Volume 17 | Issue 1 | January 2024

Clinical Thyroidology® for the Public

AMERICAN THYROID ASSOCIATION
Optimal Thyroid Health for All

Current American Thyroid Association guidelines recommend that women who are treated with levothyroxine for hypothyroidism and planning for pregnancy should have their TSH levels checked before becoming pregnant and to have their levothyroxine dose adjusted to keep TSH below 2.5mIU/L. In general, the levothyroxine dose needs to be increased during pregnancy. This study assessed how many women with known hypothyroidism had TSH levels measured and how many of these women had normal thyroid levels within the year before pregnancy.

Tena Vivó G et al 2023 Description of thyroid disorders the year before conception: A population-based study. Front Endocrinol (Lausanne) **14:**1236505. PMID: 37818089.

Post-surgical hypothyroidism requires thyroid hormone replacement after the procedure for the rest of their lives. Calculation of the dose of the levothyroxine to begin after a thyroidectomy can often be a challenge. This study was done to look at the outcome of thyroid hormone replacement by weight based dosing or a computer assisted algorithm to look for any potential differences in these approaches.

Barrio M et al 2023 Computer-assisted levothyroxine dose selection for the treatment of postoperative hypothyroidism. Thyroid **33:**547–555. PMID: 37084246.

American Thyroid Association guidelines suggest that hyperthyroid patients should have their thyroid levels in the normal range prior to surgery to prevent thyroid storm. However, despite strong recommendations, there is very little clear evidence for this. This study aimed to assess safety and efficacy of thyroidectomy in patients while still in the hyperthyroid state.

Fazendin J et al 2023 Surgical treatment of hyperthyroidism can be performed safely before a euthyroid state is achieved. Thyroid **33:**691–696. PMID: 37253173.

Ultrasound is the best way to evaluate a nodule to determine the risk of cancer and whether a biopsy is needed. Deep learning AI could potentially have a more accurate diagnosis of thyroid nodules and cancer than experienced radiologists when used with important ultrasound characteristics. This multicenter study evaluated the use of a deep learning–based AI model to improve diagnosis of thyroid cancer by ultrasound images and compared the results with evaluation in clinical practice by physicians with different levels of experience.

Ha EJ et al 2023 Artificial intelligence model assisting thyroid nodule diagnosis and management: A multicenter diagnostic study. J Clin Endocrinol Metab. Epub 2023 Aug 25. PMID: 37622451.

One way of treating recurrent thyroid cancer without surgery is to use heat to try and destroy the involved lymph node(s) (thermal ablation). There are three different ways that heat is delivered by the inserted needle: radiowave-based heat (radiofrequency ablation, RFA), microwave-based heat and laser-based heat. The authors of the research described here sought to study the effectiveness and safety of thermal ablation for treatment of recurrent thyroid cancer.

Zhang X et al 2022 Ultrasonography-guided thermal ablation for cervical lymph node metastasis of recurrent papillary thyroid carcinoma: Is it superior to surgical resection? Front Endocrinol (Lausanne) **13:**907195. PMID: 35832431.

TSH levels are opposite to FT4 levels. The authors of this study noticed that when they measured thyroid levels in their hospital, in many patients there was an unexpected pattern: the patients had high FT4 levels even though their TSH levels were normal, not low, as it would be expected. Since they had just started using a new FT4 assay, this study was done to compare the FT4 levels with both the new assay and the old assay to determine what was the cause of these results.

Jansen HI et al 2023 Increased fT4 concentrations in patients using levothyroxine without complete suppression of TSH. Endocr Connect **12(4):**e220538. PMID: 36762702.

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Optimal Thyroid Health for All

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Clinical Thyroidology® for the Public

Editor's Comments

Welcome to another issue of *Clinical Thyroidology for the Public* and Happy New Year!! ! In this journal, we will bring to you the most up-to-date, cutting edge thyroid research. We also provide even faster updates of late-breaking thyroid news through X (previously known as Twitter) at @thyroidfriends and on Facebook. Our goal is to provide patients with the tools to be the most informed thyroid patient in the waiting room. Also check out our friends in the **Alliance for Thyroid Patient Education**. The **Alliance** member groups consist of: the *American Thyroid Association®, Bite Me Cancer, the Graves' Disease and Thyroid Foundation, the Light of Life Foundation, MCT8 – AHDS Foundation, ThyCa: Thyroid Cancer Survivors' Association, Thyroid Cancer Canada, Thyroid Cancer Alliance* and *Thyroid Federation International*.

