AMERICAN THYROID ASSOCIATION
Optimal Thyroid Health for All

Clinical Thyroidology® for the Public

VOLUME 12 | ISSUE 11 | NOVEMBER 2019

AMERICAN THYROID ASSOCIATION
ATA | Founded 1923

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EDITOR'S COMMENTS

Welcome to another issue of *Clinical Thyroidology for the Public*. 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 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*.

The American Thyroid Association (ATA) extends its appreciation to all of the patients and their families that are part of the ATA community — our **Friends of the ATA**. It is for you that the 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.

November is Hyperthyroidism Awareness Month.

In this issue, the studies ask the following questions:

- Does the treatment option of Graves' disease affect survival?
- Do clotting factors play a role in the association between high thyroid levels and heart disease?
- Is tocilizmab an effective treatment for Graves' eye disease?
- Is Hashimoto's thyroiditis a risk factor for thyroid cancer?
- Do thyroid cancer survivors with good outcomes continue to worry about their cancer?
- Does thyroid hormone treatment affect metabolism?

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, FACE

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GRAVES' DISEASE

Early and effective control of Graves' disease is associated with improved survival regardless of treatment method

BACKGROUND

Graves' disease is the most common cause of hyperthyroidism in the United States. It is an autoimmune disease where the immune system produces an antibody that attacks the thyroid and turns it on. Treatment options for Graves' disease include antithyroid medications (methimazole, PTU), radioactive iodine therapy and surgery. Some studies suggest that patients with Graves' disease have an increased risk of death, mainly due to cardiac disease. While all 3 of these options are routinely recommended, it is unclear if any of them affect the risk from of heart disease or improve survival in patients with Graves' disease.

The goal of the study was to look at the effect of treatment of Graves' disease on heart disease and to understand whether the choice of therapy affects the survival in a large group of patients.

FULL JOURNAL TITLE

Okosieme OE et al 2019 Primary therapy of Graves' disease and cardiovascular morbidity and mortality: a linked-record cohort study. Lancet Diabetes Endocrinol 7:278–287. PMID: 30827829.

SUMMARY OF THE STUDY

A total of 4189 patients diagnosed with Graves' disease between January 1, 1998, and December 31, 2013, were identified from a registry in South Wales, United Kingdom, and were included in this study. The treatment groups were: (i) antithyroid drug, (ii) radioactive iodine with resolved hyperthyroidism (RAI group A), and (iii) radioactive iodine with unresolved hyperthyroidism (RAI group B). Control of hyperthyroidism was defined as the initiation of levothyroxine therapy, TSH concentration above the reference limit, or persistent normal TSH (>6 months), each without antithyroid drug use. The outcomes studies included death or heart disease (myocardial infarction, heart failure, stroke) one year after diagnosis.

Overall, patients had an increased all-cause mortality as compared with individuals without Grave' disease. Mortality and the number of adverse heart problems was lower in patients in RAI group A than in the patients in the antithyroid drug group, but not for those in RAI group B. Persistently low TSH concentrations at 1 year after treatment were associated with increased mortality independent of treatment method.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

This study confirms prior studies indicating an increased risk of death in patients with Graves' disease. In general, patients who received radioactive iodine therapy resulting in resolution of the hyperthyroidism had the best survival, while a persistent low TSH was associated with an increased risk of death regardless of the treatment option. This is an important study and highlights the need to effectively treat patients with Graves' disease to return thyroid blood levels to normal. It is important for the patients to discuss their diagnosis and treatment options with their doctor prior to starting therapy and during follow up to ensure treatment is successful.

—Vibhavasu Sharma, MD, FACE

ATA THYROID BROCHURE LINKS

Graves' Disease: https://www.thyroid.org/graves-disease/
Hyperthyroidism (Overactive): https://www.thyroid.org/hyperthyroidism/
Radioactive Iodine: https://www.thyroid.org/radioactive-iodine/
Thyroid Surgery: https://www.thyroid.org/thyroid-surgery/

