

# Evidence Discussion (Neck 8.2)

## Hyperthyroidism and Hypothyroidism

- The etiology of thyrotoxicosis is not always apparent in clinical presentation and therefore the use of diagnostic imaging studies is indicated to determine the etiology of hyperthyroidism.
- Thyroid nuclear scans play a central role in thyroid disease evaluation. They provide a planar image of the thyroid gland using a gamma camera to assess potential variability in the concentration of the radioisotope within thyroid tissue and can be combined with measurements of uptake of specific tracers and provide very useful information regarding thyroid pathology and function.
- Imaging with a radioiodine uptake and scan provides a valuable benefit as it can help confirm the cause for thyrotoxicosis and helps to decide the most appropriate treatment, which may vary depending on cause of hyperthyroidism.
- Imaging with a thyroid nuclear scan also has a role in planning therapy with radioactive iodine.
- Radioiodine uptake and scans can distinguish between high-uptake causes of thyrotoxicosis, such as Graves disease, toxic adenoma, and toxic multinodular goiter, and low-uptake causes, such as subacute thyroiditis.
- The scan component is helpful in differentiating between the high-uptake causes that show a focal uptake pattern, such as toxic adenoma or toxic multinodular goiter, and the high uptake causes that show a diffuse uptake pattern such as Graves disease.
- If radioiodine therapy is planned, the uptake component of the scan can then help determine the dose.
- A neck ultrasound is the best imaging study to evaluate thyroid morphology and can be a helpful adjunct study to a radioiodine uptake. Although a Doppler ultrasound may help to distinguish the cause of hyperthyroidism, a radionuclide uptake study is still preferred because it directly measures thyroid activity rather than inferring it based on blood flow.
- When a radioactive uptake scan shows nodules from toxic multinodular goiter or toxic adenoma, a neck ultrasound can confirm presence of nodules and also evaluate for suspicious features of malignancy.
- Though radioactivity exposure exists with the use of radioactive scans, the studies are an invaluable resource when helping to establish the cause of hyperthyroidism and guide treatment; guidelines as to when it is appropriate to order should be followed to avoid unnecessary radiation exposure.
- There is no role for imaging in the workup of hypothyroidism in adults. Imaging for thyroid morphology does not help differentiate among causes of hypothyroidism, and all causes of hypothyroidism will have decreased radioiodine uptake.

## References:

1. Hoang JK, Oldan JD, Mandel SJ, et al. ACR Appropriateness Criteria® Thyroid Disease. *Journal of the American College of Radiology*. 2019;16(5). doi:10.1016/j.jacr.2019.02.004
2. Ross DS, Burch HB, Cooper DS, et al. 2016 American Thyroid Association Guidelines for Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis. *Thyroid*. 2016;26(10):1343-1421. doi:10.1089/thy.2016.0229
3. Donangelo I and Suh SY. Subclinical hyperthyroidism: when to consider treatment. *Am Fam Physician*. 2017 Jun;95(11):710-716