We invite all of you to join our **Friends of the ATA** community. It is for you that the American Thyroid Association® (ATA®) is dedicated to carrying out our mission of providing reliable thyroid information and resources, clinical practice guidelines for thyroid detection and treatments, resources for connecting you with other patients affected by thyroid conditions, and cutting edge thyroid research as we search for better diagnoses and treatment outcomes for thyroid disease and thyroid cancer. We thank all of the *Friends of the ATA* who support our mission and work throughout the year to support us. We invite you to help keep the ATA® mission strong by choosing to make a donation that suits you — it takes just one moment to give online at: www.thyroid.org/donate and all donations are put to good work. The ATA® is a 501(c)3 nonprofit organization and your gift is tax deductible.

January is Thyroid Awareness Month.

In this issue, the studies ask the following questions:

- Do hypothyroid women need to change their levothyroxine dose during pregnancy?
- What is the best way to determine levothyroxine dose after thyroidectomy?
- Can thyroidectomy be performed safely if a patient is still hyperthyroid?
- Can artificial intelligence assist the diagnosis and management thyroid nodules?
- Is thermal ablation an option for treatment of recurrent thyroid cancer?
- What is the most common cause of an elevated FT4 with a normal TSH?

We welcome your feedback and suggestions. Let us know what you want to see in this publication. I hope you find these summaries interesting and informative.

— Alan P. Farwell, MD

AMERICAN THYROID ASSOCIATION
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Clinical Thyroidology® for the Public

THYROID AND PREGNANCY

Women with hypothyroidism taking levothyroxine may need to be more closely monitored before pregnancy

BACKGROUND

Normal thyroid function during pregnancy is critically important for baby's normal development. Too low thyroid hormone levels in mothers during pregnancy can cause complications in pregnancy and affect baby's body and brain development. Pregnant women without thyroid disease naturally make more thyroid hormone during pregnancy to provide enough for both mother and baby. In women with preexisting hypothyroidism (low thyroid hormone levels) taking levothyroxine before pregnant, the levothyroxine dose generally needs to be increased during pregnancy, usually by 25-30%. Many pregnant patients may not know that they are pregnant until 1-2 missed menstrual periods and early pregnancy is a critical time for baby's development. Therefore, it is important for patients with hypothyroidism planning pregnancy to have normal thyroid levels before becoming pregnant.

Generally, the thyroid stimulating hormone (TSH) level in blood is a good indication of thyroid status. TSH is opposite to thyroid hormone levels (i.e. high TSH level means low thyroid hormone levels and low TSH level means high thyroid hormone levels). The current American Thyroid Association guidelines recommend that women who are treated with levothyroxine for hypothyroidism and planning for pregnancy should have their TSH levels checked before becoming pregnant and to have their levothyroxine dose adjusted to keep TSH below 2.5mIU/L. This study assessed how many women with known hypothyroidism had TSH levels measured and how many of these women had normal thyroid levels within the year before pregnancy.

THE FULL ARTICLE TITLE

Tena Vivó G et al 2023 Description of thyroid disorders the year before conception: A population-based study. Front Endocrinol (Lausanne) **14:**1236505. PMID: 37818089.

SUMMARY OF THE STUDY

A total of 120,763 pregnancies from medical records registry of primary care offices and hospitals of women living in Catalonia, Spain from 2014-2026 was included in the study. Thyroid function test results during the year before pregnancy were reviewed. About 2800 women (~2.4%) had hypothyroidism and were taking levothyroxine before pregnancy. Among these women with known thyroid disease, about 77% had a thyroid level measured in the year before pregnancy. Of these women with known hypothyroidism and available thyroid levels, 42% had TSH levels less than 2.5mIU/L (ideal) and 32% had TSH above normal range, indicating lower than recommended thyroid hormone levels.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

In a large group of pregnant women in Catalonia region of Spain, almost a quarter of women with history of hypothyroidism taking levothyroxine did not have thyroid level results available in the year before pregnancy. Among those who had TSH levels available, only 42% had TSH level in a good range for pregnancy. These findings are an important reminder that monitoring and care of women with hypothyroidism planning pregnancy can be much improved. Clinicians as well as patients should be aware of the importance of normal thyroid function and current recommendation regarding thyroid function monitoring before pregnancy.

