AMERICAN THYROID ASSOCIATION
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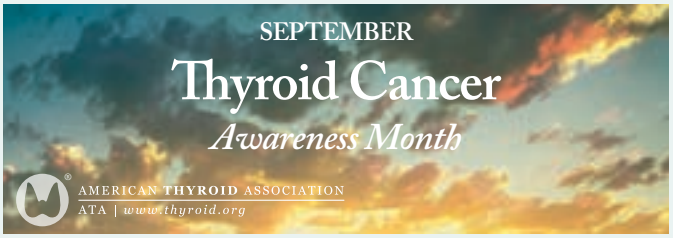
Clinical Thyroidology® for the Public

VOLUME 10 | ISSUE 9 | SEPTEMBER 2017



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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 will be providing summaries of research studies that were discussed in a recent issue of *Clinical Thyroidology*, a publication of the American Thyroid Association for physicians. These summaries are present in lay language to allow the rapid dissemination of thyroid research to the widest possible audience. This means that you are getting the latest information on thyroid research and treatment almost as soon as your physicians. As always, we are happy to entertain any suggestions to improve *Clinical Thyroidology for the Public* so let us know what you want to see.

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*, *ThyCa: Thyroid Cancer Survivors Association*, *Thyroid Cancer Canada and Thyroid Federation International*.

September is Thyroid Cancer Awareness Month.

In this issue, the studies ask the following questions:

- Are "benign" variants of papillary thyroid cancer (NIFTP) really benign?
- Is the risk of complications of thyroid surgery different in older patients?
- Does the intensity of PET-CT uptake correlate with cancer growth?
- What is the risk of hypothyroidism in patients with a family history of thyroid problems?
- Is there a correlation between thyroid hormone levels and obesity during pregnancy?

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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THYROID CANCER

Large "benign" variants of papillary thyroid cancer (NIFTP) have a very low risk of cancer recurrence

BACKGROUND

Papillary thyroid cancer is the most common cause of thyroid cancer. The follicular variant of papillary thyroid cancer accounts for the majority of thyroid cancer cases in the United States. In 2016, the encapsulated follicular variant of papillary thyroid cancer with no evidence of spread into the thyroid capsule or into the blood vessels seen under the microscope was renamed as noninvasive follicular thyroid neoplasm with papillary-like nuclear features (NIFTP), and was suggested that it was a non-cancer diagnosis. Because a study showed that patients with NIFTP had an excellent prognosis without recurrence, it is no longer recommended for patients with NIFTP to have additional treatments such as completion thyroidectomy surgeries or radioactive iodine therapy.

The current study looked at patients with large (>4cm) NIFTP to determine whether the prognosis and recurrence risk remains low even though the tumors are big. The authors want to make sure that patients can be reassured that the renaming of a cancer to a non-cancer diagnosis (NIFTP) is appropriate for large tumors and that additional treatments such as radioactive iodine therapy would not be required.

THE FULL ARTICLE TITLE

Xu B et al. Outcome of large noninvasive follicular thyroid neoplasm with papillary-like nuclear features (NIFTP). Thyroid. 2017 Apr;27(4):512-517.

SUMMARY OF THE STUDY

A group of 4 hospitals reviewed their databases of patients who had thyroid surgery between the years 1982 to 2015. They found 79 cases that met criteria for NIFTP tumors greater than 4 cm. The patient files were reviewed to get information about management and patient outcomes. There were more women than men (ratio 1.8:1). The average size of the NIFTP tumors was 4.5 cm (ranging from 4 to 8 cm). The tumors did not extend beyond the thyroid, and of the 25 patients who had lymph nodes removed at the time of surgery, none had cancer metastases.

The average time of follow up was 5.8 years (range from 0.3 to 7.9). A total of 26 of the 79 patients had half of their thyroid removed (lobectomy) and the rest had total thyroidectomy. A total of 42 patients of the 79 had radioactive iodine therapy and most of those treated with radioactive iodine therapy had tumors larger than 5 cm.

