

**THYROID CANCER****Thyroglobulin measurements and neck ultrasound findings in patients with thyroid cancer after total thyroidectomy****BACKGROUND**

Thyroid cancer has an excellent prognosis due, in part, to very effective treatment options including surgery, thyroid hormone therapy and radioactive iodine therapy. Papillary and follicular thyroid cancer are the most common types of thyroid cancer and are typically treated initially with thyroidectomy followed by thyroid hormone therapy. After thyroid surgery, patients are divided into low, intermediate and high risk groups based on the severity of the thyroid cancer, whether there is any suspicion of persistent cancer, or whether there is a high risk of the cancer recurring. A thyroglobulin blood test (with thyroglobulin antibody) and neck ultrasound are generally performed to re-evaluate the status of the cancer as part of this risk evaluation and to look for any possible persistent cancer or remaining thyroid tissue. Most of the time, patients in the low risk group are simply monitored by ultrasound. Patients in the intermediate and high risk groups are usually selected to be treated with radioactive iodine. Those treated with radioactive iodine typically have a post-treatment whole body scan.

In this study, the authors reviewed the medical records of thyroid cancer patients who had a total thyroidectomy and radioactive iodine treatment, to evaluate the relationship between thyroglobulin levels, neck ultrasound and whole body radioactive iodine scan (performed after radioactive iodine treatment).

**THE FULL ARTICLE TITLE**

Matrone A et al. Postoperative thyroglobulin and neck ultrasound in the risk re-stratification and decision to perform 131I ablation. *J Clin Endocrinol Metab* 2016;Dec 8;jc20162860 [Epub ahead of print].

**SUMMARY OF THE STUDY**

The medical records of 505 low and intermediate risk thyroid cancer patients who were evaluated a few months after total thyroidectomy at the Endocrine Unit of the University Hospital of Pisa (during the years 2010 to 2011) were reviewed. All patients had a total thyroidectomy and underwent radioactive iodine therapy with 30 mCi of radioactive iodine after receiving recombinant

human thyrotropin (rhTSH) preparation. Patients were excluded if they did not receive radioactive iodine (e.g. papillary microcarcinoma without adverse features) or had higher risk thyroid cancer (which was treated with higher dose activities of radioactive iodine). Patients with positive thyroglobulin antibodies (TgAb) (i.e. levels  $\geq 20$  U/ml) were also excluded, since thyroglobulin antibodies interfere with accurate measurement of thyroglobulin.

The study population characteristics were described as follows: 71.9% women, average age 47.4 years, 13.3% had central neck lymph node dissection, 53.9% American Thyroid Association Low Risk disease, 41.6% American Thyroid Association Intermediate Risk disease, 97% had surgery in Pisa. Following total thyroidectomy, the following surgical complication rates were reported: 5.7% temporary post-surgical hypoparathyroidism, 7.9% permanent hypoparathyroidism, 0.4% temporary post-surgical vocal cord injury, 1.4% permanent vocal cord injury. All patients took levothyroxine after total thyroidectomy. Following surgery, but before radioactive iodine treatment, the following percentages of patients were reported for each thyroglobulin measurement category (using a high sensitivity thyroglobulin blood test): 29.7% had thyroglobulin measurement  $< 0.1$  ng/ml (Group A), 56.8% had thyroglobulin measurement 0.1 to 1 ng/ml (Group B), and 13.5% had thyroglobulin measurement  $> 1$  ng/ml (Group C). Of the patients in Group A, 1/150 patients (0.7%) had apparent spread of cancer to the lymph nodes seen on neck ultrasound but not whole body radioactive iodine scan. Of the patients in Group B, 15/285 (5.2%) had apparent spread of cancer to the lymph nodes seen on neck ultrasound, 7 of which were detected only on whole body radioactive iodine scan. In group B, there were 4/285 (1.4%) of patients who had spread of the cancer outside of the neck seen on the whole body radioactive iodine scan. In Group C, 16.2% of patients had spread of cancer to the lymph nodes which were all detected on neck ultrasound.