— Sun Y. Lee, MD, MSc

THYROID AND PREGNANCY, continued

ATA THYROID BROCHURE LINKS

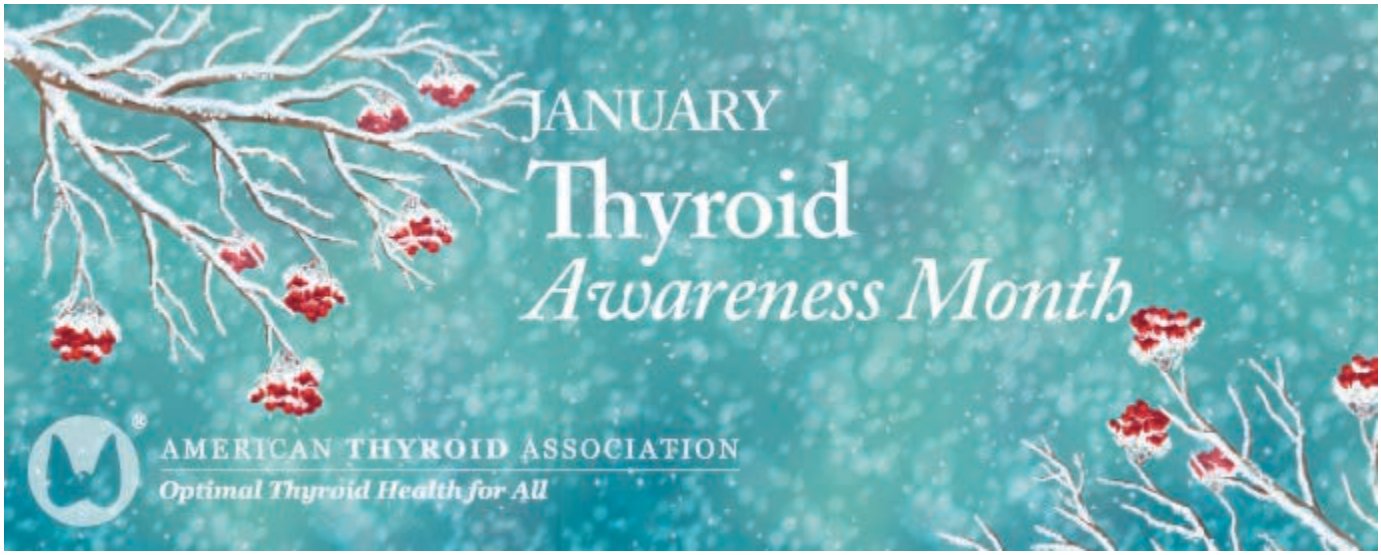
Thyroid Disease in Pregnancy: https://www.thyroid.org/thyroid-disease-pregnancy/
Hyperthyroidism (Overactive): https://www.thyroid.org/hyperthyroidism/
Thyroid Function Tests: https://www.thyroid.org/thyroid-function-tests/

ABBREVIATIONS & DEFINITIONS

Hypothyroidism: a condition where the thyroid gland is underactive and doesn't produce enough thyroid hormone. Treatment requires taking thyroid hormone pills.

TSH: thyroid stimulating hormone — produced by the pituitary gland that regulates thyroid function; also the best screening test to determine if the thyroid is functioning normally.

Levothyroxine (T4): the major hormone produced by the thyroid gland and available in pill form as Synthroid™, Levoxyl™, Tyrosint™ and generic preparations.



AMERICAN THYROID ASSOCIATION
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Clinical Thyroidology® for the Public

HYPOTHYROIDISM

Thyroid hormone dosing after thyroid surgery: Is there a better way?