During the follow up period, there were no cancer metastases or cancer related deaths in any of the patients with the NIFTP diagnosis, including those 25 patients who did not get radioactive iodine therapy.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

The encapsulated follicular variant of papillary thyroid cancer without capsular or vascular invasion has been renamed to a non-cancer diagnosis called NIFTP. The long-term prognosis of NIFTP tumors appears to be excellent without risk for developing metastatic disease. The authors of this study confirmed that even large NIFTP tumors over 4 cm in size have an excellent prognosis without metastatic potential. However, half of the patients in the study got radioactive iodine therapy and we don't know what effect that might have had on their long-term outcome. Therefore, it is important for patients and clinicians to understand that aggressive management is not recommended for NIFTP tumors, but patients should have continued follow up.

—Wendy Sacks, M.D.

ATA THYROID BROCHURE LINKS

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

THYROID CANCER, continued

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).

Noninvasive follicular thyroid neoplasm with papillary-like nuclear features (NIFTP): a new term has been used to describe a type of papillary thyroid cancer which is non-invasive. These cancers behave less aggressively than typical papillary thyroid cancer and have been shown to have low risk for recurrence and low risk for spread outside of the thyroid.

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.

Lobectomy: surgery to remove one lobe of the thyroid.

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

Total thyroidectomy: surgery to remove the entire thyroid gland.

Cancer metastasis: spread of the cancer from the initial organ where it developed to other organs, such as the lungs and bone.

Thyroid Awareness Monthly Campaigns

The ATA will be highlighting a distinct thyroid disorder each month and a portion of the sales for Bravelets™ will be donated to the ATA. The month of **September** is **Thyroid Cancer Awareness Month** and a bracelet is available through the **ATA Marketplace** to support thyroid cancer awareness and education related to thyroid disease.

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THYROID CANCER

Older age and advanced disease are risk factors for complications after thyroid cancer surgery

BACKGROUND

Thyroid cancer is the fastest rising cancer, especially in women. The first step after a diagnosis of thyroid cancer is usually surgery. Thyroid surgery is a fairly safe procedure with very low complication rate. Among the most common complications are damage to the vocal cords, damage to the parathyroid glands that control calcium levels and bleeding. This study looked at the risk of complications after thyroid surgery and if there are specific risk factors for complications in older adults in the US.

THE FULL ARTICLE TITLE

Papaleontiou M et al Extrathyroidal population-based assessment of complications following surgery for thyroid cancer. J Clin Endocrinol Metab. April 28, 2017 [Epub ahead of print].

SUMMARY OF THE STUDY

The authors used a combined Medicare-SEER cancer registry database to look at all thyroid surgeries performed for cancer in Medicare patients. They looked at both thyroid surgery-specific complications (such as nerve/vocal cord injury or low calcium) as well as general complications (such as heart or lung problems or infections). Of more than 27,000 patients (50% of which were over 65 years old), the rate of general complications was 6.5% and the rate of thyroid-surgery specific complications was 12.3%. Patients were more likely to have a complication if they had surgery for advanced cancer, more extensive surgery, were sicker (had other medical problems) and/or older.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

These rates of complications after thyroid surgery for thyroid cancer in this study are higher than previously reported and are increased with increasing age. One limitation of this study is that it did not indicate the experience of the surgeon in these cases. It is well known that surgeons that do a lot of thyroid surgery (high volume surgeons) have a much lower complication rate than surgeons that do only a few thyroid surgeries per year. However, this study does confirm that the extent of surgery should be individualized based on patient and disease factors.

— Melanie Goldfarb, MD

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

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.

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/

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THYROID CANCER

Intensity of uptake on PET-CT scan in metastatic thyroid cancer fails to predict growth in individual metastatic lesions

BACKGROUND

Thyroid cancer usually has an excellent prognosis. In fact, risk in thyroid cancer usually refers to risk of recurrence of cancer and not risk of death from cancer, which is quite low. In most patients with spread of the cancer outside of the thyroid (metastatic cancer), the metastatic cancer is limited to the neck. The most common place for metastatic cancer outside of the neck is in the lungs.