GRAVES' DISEASE, continued

ABBREVIATIONS & DEFINITIONS

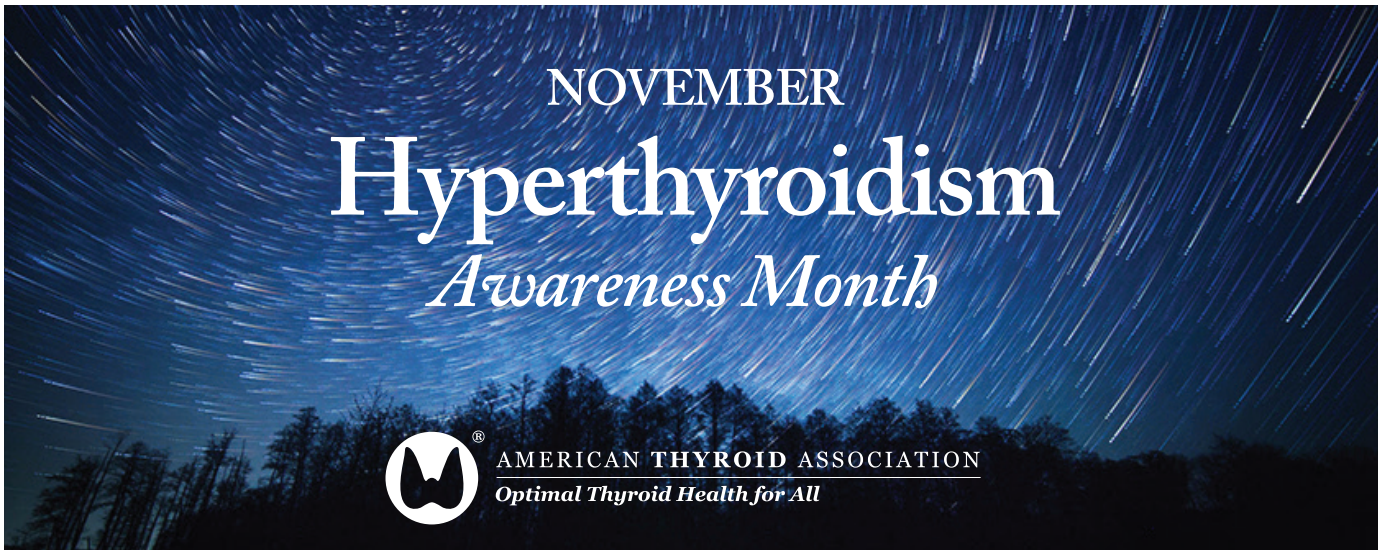
Autoimmune thyroid disease: a group of disorders that are caused by antibodies that get confused and attack the thyroid. These antibodies can either turn on the thyroid (Graves' disease, hyperthyroidism) or turn it off (Hashimoto's thyroiditis, hypothyroidism).

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.

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.

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.



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THYROID AND THE HEART

High levels of some clotting factors may explain the association between high free T_4 and cardiovascular disease

BACKGROUND

Thyroid hormone has major effects on the heart. It is well known that changes in thyroid hormone levels affect heart rate, heart muscle contractions and heart rhythms. Previous studies have shown that high and high-normal thyroid hormone levels are independently associated with increased risk of heart disease and death in middle-aged and older adults. However, the mechanisms by which this occurs are complex and not completely understood. This study examined whether certain clotting factors, such as von Willenbrand factor, ADAMTS13 and fibrinogen, play a role in the association of thyroid function with heart events and death.

THE FULL ARTICLE TITLE

Bano A et al 2019 Thyroid function and cardiovascular disease: the mediating role of coagulation factors. J Clin Endocrinol Metab 104:3203–3212. PMID: 30938758.

SUMMARY OF THE STUDY

The study included 5,918 adults aged 55 years and older selected from the Rotterdam Study, a population-based study in the Netherlands. Eligible participants included those with serum thyroid function measurements, coagulation data, and complete information on prevalent cardiovascular events and death. Cardiovascular events included heart attack, other heart disease, stroke and death.

The average age of the participants was 69.1 years and 56.7% were women. Higher free T_4 levels were associated with higher von Willenbrand factor levels, lower ADAMTS13 activity and higher fibrinogen levels, indicating a higher likelihood of clotting. These associations occurred independent of traditional heart risk factors, such as high blood pressure and smoking. Additionally, the study showed that von Willenbrand factor and fibrinogen could explain up to 10% of the association between the higher free T_4 levels and heart events.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

This study is important as it highlights possible new mechanisms that explain thyroid hormone action on the heart. Physicians should be aware of the possible relationship between thyroid hormones and the coagulation system, even though it remains unclear how to use these findings in the real-world setting. In the future, these results may be useful in determining the overall risk profile for patients' risk of heart disease.

— Maria Papaleontiou, MD

ATA THYROID BROCHURE LINKS

Thyroid Function Tests: https://www.thyroid.org/thyroid-function-tests/

ABBREVIATIONS & DEFINITIONS

Clotting factors: proteins in the blood that control bleeding. Von Willenbrand factor, fibrinogen and ADAMTS13 activity are examples of clotting factors.

Thyroxine (T_4): the major hormone produced by the thyroid gland. T_4 gets converted to the active hormone T_3 in various tissues in the body.

Coagulation system: composed of cells, proteins and processes that regulate blood clotting.