BACKGROUND

Thyroid surgery (thyroidectomy) is a common procedure done for cancer as well as benign conditions (nodules, hyperthyroidism, etc). The main byproduct of a thyroidectomy is hypothyroidism, as the thyroid gland gland been removed. Post-surgical hypothyroidism requires thyroid hormone replacement (levothyroxine) after the procedure for the rest of their lives. They may or may not have been on thyroid hormone previously. Calculation of the dose of the levothyroxine to begin after a thyroidectomy can often be a challenge. Frequently, the dose is based on the person's weight. However, this may be inaccurate.

This study was done to look at the outcome of thyroid hormone replacement in the post-operative period. Either a weight based dosing or a computer assisted algorithm was utilized. The goal of the study was to look for any potential differences in these approaches.

THE FULL ARTICLE TITLE

Barrio M et al 2023 Computer-assisted levothyroxine dose selection for the treatment of postoperative hypothyroidism. Thyroid **33:**547–555. PMID: 37084246.

SUMMARY OF THE STUDY

The authors of the study reviewed ~3000 medical records. Of these, ~900 met criteria for inclusion in the study.

Patients either had a total thyroidectomy or a completion thyroidectomy (a second surgery done after an initial partial removal of the thyroid). Most patients were female and a majority had a diagnosis of thyroid cancer.

Dosing of the thyroid hormone based on the person's weight was accurate approximately 30% of the time. Using the computer assisted dose calculation, the accuracy was 40 to 47%. Patients with obesity and benign thyroid disease and low risk thyroid cancer were more likely to be started on a dose that was too high. On the other hand, women who were on estrogen containing medications as well as men were more often likely to be started on a dose that was too low.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

Computer assisted dose calculation of the thyroid hormone dosing can improve the accuracy of the levothyroxine dose calculation following a thyroidectomy procedure. However, other factors such as body weight, other medications and gender also play a role in the response to thyroid hormone therapy after the surgery. It is important to acknowledge and understand these differences so that the need for repeated dose adjustments can be minimized.

—Vibhavasu Sharma, MD, FACE

ATA THYROID BROCHURE LINKS

Thyroid Surgery: https://www.thyroid.org/thyroid-surgery/

Thyroid Hormone Treatment: https://www.thyroid.org/thyroid-hormone-treatment/

Hypothyroidism (Underactive): https://www.thyroid.org/hypothyroidism/

HYPOTHYROIDISM, continued

ABBREVIATIONS & DEFINITIONS

Thyroidectomy: surgery to remove the entire 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.

Completion thyroidectomy: surgery to remove the remaining thyroid lobe in thyroid cancer patients who initially had a lobectomy.

Hypothyroidism: a condition where the thyroid gland is underactive and doesn't produce enough thyroid hormone. Treatment requires taking thyroid hormone pills.

Levothyroxine (T4): the major hormone produced by the thyroid gland and available in pill form as Synthroid™, Levoxyl™, Tyrosint™ and generic preparations.

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HYPERTHYROIDISM

Can thyroidectomy be performed safely before a euthyroid state is achieved?

BACKGROUND

Hyperthyroidism, or overactive thyroid, is a condition where the thyroid is producing too much thyroid hormone. The most common cause of hyperthyroidism in the United States is Graves' disease followed by toxic, or overactive, thyroid nodules. Symptoms of hyperthyroidism can range from relatively minor with a mild tremor, insomnia and anxiety, to moderate with severe palpitations and irregular heart rhythms and significant weight loss to the most extreme cases with thyroid storm, which can be fatal. Treatment options include antithyroid medications, radioactive iodine therapy and surgery. Surgery with removal of the entire thyroid (thyroidectomy) is usually pursued when patients have large goiters with compressive symptoms or have a contraindication to medical therapy or radioactive iodine treatment. American Thyroid Association guidelines suggest that patients should have their thyroid levels in the normal range with antithyroid medications prior to surgery to prevent thyroid storm. However, despite strong recommendations, there is very little clear evidence for this. This study aimed to assess safety and efficacy of thyroidectomy in patients while still in the hyperthyroid state.

THE FULL ARTICLE TITLE

Fazendin J et al 2023 Surgical treatment of hyperthyroidism can be performed safely before a euthyroid state is achieved. Thyroid **33:**691–696. PMID: 37253173.