First-line therapy for metastatic thyroid cancer is radioactive iodine therapy after initial total thyroidectomy. When the cancer does not respond to radioactive iodine treatment, and surgery or external radiation therapy are not an option, a wait-and-see approach is recommended with close monitoring with imaging studies. Previous studies have shown that uptake of radioactive 18F-labeled fluorodeoxy-glucose (a PET-CT scan) is a predictor of survival in these patients. This study examines the relationship between the intensity of the PET-CT scan with cancer growth.

THE FULL ARTICLE TITLES:

Terroir M et al. The intensity of 18FDG uptake does not predict tumor growth in patients with metastatic differentiated thyroid cancer. Eur J Nucl Med Mol Imaging 2017;44:638–46. Epub October 29, 2016.

SUMMARY OF THE STUDY

Between July 2012 and May 2014, 55 patients who met the following criteria were analyzed: measurable metastasic cancer foci larger than 1 cm on the CT component of the PET-CT, follow-up CT within 3 to 12 months after the initial PET-CT, and no local or systemic treatment in the interval between the two imaging procedures.

In each patient, up to 10 individual metastatic cancer foci were evaluated by measuring maximum standard uptake value on the initial PET-CT scan, metabolic tumor volume, and physical tumor volume calculated based on the largest transverse lesion diameter on the CT scan. Outcome parameters were cancer growth rate in each lesion and patient survival.

The thyroid cancer was papillary in 60%, follicular in 14%, and poorly differentiated in 25% of patients. Average cancer size was 37 mm. A total of 53% of patients had lymph node metastatic cancer foci. Spread of the cancer outside of the neck was present at diagnosis in 47% and otherwise was diagnosed during follow-up after an average of 3 years. Patients were considered resistant to radioactive iodine treatment because of lack of uptake in distant metastases, persistent metastases after high dose radioactive iodine treatment, or because of disease got worse despite persistent radioactive iodine uptake.

The average number of metastatic cancer foci per patient was 2, with an average maximum standard uptake value on PET-CT scan of 8.7, an average metabolic total volume of 3.7 cm3 and an average diameter of 16 mm. The average cancer growth rate was 41% per year. After an average follow-up of 77 weeks, 55% of patients died from thyroid cancer.

The metastatic cancer foci total growth rate did not correlate with maximum standard uptake value, metabolic total volume, or physical total volume. Among the four patients with five or more metastases, the cancers with the highest maximum standard uptake value or highest metabolic total volume did not have the highest tumor growth rate.

Overall 1- and 2-year-survival was 100% in patients with maximum standard uptake value <5. Survival was strongly correlated to patient cancer load as expressed as metabolic total volume or physical total volume.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

PET-CT scanning is a highly useful diagnostic tool for identifying metastatic disease. In patients with thyroid cancer that has spread and is resistant to radioactive iodine, uptake on a PET-CT scan was not predictive of the subsequent growth rate of the metastases as measured by CT scan 3 to 12 months after the initial PET-CT scan.

THYROID CANCER, continued

The present study confirms the correlation of total metabolic total volume with poor survival. The surprising finding was that the metastatic cancer foci with the highest uptake on PET-CT were not the metastatic cancer foci that grew the fastest. The apparent predictive power of metabolic total volume regarding survival may be due to the amount of cancer present rather than to the intensity of uptake on PET-CT scan.

