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A Basic Technique for Evaluation of Regional Thyroid Function with the Nuclear-Chicago Pho/Gamma® Scintillation Camera

Scintiphography, using ¹³¹I iodide and the Pho/Gamma Scintillation Camera, serves as both a primary diagnostic method and as a supplement to rectilinear scanning in the evaluation of thyroid function.

SETTING-UP. The patient is positioned with his thyroid at the appropriate distance (usually about 3 inches) from the aperture of the Pho/Gamma single-pinhole collimator which is directed at the thyroid isthmus. The patient must be positioned to remain stationary during the exposure.

ISOTOPE AND DOSE. Normally, 50 µCi of ¹³¹I iodide is given orally 6 to 24 hours prior to the study. Smaller doses may be used, depending upon radiiodide uptake. The 24-hour uptake is generally twice the 6-hour uptake and therefore permits data accumulation at double the rate. (Note: Thyroid scintiphography may also follow oral or intravenous administration of ⁹⁹mTc pertechnetate to yield higher data densities and good images of small nodules.)

DATA ACCUMULATION. With ¹³¹I iodide, small cold nodules located within thyroid lobes may be defined by data densities as low as 5000 counts in the entire scintiphoto. Better resolution is produced in the image by longer counting times to accumulate an increased number of counts. Extended exposure times may also be necessary to obtain thyroid images in children who are given reduced isotope doses.

CASE HISTORY. The clinical illustrations on the facing page are for a patient with the following case history: Female, 53 years old. Scheduled for mitral-valve surgery. Referred for thyroid evaluation because of atrial fibrillation and recent weight loss. Pertinent physical findings limited to a fine tremor and a 60-gram multinodular thyroid gland. Neck radiiodide uptake was 43% at 24 hours and T₄ was 9.4 µg/dL (normal maximum 8.2 µg/dL). Initially, a rectilinear scan was ordered.

EVALUATION. The rectilinear scan was performed with the focal distance of the collimator carefully adjusted to the level of the thyroid gland. The images thus produced failed to show any clear definition of two discrete palpable nodules, which are shown, as palpated, in outlines superimposed on the images.

The Pho/Gamma scintiphoto study was therefore ordered, following the procedure described above. In the scintiphoto obtained from this study, a definite cold nodule is apparent. It is seen as a large area of decreased labelling laterally in the mid-portion of the more actively functioning tissue in the left lobe. Other areas of decreased labelling are seen in both lobes.

CONCLUSIONS. The Pho/Gamma thyroid-imaging technique illustrated here is most often used as a primary diagnostic method for the determination of regional thyroid function. It may be used as a secondary or supplementary method when rectilinear scanning fails to demonstrate the nature of a clearly palpable nodule. In the latter case, the scintiphoto made with the Pho/Gamma single-pinhole collimator often demonstrates cold nodules, even though they are not apparent on the scan. Pho/Gamma imaging generally requires one-third the time of a rectilinear scan of the same area.

Nuclear Reviews

PHO/GAMMA AT WORK: A DISTILLATION. For convenient reference, we offer a new brochure containing both clinical and phantom studies, plus results of the latest advances in scintillation-camera technology. Profusely illustrated. Properly detailed. Write for it.

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