



## HYPERTHYROIDISM

# Quantitative uptake of sestamibi differentiates Type 1 from Type 2 amiodarone-induced thyrotoxicosis

### BACKGROUND

Amiodarone is a medication commonly used to treat patients with irregular heart rhythms. It contains considerable amounts of iodine that is normally used by the thyroid gland to make thyroid hormone. In some patients taking amiodarone, thyrotoxicosis develops, releasing high levels of thyroid hormone into the blood. There are two types of amiodarone-induced thyrotoxicosis. Type 1 occurs in patients with an underlying thyroid condition, such as Graves' disease, and leads to formation of new thyroid hormones. This is treated with antithyroid medications. Type 2 occurs due to a destructive process in the thyroid, leading to leakage of thyroid hormones from the gland. This is treated with steroids. Mixed forms are treated with a combination of these medications.

In order to differentiate the two types of amiodarone-induced thyrotoxicosis and treat them appropriately, a scan using sestamibi can be used. A sestamibi scan uses a tracer that shows good uptake by the thyroid gland in type 1 amiodarone-induced thyrotoxicosis (AIT-1) but almost no uptake in type 2 (AIT-2). If there are components of both types, then a faint but definite uptake can be seen. The aim of this study was to analyze the usefulness of sestamibi in differentiating between the types of amiodarone-induced thyrotoxicosis.

### THE FULL ARTICLE TITLE

Censi S et al 2018 Amiodarone-induced thyrotoxicosis: differential diagnosis using <sup>99m</sup>Tc-sestamibi and target-to-background ratio (TBR). *Clin Nucl Med* 43:655–662. PMID: 30036255.

### SUMMARY OF THE STUDY

The study authors reviewed the records of 30 patients with amiodarone-induced thyrotoxicosis who were followed

by several tests and response to therapy. All patients had thyroid function tests every 15 days during follow up and also had thyroid ultrasounds to estimate thyroid blood flow. Patients also underwent sestamibi scans with calculation of the quantity of tracer uptake by the thyroid in reference to background, resulting in the target-to-background ratio (TBR).

The authors found that according to response to treatment, 14 out of 30 patients had AIT-1, 12 out of 30 had AIT-2 and 4 had mixed forms. Of the 14, 12 AIT-1 patients had clear diffuse uptake of the sestamibi tracer, one had increased uptake in a nodule, and one had minimal uptake, suggesting a mixed form. A total of 6 of the 12 AIT-2 patients had no thyroid uptake and 6 had minimal uptake, suggesting a mixed form. The visual results of the sestamibi scans in the four patients with mixed forms were inconsistent. When comparing the quantitative TBR of the sestamibi scans with the final clinical diagnosis, the authors were able to successfully differentiate patients with AIT-1 from those with AIT-2. However, the method was not reliable for the mixed form.

### WHAT ARE THE IMPLICATIONS OF THIS STUDY?

Amiodarone-induced thyrotoxicosis is often treated with both antithyroid and steroid medications due to either unclear etiology or insufficient time for diagnostic studies to determine the type. This study demonstrates that quantifying the sestamibi uptake using TBR is very helpful in differentiating AIT-1 from AIT-2. This is important for both physicians and patients as early correct diagnosis ensures appropriate treatment and avoids overtreatment.

— Maria Papaleontiou, MD

### ATA THYROID BROCHURE LINKS

Hyperthyroidism (Overactive): <https://www.thyroid.org/hyperthyroidism/>





**HYPERTHYROIDISM, continued**

**ABBREVIATIONS & DEFINITIONS**

**Amiodarone:** an iodine-rich drug that is commonly used for the treatment of irregular heart rhythms. Amiodarone can cause thyroid problems, including both hypothyroidism and hyperthyroidism.

**Hyperthyroidism:** a condition where the thyroid gland is overactive and produces too much thyroid hormone. Hyperthyroidism may be treated with antithyroid meds (Methimazole, Propylthiouracil), radioactive iodine or surgery.

**Amiodarone induced Thyrotoxicosis:** elevated thyroid hormone levels that can occur as a result of excessive iodine from amiodarone resulting in increased thyroid hormone production and secretion or to destruction of thyroid cells with release of thyroid hormone into the blood.

**Sestamibi:** a pharmaceutical agent used in nuclear medicine imaging.