— Ronald B. Kuppersmith, MD, FACS

ATA THYROID BROCHURE LINKS

Radioactive Iodine: https://www.thyroid.org/radioactive-iodine/

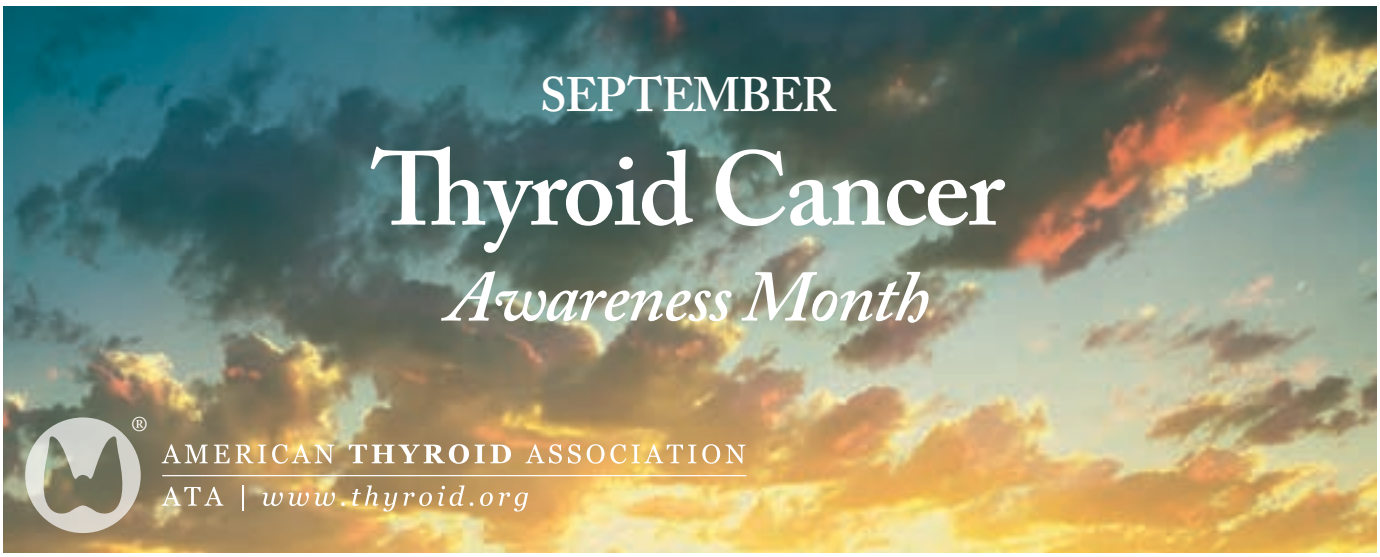
Thyroid Cancer (Papillary and Follicular): https://www.thyroid.org/thyroid-cancer/

ABBREVIATIONS & DEFINITIONS

Metastasis: The spread of cancer cells from the place where they first formed to another part of the body. In metastasis, cancer cells break away from the original (primary) tumor, travel through the blood or lymph system, and form a new tumor in other organs or tissues of the body. The new, metastatic tumor is the same type of cancer as the primary tumor. (Metastases is the plural form of metastasis, meaning multiple areas of spread).

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).

Positron-Emission-Tomography (PET) scans: a nuclear medicine imaging test that uses a small amount of radiolabeled glucose to identify cancer. Since cancer cells are more active than normal cells, the cancer cells take up more of the radiolabeled glucose and show up on the PET scan. PET scans are frequently combined with CT scans to accurately identify where the cancer is located.



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HYPOTHYROIDISM

First-degree family members of patients with hypothyroidism due to Hashimoto's Thyroiditis have an increased risk of developing hypothyroidism

BACKGROUND

The most common cause of hypothyroidism is Hashimoto's thyroiditis. This is an autoimmune disease where the patient's antibodies, which usually fight infection, get confused and attack the body. In the case of Hashimoto's thyroiditis, the antibodies attack the thyroid and destroy it. As the disease progresses, the thyroid gland is unable to produce enough thyroid hormone and the patients develop hypothyroidism. Family members of patients with hypothyroidism due to Hashimoto's thyroiditis have a higher risk to develop this disorder, but it is unclear what degree is this risk. The aim of this study was to evaluate the risk of developing the disease in first-degree relatives (parents, children, siblings) of patients with hypothyroidism due to Hashimoto's thyroiditis as compared with the general population in an Indian population.

THE FULL ARTICLE TITLE

Bothra N et al Hashimoto's thyroiditis: relative recurrence risk ratio and implications for screening of first degree relatives. Clin Endocrinol (Oxf). 2017 Aug;87(2):201-206.