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HYPERTHYROIDISM

Tocilizumab treatment for Graves' eye disease

BACKGROUND

Graves' eye disease (also called Graves' ophthalmopathy or orbitopathy or thyroid eye disease) is a condition associated with the autoimmune hyperthyroid disorder known as Graves' disease. The inflammation in Graves' disease can affect the eyes in patients and can cause symptoms ranging from mild eye irritation to severe eye bulging and double vision. In severe cases, it can be associated with loss of sight. Severe Graves' disease often leads to eye surgery to correct the bulging and/or double vision. Medical treatment options are limited. High dose corticosteroids alone or in combination with radiation treatments can be used to treat moderate to severe Graves' eye disease, but are associated with significant adverse health effects. Side effects of corticosteroids, particularly the higher doses used in this condition, include weight gain, elevated blood glucose or diabetes, high blood pressure, difficulty sleeping and mood changes. Therefore, researchers have sought to find alternative treatments. Cells surrounding the eye (orbital fibroblasts) secrete an inflamatory protein named interleukin-6 (IL-6) which is thought to be involved the development of Graves' eye disease. In this study, the investigators researched whether interfering with the function of this protein using an antibody against IL-6 would improve eye symptoms in patients with Graves' eye disease.

THE FULL ARTICLE TITLE:

Perez-Moreiras JV et al 2018 Efficacy of tocilizumab in patients with moderate-to-severe corticosteroid-resistant graves orbitopathy: a randomized clinical trial. Am J Ophthalmol 195:181–190. Epub 2018 Aug 4. PMID: 30081019.

SUMMARY OF THE STUDY:

These investigators recruited 32 patients with moderate to severe Graves' eye disease that had not previously responded to corticosteroid treatment from 10 medical centers in Spain. Patients were randomized to receive either placebo or the IL-6 receptor monoclonal antibody tocilizumab. Patients received either tocilizumab or placebo intravenously every 4 weeks for a total of 12 weeks and then were followed for improvement in eye symptoms for 28 weeks. A 10-point clinical activity score (CAS) was the primary method used to rate patient eye symptoms. The CAS measured a number of different eye symptoms including eye pain, redness, swelling, impairment in eye movements, bulging of eyes and vision. Patients also filled out questionnaires to evaluate their eye pain and quality of life. The primary outcome was the percentage of patients that had an improvement of 2 or more points in their CAS assessment.

More patients receiving tocilizumab (93.3%) compared to the placebo (58.8%) group demonstrated a 2 or more point improvement in CAS. Other tests of eye disease symptoms also showed more improvement in the tocilizumab treated patients compared to placebo. Tocilizumab was associated with significantly more adverse effects than the placebo. A total of 93 adverse events were reported in 27 patients, only 2 events (abnormal liver test and kidney infection) were considered serious and both of these occurred in patients treated with tocilizumab. At the study conclusion (40 weeks), significantly more patients treated with tocilizumab (80%) experienced greater than 1 adverse event than patients treated with placebo (41%) but none of the participants withdrew from the study due to an adverse event.

WHAT ARE THE IMPLICATIONS OF THE STUDY?

This study provides clinical experience with a potentially promising new medication for the treatment of moderate to severe Graves' eye disease in patients who do not respond to first line therapy with corticosteroids. Tocilizumab treatment was more effective than placebo in improving eye symptoms in patients with difficult to treat Graves' eye disease. Future studies in larger groups of patients are needed to confirm these findings.

—Whitney Woodmansee MD

HYPERTHYROIDISM, continued

ATA THYROID BROCHURE LINKS

Graves' Disease: https://www.thyroid.org/graves-disease/
Graves' Eye Disease: https://www.thyroid.org/graves-eye-disease/
Hyperthyroidism (Overactive): https://www.thyroid.org/hyperthyroidism/

ABBREVIATIONS & DEFINITIONS

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.

Graves' eye disease: also known as Graves ophthalmopathy or orbitopathy or thyroid eye disease. Graves' eye disease is most often seen in patients with Graves' disease but also can be seen with Hashimoto's thyroiditis. It includes inflammation of the eyes, eye muscles and the surrounding tissues. Symptoms include dry eyes, red eyes, bulging of the eyes and double vision.

Immune system: a system of organs, tissues, and cells in our body that has the role to recognize potentially harmful foreign substances and organisms as well as abnormal body cells and produce antibodies to destroy these factors.

Glucocorticoids: general antiinflammatory and immunosuppressive drugs that are commonly used for the treatment of many autoimmune diseases associated with inflammation

Tocilizumab: a monoclonal antibody drug that that is administered intravenously and blocks the activity of the inflamatory protein interleukin-6 (IL-6)

CAS: Clinical Activity Score, a scoring system used to evaluate patients with Graves' ophthalmopathy, and is based on classical signs of inflammation (pain, redness, swelling and function) and that helps predict which patients will benefit from immunosuppressive treatment

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THYROID NODULES

Hashimoto's thyroiditis increases risk for thyroid cancer

BACKGROUND

Antibodies are made by the immune system to protect our bodies from infections but sometimes they get confused and attack parts of the body. These conditions are called autoimmune diseases. Hashimoto's thyroiditis, the most common cause of hypothyroidism in the United States, is caused by antibodies that attack the thyroid gland causing inflammation which eventually destroys the gland. The possibility of an association between long term inflammation and cancer was first questioned in 1893. There had been multiple studies since then, but the results were not conclusive. The aim of this study was to evaluate whether there is an association between Hashimoto's thyroiditis and thyroid cancer in a large group of patients evaluated for thyroid nodules. The researchers also wanted to find out whether Hashimoto's thyroiditis affected the results of the thyroid biopsies since it can cause changes in the thyroid cells.

