen and sterility tests which seem appropriate.

4. Checking other patients who received the same radiopharmaceutical.

5. Identifying other possible causes of the reaction.

6. Deciding to continue or discontinue the investigation using criteria listed above.

VI. If the radiopharmaceutical remains suspected, the following steps are taken.

A. The manufacturer is notified, giving:

1. the agent, lot number, dose, date of administration

2. sequence of symptoms

3. estimation of probability that the radiopharmaceutical is at fault.

B. The patient's clinical course is monitored over the next few days with accumulation of additional quality-control data and data from the manufacturer.

C. A case report is prepared and reviewed with the physician in charge of the patient and physician in charge of the nuclear medicine clinic.

D. A report is sent to the manufacturer who in turn reports to regulatory agencies, i.e. AEC, and the Food and Drug Administration, and to the Adverse Reaction Registry of the Society of Nuclear Medicine.

We welcome comments and further discussion of this subject.

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COMMENT ON “FRESNEL ZONE PLATE IMAGING IN NUCLEAR MEDICINE”

Barrett and others (1,2) recently proposed a method which permits a considerable increase in collection efficiency and sensitivity of gamma cameras, all other characteristics remaining unchanged. This method roughly consists of spatially coding the gamma beam by a Fresnel zone plate aperture and in decoding the picture by handling it as a hologram. It is very similar in its principle to methods of coding employed in fields as different as radar detection (3), infrared spectrometry (4), neutron diffractometry (5), or x- and gamma-ray astronomy (6). The success of these methods lies in the fact that they permit an increase of the signal without increasing the part of the noise which is independent from the signal (detector noise for instance) and without losing resolution. They thus permit, when the main noise is independent from the signal, a gain in signal-to-noise ratio (SNR) over the classical methods.

When the main noise is linked with signal (photon noise) as in nuclear medicine or in x- and gamma-ray