SUMMARY OF THE STUDY

This was a study of adult patients with hyperthyroidism who underwent thyroidectomy from December 2015 to November 2022 at an academic medical center in the United States. These patients were divided into two groups: those with controlled and those with uncontrolled hyperthyroidism (defined as serum triiodothyronine [T3] or thyroxine [T4] higher than the assay's upper limit of normal immediately before surgery). Four high-volume endocrine surgeons performed the surgeries. Outcomes included temporary and permanent hypocalcemia, defined as serum calcium <8.4 mg/dl, temporary and permanent hoarseness, the need for urgent re-operation due to bleeding, and thyroid storm.

The study included 275 subjects; 67.9% of the subjects had hyperthyroidism due to Graves' disease and 32.1% had a toxic nodule. The majority of patients underwent surgery for persistent symptoms (91.8% and 77.3% in the controlled and uncontrolled groups, respectively), while smaller proportions were referred for surgery owing to a reaction to medication (6% and 12.1%), thyroid storm (6.4% and 1.5%), or allergy to medication (4.3% and 0.7%). Out of 275 patients, about half (51.3%) had uncontrolled hyperthyroidism at the time of surgery.

Patients with uncontrolled hyperthyroidism were more likely to have Graves' disease (85.1% vs. 67.9%) and to have taken antithyroid medications prior to surgery (2.3% vs. 1.4%) than patients with normal thyroid function. Most notably, none of the patients in either of the groups progressed to thyroid storm during the perioperative period. Notably though, 6.4% of the patients in the uncontrolled group had thyroid storm prior to surgery. As compared to those with uncontrolled hyperthyroidism, controlled patients had shorter operative times, decreased estimated blood loss and less temporary hypocalcemia. Clinical outcomes, including incidence of permanent hypocalcemia, temporary hoarseness, and permanent hoarseness, were similar in the two groups.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

In this study performed at a high-surgical-volume academic center, thyroidectomy during the hyperthyroid state did not precipitate thyroid storm or worsen clinical outcomes. This study shows that thyroid surgery while a patient is still

HYPERTHYROIDISM, continued

hyperthyroid can be done safely. The main caveat is that the surgery in this study was performed by an experienced, high-volume thyroid surgeon. Overall, it is preferable for a patient to have normal thyroid levels prior to surgery, but this may be not possible for a variety of reasons. This study shows that such surgery can be safely.

— Alan P. Farwell, MD

ATA THYROID BROCHURE LINKS

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

Graves' Disease: https://www.thyroid.org/graves-disease/

Thyroid Surgery: https://www.thyroid.org/thyroid-surgery/

ABBREVIATIONS & DEFINITIONS

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.

Graves' disease: the most common cause of hyperthyroidism in the United States. It is caused by antibodies that attack the thyroid and turn it on.

Thyroidectomy: surgery to remove the entire 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*.

Hypocalcemia: low calcium levels in the blood, a complication from thyroid surgery that is usually short-term and relatively easily treated with calcium pills. If left untreated, low calcium may be associated with muscle twitching or cramping and, if severe, can cause seizures and/or heart problems.

AMERICAN THYROID ASSOCIATION
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Clinical Thyroidology® for the Public

THYROID NODULES

Can artificial intelligence assist the diagnosis and management thyroid nodules?

BACKGROUND

Thyroid nodules are very common in the general population. However, only 5-10% of all thyroid nodules are cancerous. Overall, thyroid cancer has an excellent prognosis. Many small (<1 cm) nodules are at very low risk and may not even need to be removed. Since thyroid nodules are commonly found, it can lead to overdiagnosis and overtreatment of thyroid cancer. Ultrasound is the best way to evaluate a nodule to determine the risk of cancer and whether a biopsy is needed. To avoid unnecessary thyroid nodule biopsy and increase accuracy for diagnosis of cancer, some methods have been developed to classify nodules based on the ultrasound findings, such as the Thyroid Imaging Reporting and Data System (TI-RADS) and the American Thyroid Association Risk Assessment.