THE FULL ARTICLE TITLE

Silva de Morais N et al 2019 The impact of Hashimoto thyroiditis on thyroid nodule cytology and risk of thyroid Cancer. J Endocr Soc 3:791–800. PMID: 30963137

SUMMARY OF THE STUDY

Researchers analyzed a database that had information from patients who were seen at Brigham and Women's Hospital Thyroid Nodule Clinic between 1995 and 2017. Some patients had more than one nodule, all nodules were >1 cm. Patients had a clinical exam and a thyroid ultrasound. TPO antibodies (TPOAb) were measured in some patients if their thyroid hormone levels were abnormal. Ultrasound was used to guide the needle when the nodules were biopsied. Biopsy results were reported as nondiagnostic, negative for malignant cells, indeterminate (atypia of undetermined significance, suspicious for follicular neoplasm), suspicious for malignancy, or malignant. Nodules that were suspicious for malignancy or malignant were treated with surgery. Hashimoto's thyroiditis was diagnosed by elevated TPOAb in the blood, ultrasound features of thyroiditis, or diffuse lymphocytic thyroiditis diagnosis on examination of the thyroid tissue.

There were 9851 patients with 21,397 nodules. 83.9% of the patients were female. 14,063 nodules were biopsied. Hashimoto's thyroiditis was diagnosed in 3895 (27%) of the nodules. More nodules had indeterminate or malignant (cancer) biopsy results in the Hashimoto's thyroiditis group. Among the nodules treated with surgery, cancer was diagnosed more frequently in the patients with Hashimoto's thyroiditis compared to patients who did not have Hashimoto's thyroiditis (23.3% vs 15.9%). The aggressiveness of the cancer was similar in the two groups. The risk of cancer was the same whether a patient had one or multiple nodules.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

In conclusion, in this large study, patients with thyroid nodules > 1 cm were at increased risk of having indeterminate biopsy results and thyroid cancer if they also had Hashimoto's thyroiditis. This finding is important because Hashimoto's thyroiditis is very common. Not everyone with Hashimoto's thyroiditis has thyroid nodules. But when someone has both conditions, thyroid nodules may need to be more carefully examined and followed in patients who have Hashimoto's thyroiditis.

— Ebru Sulanc, MD

ATA THYROID BROCHURE LINKS

Hashimoto's Thyroiditis: https://www.thyroid.org/hashimotos-thyroiditis/

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

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

THYROID NODULES, continued

ABBREVIATIONS & DEFINITIONS

Autoimmune thyroid disease: a group of disorders that are caused by antibodies that get confused and attack the thyroid. These antibodies can either turn on the thyroid (Graves' disease, hyperthyroidism) or turn it off (Hashimoto's thyroiditis, hypothyroidism).

Hashimotos thyroiditis: the most common cause of hypothyroidism in the United States. It is caused by antibodies that attack the thyroid and destroy it.

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 fine needle aspiration biopsy (FNAB): a simple procedure that is done in the doctor's office to determine if a thyroid nodule is benign (non-cancerous) or cancer. The doctor uses a very thin needle to withdraw cells from the thyroid nodule. Patients usually return home or to work after the biopsy without any ill effects.

Indeterminate thyroid biopsy: this happens a few atypical cells are seen but not enough to be abnormal (atypia of unknown significance (AUS) or follicular lesion of unknown significance (FLUS)) or when the diagnosis is a follicular or hurthle cell lesion. Follicular and hurthle cells are normal cells found in the thyroid. Current analysis of thyroid biopsy results cannot differentiate between follicular or hurthle cell cancer from noncancerous adenomas. This occurs in 15-20% of biopsies and often results in the need for surgery to remove the nodule.

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.

TPO 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.

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THYROID CANCER

Thyroid cancer survivors with good outcomes continue to worry after cancer diagnosis

BACKGROUND

Thyroid cancer is the fastest rising cancer in women in the United States. Fortunately, there are very effective treatments for thyroid cancer and the prognosis is usually excellent. Cancer survivors frequently worry about their future and this can impact their quality of life. This cancer-related worry can continue for several years after a cancer diagnosis. Given the excellent outcomes for a majority of patients with thyroid cancer, it is sometimes thought that these patients do not have cancer-related worry. However, little is known about worry in these patients. The goal of this study is to better understand cancer-related worry in thyroid cancer survivors with good outcomes.