**WHAT ARE THE IMPLICATIONS OF THIS STUDY?**

The authors concluded that highly sensitive thyroglobu-

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lin measurements and neck ultrasounds performed a few months after total thyroidectomy are useful in re-evaluating risk level (for persistent cancer) in patients with thyroid cancer. This study shows that patient that have a thyroglobulin <1 ng/ml after surgery have a <5% risk of having persistent thyroid cancer, while those with a thyroglobulin <0.1 ng/ml after surgery have a <1% risk of having persistent thyroid cancer. This study adds to the current knowledge of interpretation of sensitive thyroglobulin measurement after total thyroidectomy for thyroid cancer and helps further identify those patients

that will benefit the most with the use of radioactive iodine therapy.

— Anna M. Sawka, MD, PhD

**ATA THYROID BROCHURE LINKS**

Thyroid Cancer (Papillary and Follicular): <http://www.thyroid.org/thyroid-cancer/>

Thyroid Surgery: <http://www.thyroid.org/thyroid-surgery/>

Radioactive Iodine: <http://www.thyroid.org/radioactive-iodine/>

**ABBREVIATIONS & DEFINITIONS**

**Papillary thyroid cancer:** the most common type of thyroid cancer. There are 4 variants of papillary thyroid cancer: classic, follicular, tall-cell and noninvasive follicular thyroid neoplasm with papillary-like nuclear features (NIFTP).

**Thyroidectomy:** surgery to remove the thyroid gland. When the entire thyroid is removed it is termed a total thyroidectomy. When less is removed, such as in removal of a lobe, it is termed a partial thyroidectomy, hemithyroidectomy, or lobectomy

**Hypoparathyroidism:** low calcium levels due to decreased secretion of parathyroid hormone (PTH) from the parathyroid glands next to the thyroid. This can occur as a result of damage to the glands during thyroid surgery and may be temporary, but sometimes it can be permanent. Hypoparathyroidism is generally treated with high dose calcium and vitamin D preparations, often taken multiple times per day.

**Thyroid hormone therapy:** patients with hypothyroidism are most often treated with Levothyroxine in order to return their thyroid hormone levels to normal. Replacement therapy means the goal is a TSH in the normal range and is the usual therapy. Suppressive therapy means that the goal is a TSH below the normal range and is used in thyroid cancer patients to prevent growth of any remaining cancer cells.

**Thyroid Ultrasound:** a common imaging test used to evaluate the structure of the thyroid gland. Ultrasound uses soundwaves to create a picture of the structure of the thyroid gland and accurately identify and

characterize nodules within the thyroid. Ultrasound is also frequently used to guide the needle into a nodule during a thyroid nodule biopsy.

**Thyroglobulin:** a protein made only by thyroid cells, both normal and cancerous. When all normal thyroid tissue is destroyed after radioactive iodine therapy in patients with thyroid cancer, thyroglobulin can be used as a thyroid cancer marker in patients that do not have thyroglobulin antibodies.

**Thyroglobulin antibodies:** these are antibodies that attack the thyroid instead of bacteria and viruses, they are a marker for autoimmune thyroid disease, which is the main underlying cause for hypothyroidism and hyperthyroidism in the United States.

**Radioactive iodine (RAI):** this plays a valuable role in diagnosing and treating thyroid problems since it is taken up only by the thyroid gland. I-131 is the destructive form used to destroy thyroid tissue in the treatment of thyroid cancer and with an overactive thyroid. I-123 is the non-destructive form that does not damage the thyroid and is used in scans to take pictures of the thyroid (Thyroid Scan) or to take pictures of the whole body to look for thyroid cancer (Whole Body Scan).

**mCi:** millicurie, the units used for I-131.

**Post- Radioactive iodine Whole Body Scan (post-RAI WBS):** the scan done after radioactive iodine treatment that identifies what was treated and if there is any evidence of metastatic thyroid cancer.



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**Recombinant human TSH (rhTSH):** human TSH that is produced in the laboratory and used to produce high levels of TSH in patients after an intramuscular injection. This is mainly used in thyroid cancer patients before treating with radioactive iodine or performing a whole body scan. The brand name for rhTSH is Thyrogen™.

**Lymph node:** bean-shaped organ that plays a role in removing what the body considers harmful, such as infections and cancer cells.