SUMMARY OF THE STUDY

This large study evaluated the families of 264 patients with hypothyroidism due to Hashimoto's thyroiditis who were receiving medical care at a single hospital in Western India. A total of 861 first-degree relatives of these patients (205 parents, 336 siblings, 320 children) underwent thyroid evaluation, including physical exam for presence of a goiter, serum thyroid function tests, and serum thyroid antibodies.

Serum thyroid antibodies were present in 38% of the 861 first-degree relatives, while only 17% of relatives had hypothyroidism due to Hashimoto's thyroiditis. A higher percentage of female relatives had thyroid antibodies and hypothyroidism due to Hashimoto's thyroiditis as compared to males. Goiter was found on exam in 31% of relatives.

A total of 46 % of the 264 patients with hypothyroidism due to Hashimoto's disease included in the study had at least one affected relative. The overall risk of the first-degree relatives of developing the disease was 9-fold higher as compared to the general population. Specifically, parents and siblings each had a 6-fold higher risk, while children had a 3-fold higher risk of developing hypothyroidism due to Hashimoto's disease. There was a gradual increase in the risk of developing thyroid antibodies and hypothyroidism due to Hashimoto's thyroiditis with age, the risk being higher than in the general population starting at age 20 in females and age 27 in males.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

In this study from India, first-degree relatives of patients with hypothyroidism due to Hashimoto's thyroiditis have a 9-fold higher risk to develop this disease as compared to the general population; studies from other regions have reported similar results. These findings suggest an important genetic element in the development of hypothyroidism due to Hashimoto's thyroiditis. Further, it is important for physicians to be aware of this increased risk of developing hypothyroidism and have a lower threshold for testing for thyroid disease in patients with a relative with hypothyroidism.

— Alina Gavrila, MD, MMSC

ATA THYROID BROCHURE LINKS

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

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

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

HYPOTHYROIDISM, 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).

Hashimoto's thyroiditis: the most common cause of hypothyroidism in the United States. It is caused by antibodies that attack the thyroid and destroy the gland.

Thyroid antibodies: these are antibodies that attack the thyroid instead of bacteria and viruses, they are a marker for autoimmune thyroid disease. The main thyroid antibodies that can be measured in the blood are thyroid peroxidase (TPO) and thyroglobulin antibodies.

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

Thyroid function tests: blood tests which help to check whether the thyroid gland produces the right amount of thyroid hormones. These tests include the thyroid stimulating hormone test (TSH), the thyroxine test (T_4), and the triiodothyronine test (T_3).

Goiter: a thyroid gland that is enlarged for any reason is called a goiter. A goiter can be seen when the thyroid is overactive, underactive or functioning normally. If there are nodules in the goiter it is called a multinodular goiter.

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THYROID AND WEIGHT

Weight gain and thyroid tests during pregnancy: is there a link?

BACKGROUND

The relationship between body weight and thyroid hormone levels is complex. It is known that higher body weight and body mass index (BMI) is linked to higher blood levels of TSH and lower levels of free thyroxine (FT_4). This pattern is typically seen in hypothyroidism, where TSH levels are high and the FT_4 levels are low. However, T_3 levels are often higher in obesity and high T_3 levels are seen in hyperthyroidism. Weight gain is common in hypothyroidism while weight loss is common in hyperthyroidism.

Thyroid hormone levels also change during pregnancy, as both TSH and FT_4 levels frequently lower while T_3 levels are higher. It is unknown what the correlation is between obesity and pregnancy in terms of thyroid hormone levels. This study looked at thyroid tests during pregnancy and their link with the mother's weight both before and during pregnancy.

THE FULL ARTICLE TITLE

M Collares F. Maternal thyroid function, prepregnancy obesity and gestational weight gain— the Generation R Study: a prospective cohort study. Clin Endocrinol (Oxf). June 30, 2017 [Epub ahead of print].

SUMMARY OF THE STUDY

This study was done in Rotterdam, Netherlands. About 5,000 patients were studied during pregnancy (on average at14 weeks of pregnancy). Blood levels of TSH and FT_4 were examined to see if there was a link with the weight and BMI before pregnancy and weight gain during pregnancy.