THE FULL ARTICLE TITLE

Papaleontiou M et al Worry in thyroid cancer survivors with a favorable prognosis. Thyroid. Epub 2019 Jun 22. PMID: 31232194.

SUMMARY OF THE STUDY

Patients ages 18-79 years who were diagnosed with thyroid cancer between 2014-2015 were identified from the Georgia and Los Angeles County Surveillance, Epidemiology, and End Results (SEER) Program registries. These patients were surveyed 2-4 years after their diagnosis. Questions regarding worry were included in the survey. Patients were asked how each the following worried them: harms from treatment, quality of life after their cancer diagnosis, family members being at risk for cancer, their cancer coming back, and death. Patients also reported the impact of worry on their life and how often they had issues with daily activities, felt distant from friends/family, or felt upset because of their diagnosis of thyroid cancer.

A total of 2,215 thyroid cancer survivors who were disease-free were included in this study. Of those people who responded to the survey, 41% of patients reported worry about death, 54.7% reported worry about decreased quality of life, 58% reported worry about other family members being at risk for cancer, and 63.2% reported worry about their cancer coming back. There was more worry in patients with lower education when compared to those patients with a college degree or higher education. There was less worry reported in males and in older aged patients. Asian and Hispanic patients were associated with more worry than white patients.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

Cancer-related worry is a major problem for thyroid cancer survivors despite the excellent prognosis. Groups associated with more worry include female patients, younger patients, patients with lower education, and racial/ethnic minorities. Physician recognition of cancer-related worry is important recognize this and help patients to reduce worry.

— Priya Mahajan, MD

ATA THYROID BROCHURE LINKS

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

ABBREVIATIONS & DEFINITIONS

SEER: Surveillance, Epidemiology and End Results program, a nation-wide anonymous cancer registry generated by the National Cancer Institute that contains information on 26% of the United States population. Website: http://seer.cancer.gov/

THYROID CANCER, continued

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

Initial treatment of thyroid cancer with levothyroxine results in metabolic changes among women

BACKGROUND

Hypothyroidism causes changes in metabolism, resulting in a general slowing down of energy expenditure and metabolic rate. This means that hypothyroid patients burn up less calories than individuals with normal thyroid function. This is thought to be a major reason why hypothyroid patients tend to gain weight. There is controversial information regarding the effects of thyroid hormone on metabolism in hypothyroid patients and whether levothyroxine treatment returns metabolism to normal. This study was done to compare the metabolic rate in patients when they had normal thyroid function to when they were hypothyroid and on levothyroxine. By using patients with thyroid cancer who underwent thyroidectomy, radioactive iodine ablation and who were on TSH-suppressive doses of levothyroxine, the study was able to evaluate potential effects of levothyroxine on these changes in metabolism in a controlled manner as well as possible adverse side effects of levothyroxine-suppression therapy.

THE FULL ARTICLE TITLE

Izkhakov E et al 2019 Body composition, resting energy expenditure and metabolic changes in women diagnosed with differentiated thyroid carcinoma. Thyroid. Epub May 15. PMID: 31088334.

SUMMARY OF THE STUDY

The authors studied 15 women, aged 18-62 with thyroid cancer who had normal thyroid function when they were diagnosed and were subsequently treated with total thyroidectomy, radioactive iodine ablation and levothyroxine-induced TSH suppressive therapy. Women were studied before surgery, when hypothyroid after surgery, and at 3 time points while on levothyroxine therapy, the last at >12 mo from starting levothyroxine. In addition to thyroid hormone levels, vital signs, glucose, cholesterol levels and body composition determined by dual energy X-ray absorptiometry (DEXA), metabolic testing was done using an open-circuit indirect calorimeter testing to determine resting energy expenditure (REE) and other measures of metabolism (respiratory quotient (RQ) calculated as RQ = CO_2/O_2).

When compared to their values at baseline, TSH levels were uniformly lower – either just at the lower limit of normal or suppressed, FT_4 levels were higher – although most within the normal range, T_3 levels were lower, and, as expected T_3/FT_4 ratios were lower. Body mass index (BMI) and lean body mass, glucose and cholesterol were unchanged. However, heart rate and blood pressure were higher. REE was increased, but despite this, weight was stable. On the other hand the respiratory quotient (RQ) was lower and correlated over time with lower T_3/FT_4 ratios.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

Levothyroxine-induced TSH suppressive therapy in patients with thyroid cancer results in an increase in energy expenditure but also increases in heart rate and blood pressure, which may have adverse effects on the heart. This shows that levothyroxine can improve metabolic rate in hypothyroid patients. This also supports the updated recommendations from the American Thyroid Association limiting the use of levothyroxine-suppression to patients with high risk cancers or those with low to intermediate risk cancers who have not had an excellent response to therapy.