Artificial intelligence (AI) is being tested out in a variety of medical conditions to assist in decision making. Deep learning is a subgroup of AI that could potentially have a more accurate or comparable diagnosis of thyroid nodules and cancer than experienced radiologists when used with important ultrasound characteristics. This multicenter study evaluated the use of a deep learning–based AI model to improve diagnosis of thyroid cancer by ultrasound images and compared the results with evaluation in clinical practice by physicians with different levels of experience.

THE FULL ARTICLE TITLE

Ha EJ et al 2023 Artificial intelligence model assisting thyroid nodule diagnosis and management: A multicenter diagnostic study. J Clin Endocrinol Metab. Epub 2023 Aug 25. PMID: 37622451.

SUMMARY OF THE STUDY

A total of 19,711 thyroid ultrasound images were obtained from 6163 consecutive patients with 7178 thyroid nodules from an academic hospital collected between July 2015 and May 2019. The inclusion criteria were being over 18 years of age with thyroid nodules ≥5 mm on ultrasound and available surgical specimens that were used to confirm if nodule was cancerous or non-cancerous. Types of thyroid cancer included were papillary thyroid carcinomas, follicular carcinomas, and medullary carcinomas. A total of 17 different deep-learning algorithms were used and tested to differentiate cancerous and non-cancerous thyroid nodules. Two data sets from Ajou University Medical Center in Suwon, Korea were used, test set 1 from June to September 2015 and test set 2 from June 2020 and May 2021.

A diagnostic performance of deep-learning AI-based models achieved a sensitivity of 87% (the likelihood that a diagnosis of cancer is indeed cancer at surgery) and a specificity of 81.5% (the likelihood that a diagnosis of a benign nodule is indeed benign at surgery). In comparison, the average of 6 radiologists with different levels of expertise was a sensitivity of 82.3% and a specificity of 79.2%.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

These data suggest that a deep-learning AI algorithm of thyroid ultrasound images can improve accuracy of diagnosis for thyroid cancer and assist physicians with different levels of experience. Therefore, AI may be an important tool in the diagnosis of thyroid cancer in clinic practice, by providing accuracy and minimizing errors.

— Joanna Miragaya. MD

THYROID NODULES, continued

ATA THYROID BROCHURE LINKS

Thyroid Cancer (Papillary and Follicular): https://www.thyroid.org/thyroid-cancer/

Thyroid Nodules: https://www.thyroid.org/thyroid-nodules/

ABBREVIATIONS & DEFINITIONS

Thyroid nodule: an abnormal growth of thyroid cells that forms a lump within the thyroid. While most thyroid nodules are non-cancerous (Benign), ~5% are cancerous.

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.

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).

Follicular thyroid cancer: the second most common type of thyroid cancer.

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THYROID CANCER

Thermal ablation for treatment of recurrent papillary thyroid cancer

BACKGROUND

Cancer can sometimes develop in the thyroid gland, a butterfly-shaped organ located in the front of the neck that produces thyroid hormone. The most common kind of thyroid cancer is called papillary cancer and, if this cancer is not identified and surgically removed, it can spread out of the thyroid, usually to lymph nodes that sit next to the thyroid gland in the neck. Surgery to remove the thyroid gland, and the surrounding lymph nodes, is then needed to treat this problem. People for whom this surgery is performed are then monitored over time because thyroid cancer can sometimes come back, usually in one or more new lymph nodes in the neck. This is called recurrent thyroid cancer and it happens in 20-30% of people who are initially treated with surgery for thyroid cancer. When this happens, the new cancerous neck lymph node(s) are usually removed with more surgery. Additional surgery like this, however, has a relatively high risk of complications, because the area of the neck involved is usually scarred and distorted as a result of healing from the first surgery. This means that the chances of damaging normal neck structures (nerves, blood vessels, parathyroid glands, the windpipe, etc.) while removing these new cancerous lymph node(s) is higher than during the first surgery. In addition, some people who develop recurrent thyroid cancer may have other significant health problems (such as severe heart or lung disease) that make more surgery dangerous. For these reasons, new ways of treating recurrent thyroid cancer that do not involve surgery are currently being tested.