Higher TSH values were linked to lower risk for being underweight before pregnancy as well as higher risk for excess weight gain during pregnancy. On the other hand, higher FT_4 levels were linked to lower risk for weight gain during pregnancy. Women with hypothyroidism had a higher pre pregnancy weight and also more weight gain during pregnancy. The results were opposite to this in women who had hyperthyroidism.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

The authors of the study concluded that higher TSH and lower FT_4 levels in the mother were linked to higher BMI before pregnancy and more weight gain during pregnancy. Although the study had its limitations, such as only one time testing during pregnancy, important information was learned. Since hypothyroidism in the mother is known to have adverse outcomes for child development, understanding the link of obesity and thyroid disease during pregnancy would be very helpful.

—Vibhavasu Sharma,MD

ATA THYROID BROCHURE LINKS

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

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

Pregnancy and Thyroid Disease: https://www.thyroid.org/thyroid-disease-pregnancy/

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.

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.

THYROID AND WEIGHT, continued

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.

Thyroxine (T4): the major hormone produced by the thyroid gland. T_4 gets converted to the active hormone T_3 in various tissues in the body

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.

WHO WE ARE (in alphabetical order)

AMERICAN THYROID ASSOCIATION
www.thyroid.org
ATA Patient Resources:
http://www.thyroid.org/thyroid-information/
Find a Thyroid Specialist: www.thyroid.org
(Toll-free): 1-800-THYROID
thyroid@thyroid.org

BITE ME CANCER
http://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

THYCA: THYROID CANCER SURVIVORS' ASSOCIATION, INC.
www.thyca.org
(Toll-free): 877-588-7904
thyca@thyca.org

THYROID CANCER CANADA
www.thyroidcancercanada.org
416-487-8267
info@thyroidcancercanada.org

THYROID FEDERATION INTERNATIONAL
www.thyroid-fed.org
tfi@thyroid-fed.org

AMERICAN THYROID ASSOCIATION
FOUNDED 1923

Light of Life Foundation
checkyourneck.com

GRAVES' DISEASE & THYROID FOUNDATION

Thyroid Federation International

BITE ME CANCER!

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

Thyroid Cancer Canada
Cancer de la thyroïde Canada

Thyroid Cancer
(Papillary and Follicular)

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.

CANCER OF THE THYROID

Thyroid cancer is relatively uncommon compared to other cancers. In the United States it is estimated that in 2016 approximately 64,000 new patients will be diagnosed with thyroid cancer, compared to over 240,000 patients with breast cancer and 135,000 patients with colon cancer. However, fewer than 2000 patients die of thyroid cancer each year. In 2013, the last year for which statistics are available, over 630,000 patients were living with thyroid cancer in the United States. Thyroid cancer is usually very treatable and is often cured with surgery (see *Thyroid Surgery brochure*) and, if indicated, radioactive iodine (see *Radioactive Iodine brochure*). Even when thyroid cancer is more advanced, effective treatment is available for the most common forms of thyroid cancer. Even though the diagnosis of cancer is terrifying, the prognosis for most patients with papillary and follicular thyroid cancer is usually excellent.

WHAT ARE THE TYPES OF THYROID CANCER?

Papillary thyroid cancer. Papillary thyroid cancer is the most common type, making up about 70% to 80% of all thyroid cancers. Papillary thyroid cancer can occur at any age. It tends to grow slowly and often spreads to lymph nodes in the neck. However, unlike many other cancers, papillary cancer has a generally excellent outlook, even if there is spread to the lymph nodes.

Follicular thyroid cancer. Follicular thyroid cancer makes up about 10% to 15% of all thyroid cancers in the United States. Follicular cancer can spread to lymph nodes in the neck, but this is much less common than with papillary cancer. Follicular cancer is also more likely than papillary cancer to spread to distant organs, particularly the lungs and bones.