— Marjorie Safran, MD

ATA THYROID BROCHURE LINKS

Thyroid Cancer (Papillary and Follicular): https://www.thyroid.org/thyroid-cancer/
Hypothyroidism (Underactive): https://www.thyroid.org/hypothyroidism/
Thyroid Hormone Treatment: https://www.thyroid.org/thyroid-hormone-treatment/

THYROID CANCER, continued

ABBREVIATIONS & DEFINITIONS

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

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.

Body Composition: The human body is composed of fat mass, muscle mass (lean body mass) and bone mass. Total body water is included in the measurements of muscle mass.

Lipids: the general term used to describe fat molecules in the blood. Examples of blood lipids include cholesterol, HDL ("good) cholesterol, LDL ("bad") cholesterol and triglycerides.

Body-mass index (BMI): a standardized measure of obesity calculated by dividing the weight in kilograms by the square of the height. A normal BMI is 18.5-24.9, overweight is 25-30 and obese is >30.

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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.

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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.
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Thyroid Cancer Alliance
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FOUNDED 2005

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- Special e-mail alerts about thyroid topics of special interest to you and your family

We will use your email address to send you *Friends of the ATA e-news* and occasional email updates. We won't share your email address with anyone, and you can unsubscribe at any time.

www.thyroid.org

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ATA | *Founded 1923*

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"The ATA was a valuable resource for our family when my dad was diagnosed with Anaplastic Thyroid Cancer. When you're faced with a detrimental diagnosis where even a few days can make the difference in life or death, understanding your options quickly is critical. The ATA website offers a one-stop shop for patients and caregivers to find specialists, current clinical trials, general thyroid cancer information, and links to other patient support groups and information."

Mary Catherine Petermann
- Father who was diagnosed with Anaplastic Thyroid Cancer in 2006
- He was treated at Mayo Clinic
- He has clean scans as of October 2016

PLEASE JOIN OUR JOURNEY TO ADVANCED DISCOVERIES AND TREATMENT FOR THYROID DISEASE AND THYROID CANCER

As patients with thyroid disease navigate the challenges to their quality of life and researchers and physicians look for more effective directions, we at the ATA have our own destination– **funding for critical thyroid research, prevention, and treatment.** For 94 years, the ATA has led the way in thyroidology. It's a daily obstacle course to find new drugs, better treatments, advanced surgical methods, and more rapid diagnoses for the 20 million Americans who have some form of thyroid disease.

The ATA has paved the way with management guidelines for clinicians who diagnose and treat thyroid disease. For physicians treating pregnant women diagnosed with thyroid disease, our recent publication presents 97 evidence-based recommendations making sure that best practices are implemented with the latest, most effective treatment.

Through your generous support and donations, research takes the lead and hope is on the horizon. **Will you join us** in our campaign to raise **$1.5 million** for thyroid research, prevention, and treatment? Your compassionate, tax-deductible gift will provide funds for:

- Research grants that pave the way for 1,700 ATA physicians and scientists who have devoted their careers to understanding the biology of and caring for patients affected by thyroid disease.
- Patient education for individuals and families looking for life-changing clinical trials, the best thyroid specialists, and cutting edge treatment and drugs.
- Professional education that offers a wealth of knowledge and leading-edge research for trainees and practitioners.
- A website that is the go-to resource for thyroid information for patients and practitioners alike. In 2016 alone, there were more than 3,700,000 website views of ATA's library of online thyroid information patient brochures.

Donations **of all sizes** will change the future for thyroid patients. You will make a direct impact on patients like Mary Catherine's father as he deals with Anaplastic Thyroid Cancer. You will help scientists like ATA Associate Member Julia Rodiger, Ph.D., a scientist at the National Institutes of Health, as she analyzes thyroid hormones for intestinal stem cell development.

Hyperthyroidism

WHAT IS THE THYROID GLAND?

The thyroid gland is a butterfly-shaped endocrine gland that is normally located in the lower front of the neck. The thyroid's job is to make thyroid hormones, which are secreted into the blood and then carried to every tissue in the body. Thyroid hormone helps the body use energy, stay warm and keep the brain, heart, muscles, and other organs working as they should.

WHAT IS HYPERTHYROIDISM?

The term hyperthyroidism refers to any condition in which there is too much thyroid hormone produced in the body. In other words, the thyroid gland is overactive. Another term that you might hear for this problem is thyrotoxicosis, which refers to high thyroid hormone levels in the blood stream, irrespective of their source.

WHAT ARE THE SYMPTOMS OF HYPERTHYROIDISM?