One way of treating recurrent thyroid cancer without surgery is to use heat to try and destroy the involved lymph node(s) (thermal ablation). This is done by inserting a fine needle through the skin into cancerous lymph node(s). The tip of this needle then delivers heat to the lymph node, burning the lymph node from the inside out and, as a result, hopefully destroying the cancer cells inside the node. There are three different ways that heat is delivered by the inserted needle: radiowave-based heat (radiofrequency ablation, RFA), microwave-based heat and laser-based heat. The authors of the research described here sought to study the effectiveness and safety of thermal ablation for treatment of recurrent thyroid cancer.

FULL ARTICLE TITLE

Zhang X et al 2022 Ultrasonography-guided thermal ablation for cervical lymph node metastasis of recurrent papillary thyroid carcinoma: Is it superior to surgical resection? Front Endocrinol (Lausanne) **13:**907195. PMID: 35832431.

SUMMARY OF THE STUDY

The authors of this work searched current medical databases for previously published studies that examined thermal ablation for treatment of recurrent thyroid cancer in people older than 18 years. They were able to identify 18 different studies that evaluated this treatment method, 10 using radiofrequency ablation, 4 using microwave ablation and 4 using laser ablation. For the combined studies, the authors used statistical testing to look at the effectiveness and safety of thermal ablation, as measured by how much smaller treated lymph nodes became after thermal ablation (volume reduction rate), the extent to which blood markers for thyroid cancer (thyroglobulin) decreased after thermal ablation and complications that happened because of thermal ablation.

In terms of volume reduction, they found that treated lymph nodes become significantly smaller, with an average volume reduction rate of 88.4%. For thyroglobulin levels, the authors identified a significant decrease in these levels after thermal ablation of cancerous lymph nodes. Finally, 5% of people included in this study experienced a complication related to thermal ablation treatment. Voice changes related to nerve injury were the most common complications identified, occurring in 6.23% of people undergoing thermal ablation, and were particularly

THYROID CANCER, continued

associated with thermal ablation done for lymph nodes in the center area of the neck (where the nerves that control the vocal cords are located).

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

The authors found that thermal ablation, by either RFA, microwave or laser, appears to be an effective alternative to surgical removal for treatment of recurrent thyroid cancer, at least in the short term, among people who choose not to undergo, or are not able to safely undergo, surgery. The study investigators did identify a risk of complications that can happen during thermal ablation, with the most common of these being temporary or even permanent voice changes resulting from injury to the nerves that control the vocal cords. Overall, these risks were found to be relatively low, suggesting that thermal ablation a reasonable option when surgery is not feasible for the treatment of recurrent thyroid cancer.

— Jason D. Prescott, MD PhD

ATA THYROID BROCHURE LINKS

Thyroid Cancer (Papillary and Follicular): https://www.thyroid.org/thyroid-cancer/

Thyroid Surgery: https://www.thyroid.org/thyroid-surgery/

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 entire 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*.

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

Cancer recurrence: this occurs when the cancer comes back after an initial treatment that was successful in destroying all detectable cancer at some point.

Thermal ablation: using heat delivered by a needle to destroy abnormal tissue or lymph nodes containing cancer. There are 3 types of thermal ablation: radiowave-based heat (radiofrequency ablation, RFA), microwave-based heat and laser-based heat.

AMERICAN THYROID ASSOCIATION
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Clinical Thyroidology® for the Public

HYPOTHYROIDISM

Increased FT4 and incompletely suppressed TSH levels are mainly related to levothyroxine use

BACKGROUND

Thyroid stimulating hormone (TSH) is a pituitary hormone that binds to the thyroid gland, helping it grow and produce thyroid hormones. The main thyroid hormone is thyroxine and is often measured as free thyroxine (FT4). TSH levels are opposite to FT4 levels. When the thyroid is underactive and FT4 levels are low, TSH levels go up. When the thyroid is overactive and FT4 levels are high, TSH levels go down. Patients taking levothyroxine for underactive thyroid have their TSH levels monitored to make sure that their levothyroxine dose is not too much or too little. If the TSH is either low or high, FT4 levels are usually measured next.

The authors of this study noticed that when they measured thyroid levels in their hospital, in many patients there was an unexpected pattern: the patients had high FT4 levels even though their TSH levels were normal, not low, as it would be expected. Since they had just started using a new FT4 assay, this study was done to compare the FT4 levels with both the new assay and the old assay to determine what was the cause of these results.