Thyroid hormone plays a significant role in the pace of many processes in the body. These processes are called your metabolism. If there is too much thyroid hormone, every function of the body tends to speed up. It is not surprising then that some of the symptoms of hyperthyroidism are nervousness, irritability, increased sweating, heart racing, hand tremors, anxiety, difficulty sleeping, thinning of your skin, fine brittle hair and weakness in your muscles—especially in the upper arms and thighs. You may have more frequent bowel movements, but diarrhea is uncommon. You may lose weight despite a good appetite and, for women, menstrual flow may lighten and menstrual periods may occur less often. Since hyperthyroidism increases your metabolism, many individuals initially have a lot of energy. However, as the hyperthyroidism continues, the body tends to break down, so being tired is very common.

Hyperthyroidism usually begins slowly but in some young patients these changes can be very abrupt. At first, the symptoms may be mistaken for simple nervousness due to stress. If you have been trying to lose weight by dieting, you may be pleased with your success until the hyperthyroidism, which has quickened the weight loss, causes other problems.

In *Graves' Disease* (also known as *Basedow's Disease*), which is the most common form of hyperthyroidism, the eyes may look enlarged because the upper lids are elevated. Sometimes, one or both eyes may bulge. Some patients have swelling of the front of the neck from an enlarged thyroid gland (a goiter).

WHAT CAUSES HYPERTHYROIDISM?

The most common cause (in more than 70% of people) is overproduction of thyroid hormone by the entire thyroid gland. This condition is also known as Graves' disease (see the *Graves' Disease brochure* for details). Graves' disease is caused by antibodies in the blood that turn on the thyroid and cause it to grow and secrete too much thyroid hormone. This type of hyperthyroidism tends to run in families and it occurs more often in young women. Little is known about why specific individuals get this disease. Another type of hyperthyroidism is characterized by one or more nodules or lumps in the thyroid that may gradually grow and increase their activity so that the total output of thyroid hormone into the blood is greater than normal. This condition is known as toxic nodular or multinodular goiter. Also, people may temporarily have symptoms of hyperthyroidism if they have a condition called thyroiditis. This condition is caused by a problem with the immune system or a viral infection that causes the gland to leak stored thyroid hormone. The same symptoms can also be caused by taking too much thyroid hormone in tablet form. In these last two forms, there is excess thyroid hormone but the thyroid is not overactive.

HOW IS HYPERTHYROIDISM DIAGNOSED?

If your physician suspects that you have hyperthyroidism, diagnosis is usually a simple matter. A physical examination usually detects an enlarged thyroid gland and a rapid pulse. The physician will also look for moist, smooth skin and a tremor of your fingers. Your reflexes are likely to be fast, and your eyes may have some abnormalities if you have Graves' disease.

Hyperthyroidism

The diagnosis of hyperthyroidism will be confirmed by laboratory tests that measure the amount of thyroid hormones— thyroxine (T4) and triiodothyronine (T3)—and thyroid-stimulating hormone (TSH) in your blood. A high level of thyroid hormone in the blood plus a low level of TSH is common with an overactive thyroid gland. If blood tests show that your thyroid is overactive, your doctor may want to measure levels of thyrotropin receptor antibodies (TRAbs), which when elevated confirm the diagnosis of Graves disease. Your doctor may also want to obtain a picture of your thyroid (a thyroid scan). The scan will find out if your entire thyroid gland is overactive or whether you have a toxic nodular goiter or thyroiditis (thyroid inflammation). A test that measures the ability of the gland to collect iodine (a thyroid uptake) may be done at the same time.

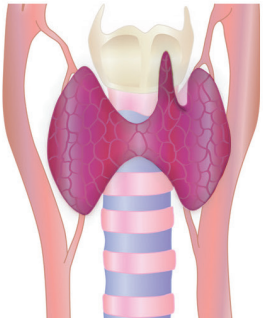
HOW IS HYPERTHYROIDISM TREATED?

No single treatment is best for all patients with hyperthyroidism. The appropriate choice of treatment will be influenced by your age, the type of hyperthyroidism that you have, the severity of your hyperthyroidism, other medical conditions that may be affecting your health, and your own preference. It may be a good idea to consult with an endocrinologist who is experienced in the treatment of hyperthyroid patients. If you are unconvinced or unclear about any thyroid treatment plan, a second opinion is a good idea.

Antithyroid Drugs: Drugs known as antithyroid agents—methimazole (Tapazole®) or in rare instances propylthiouracil (PTU)—may be prescribed if your doctor chooses to treat the hyperthyroidism by blocking the thyroid gland's ability to make new thyroid hormone. Methimazole is presently the preferred one due to less severe side-effects. These drugs work well to control the overactive thyroid, and do not cause permanent damage to the thyroid gland. In about 20% to 30% of patients with Graves' disease, treatment with antithyroid drugs for a period of 12 to 18 months will result in prolonged remission of the disease. For patients with toxic nodular or multinodular goiter, antithyroid drugs are sometimes used in preparation for either radioiodine treatment or surgery.