THE FULL ARTICLE

Jansen HI et al 2023 Increased fT4 concentrations in patients using levothyroxine without complete suppression of TSH. Endocr Connect **12(4):**e220538. PMID: 36762702.

SUMMARY OF THE STUDY

The authors studied blood samples from 50 healthy volunteers. They used two different assays to measure the hormones. They also looked at results of TSH and FT4 in over 3000 patients and compared the results obtained with new and old assays. They also looked at those patients with high Ft4 with normal TSH levels to see if they were taking thyroid medication.

The results of the testing showed that the new normal ranges were consistent with the prior normal ranges and the old and new FT4 assays gave similar results. There were slightly more results with high FT4 and normal TSH levels with the new assay (4,4% vs 2.3%). Interestingly, up to about 80% of the results with high FT4 and normal TSH levels were seen in patients taking levothyroxine.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

These data show that 2-4% of individuals will have an increased FT4 and normal TSH and that ~80% of these results will be obtained in patients currently taking levothyroxine. Measuring just TSH for the monitoring of thyroid levels in patients taking levothyroxine may be more useful of the TSH level returns in the normal range. However, if the TSH returns abnormal (either high or low), a FT4 level can be helpful.

— Susana Ebner MD

ATA THYROID BROCHURE LINKS

Thyroid Hormone Treatment: https://www.thyroid.org/thyroid-hormone-treatment/
Hypothyroidism (Underactive): https://www.thyroid.org/hypothyroidism/
Thyroid Function Tests: https://www.thyroid.org/thyroid-function-tests/

HYPOTHYROIDISM, continued

ABBREVIATIONS & DEFINITIONS

Hypothyroidism: a condition where the thyroid gland is underactive and doesn't produce enough thyroid hormone. Treatment requires taking thyroid hormone pills.

Levothyroxine (T4): the major hormone produced by the thyroid gland and available in pill form as Synthroid™, Levoxyl™, Tyrosint™ and generic preparations.

Thyroxine (T4): the major hormone produced by the thyroid gland. T4 gets converted to the active hormone T3 in various tissues in the body.

Thyroid stimulating hormone (TSH): produced by the pituitary gland that regulates thyroid function; also the best screening test to determine if the thyroid is functioning normally.

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Clinical Thyroidology® for the Public

ATA® Alliance for Thyroid Patient Education

GOAL The goal of our organizations is to provide accurate and reliable information for patients about the diagnosis, evaluation and treatment of thyroid diseases. We look forward to future collaborations and continuing to work together toward the improvement of thyroid education and resources for patients.

ATA®
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Graves' Disease & Thyroid Foundation

ThyCa: Thyroid Cancer Survivors' Association, Inc.
www.thyca.org

Light of Life Foundation
checkyourneck.com

Bite Me Cancer

MCT8 - AHDS Foundation

Thyroid Cancer Alliance

Thyroid Cancer Canada
Cancer de la thyroïde Canada

Thyroid Federation International

American Thyroid Association®
www.thyroid.org
ATA® Patient Resources:
www.thyroid.org/thyroid-information/
Find a Thyroid Specialist: www.thyroid.org
(Toll-free): 1-800-THYROID
thyroid@thyroid.org

Bite Me Cancer
www.bitemecancer.org
info@bitemecancer.org

Graves' Disease and Thyroid Foundation
www.gdatf.org
(Toll-free): 877-643-3123
info@ngdf.org

Light of Life Foundation
www.checkyourneck.com
info@checkyourneck.com

MCT8 – AHDS Foundation
mct8.info
Contact@mct8.info

Thyca: Thyroid Cancer Survivors' Association, Inc.
www.thyca.org
(Toll-free): 877-588-7904
thyca@thyca.org

Thyroid Cancer Alliance
www.thyroidcanceralliance.org
www.thyroidcancerpatientinfo.org
Rotterdam, The Netherlands

Thyroid Cancer Canada
www.thyroidcancercanada.org
416-487-8267
info@thyroidcancercanada.org

Thyroid Federation International
www.thyroid-fed.org
tfi@thyroid-fed.org

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