Antithyroid drugs cause allergic reactions in about 5% of patients who take them. Common minor reactions are red skin rashes, hives, and occasionally fever and joint pains. A rarer (occurring in 1 of 500 patients), but more serious side effect is a decrease in the number of white blood cells. Such a decrease can lower your resistance to infection. Very rarely, these white blood cells disappear completely, producing a condition known as agranulocytosis, a potentially fatal problem if a serious infection occurs. If you are taking one of these drugs and develop a fever or sore throat, you should stop the drug immediately and have a white blood cell count that day. Even if the drug has lowered your white blood cell count, the count will return to normal if the drug is stopped immediately. But if you continue to take one of these drugs in spite of a low white blood cell count, there is a risk of a more serious, even life-threatening infection. Liver damage is another very rare side effect. A very serious liver problem can occur with PTU use which is why this medication should not generally be prescribed. You should stop either methimazole or PTU and call your doctor if you develop yellow eyes, dark urine, severe fatigue, or abdominal pain.

Radioactive Iodine: Another way to treat hyperthyroidism is to damage or destroy the thyroid cells that make thyroid hormone. Because these cells need iodine to make thyroid hormone, they will take up any form of iodine in your bloodstream, whether it is radioactive or not. The radioactive iodine used in this treatment is administered by mouth, usually in a small capsule that is taken just once. once swallowed, the radioactive iodine gets into your bloodstream and quickly is taken up by the overactive thyroid cells. The radioactive iodine that is not taken up by the thyroid cells disappears from the body within days over a period of several weeks to several months (during which time drug treatment may be used to control hyperthyroid symptoms), radioactive iodine destroys the cells that have taken it up. The result is that the thyroid or thyroid nodules shrink in size, and the level of thyroid hormone in the blood returns to normal. Sometimes patients will remain hyperthyroid, but usually to a lesser degree than before.



FURTHER INFORMATION

Further details on this and other thyroid-related topics are available in the patient thyroid information section on the American Thyroid Association® website at *www.thyroid.org*.

For information on thyroid patient support organizations, please visit the *Patient Support Links* section on the ATA website at *www.thyroid.org*

Hyperthyroidism

For them, a second radioiodine treatment can be given if needed. More often, hypothyroidism (an underactive thyroid) occurs after a few months and lasts lifelong, requiring treatment. In fact, when patients have Graves' disease, a dose of radioactive iodine is chosen with the goal of making the patient hypothyroid so that the hyperthyroidism does not return in the future. Hypothyroidism can easily be treated with a thyroid hormone supplement taken once a day (see *Hypothyroidism brochure*).

Radioactive iodine has been used to treat patients for hyperthyroidism for over 60 years and has been shown to be generally safe. Importantly, there has been no clear increase in cancer in hyperthyroid patients that have been treated with radioactive iodine. As a result, in the United States more than 70% of adults who develop hyperthyroidism are treated with radioactive iodine. More and more children over the age of 5 are also being safely treated with radioiodine.

Surgery: Your hyperthyroidism can be permanently cured by surgical removal of all or most of your thyroid gland. This procedure is best performed by a surgeon who has experience in thyroid surgery. An operation could be risky unless your hyperthyroidism is first controlled by an antithyroid drug (see above) or a beta-blocking drug (see below), usually for some days before surgery, your surgeon may want you to take drops of nonradioactive iodine—either Lugol's iodine or supersaturated potassium iodide (SSKI). This extra iodine reduces the blood supply to the thyroid gland and thus makes the surgery easier and safer. Although any surgery is risky, major complications of thyroid surgery occur rarely in patients operated on by an experienced thyroid surgeon. These complications include damage to the parathyroid glands that are next to the thyroid and control your body's calcium levels (causing problems with low calcium levels) and damage to the nerves that control your vocal cords (causing you to have a hoarse voice).

After your thyroid gland is removed, the source of your hyperthyroidism is gone and you will become hypothyroid. As with hypothyroidism that develops after radioiodine treatment, your thyroid hormone levels can be restored to normal by treatment once a day with a thyroid hormone supplement.

Beta-Blockers: No matter which of these three methods of treatment are used for your hyperthyroidism, your physician may prescribe a class of drugs known as beta-blockers that block the action of thyroid hormone on your body. They usually make you feel better within hours to days, even though they do not change the high levels of thyroid hormone in your blood. These drugs may be extremely helpful in slowing down your heart rate and reducing the symptoms of palpitations, shakes, and nervousness until one of the other forms of treatment has a chance to take effect. Propranolol (Inderal®) was the first of these drugs to be developed. Some physicians now prefer related, but longer-acting beta-blocking drugs such as atenolol (Tenormin®), metoprolol (Lopressor®), nadolol (Corgard®), and Inderal-LA® because of their more convenient once- or twice-a-day dosage.

OTHER FAMILY MEMBERS AT RISK

Because hyperthyroidism, especially Graves' disease, may run in families, examinations of the members of your family may reveal other individuals with thyroid problems.

FURTHER INFORMATION

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