Papillary and follicular thyroid cancers are also known as Well-Differentiated Thyroid Cancers (DTC). The information in this brochure refers to the differentiated thyroid cancers. The other types of thyroid cancer listed below will be covered in other brochures

Medullary thyroid cancer. Medullary thyroid cancer (MTC), accounts for approximately 2% of all thyroid cancers. Approximately 25% of all MTC runs in families and is associated with other endocrine tumors (see *Medullary Thyroid Cancer brochure*). In family members of an affected person, a test for a genetic mutation in the RET proto-oncogene can lead to an early diagnosis of medullary thyroid cancer and, as a result, to curative surgery.

Anaplastic thyroid cancer. Anaplastic thyroid cancer is the most advanced and aggressive thyroid cancer and the least likely to respond to treatment. Anaplastic thyroid cancer is very rare and is found in less than 2% of patients with thyroid cancer. (See *Anaplastic thyroid cancer brochure.*)

WHAT ARE THE SYMPTOMS OF THYROID CANCER?

Thyroid cancer often presents as a lump or nodule in the thyroid and usually does not cause any symptoms (see *Thyroid Nodule brochure*). Blood tests generally do not help to find thyroid cancer and thyroid blood tests such as TSH are usually normal, even when a cancer is present. Neck examination by your doctor is a common way in which thyroid nodules and thyroid cancer are found. Often, thyroid nodules are discovered incidentally on imaging tests like CT scans and neck ultrasound done for completely unrelated reasons. Occasionally, patients themselves find thyroid nodules by noticing a lump in their neck while looking in a mirror, buttoning their collar, or fastening a necklace. Rarely, thyroid cancers and nodules may cause symptoms. In these cases, patients may complain of pain in the neck, jaw, or ear. If a nodule is large enough to compress the windpipe or esophagus, it may cause difficulty with breathing, swallowing, or cause a "tickle in the throat". Even less commonly, hoarseness can be caused if a thyroid cancer invades the nerve that controls the vocal cords.

Thyroid Cancer
(Papillary and Follicular)

The important points to remember are that cancers arising in thyroid nodules generally do not cause symptoms, thyroid function tests are typically normal even when cancer is present, and the best way to find a thyroid nodule is to make sure that your doctor examines your neck as part of your periodic check-up.

WHAT CAUSES THYROID CANCER?

Thyroid cancer is more common in people who have a history of exposure to high doses of radiation, have a family history of thyroid cancer, and are older than 40 years of age. However, for most patients, we do not know the specific reason or reasons why thyroid cancer develops.

High dose radiation exposure, especially during childhood, increases the risk of developing thyroid cancer. Prior to the 1960s, X-ray treatments were often used for conditions such as acne, inflamed tonsils and adenoids, enlarged lymph nodes, or to treat enlargement of a gland in the chest called the thymus. All these treatments were later found to be associated with an increased risk of developing thyroid cancer later in life. Even X-ray therapy used to treat cancers such as Hodgkin's disease (cancer of the lymph nodes) or breast cancer has been associated with an increased risk for developing thyroid cancer if the treatment included exposure to the head, neck or chest. Routine X-ray exposure such as dental X-rays, chest X-rays and mammograms have not been shown to cause thyroid cancer.

Exposure to radioactivity released during nuclear disasters (1986 accident at the Chernobyl power plant in Russia or the 2011 nuclear disaster in Fukushima, Japan) has also been associated with an increased risk of developing thyroid cancer, particularly in exposed children, and thyroid cancers can be seen in exposed individuals as many as 40 years after exposure.

You can be protected from developing thyroid cancer in the event of a nuclear disaster by taking potassium iodide (see *Nuclear Radiation and the Thyroid brochure*). This prevents the absorption of radioactive iodine and has been shown to reduce the risk of thyroid cancer. The American Thyroid Association recommends that anyone living within 200 miles of a nuclear accident be given potassium iodide to take prophylactically in the event of a nuclear accident. If you live near a nuclear reactor and want more information about the role of potassium iodide, check the recommendations from your state at the following link: *www.thyroid.org/web-links-for-important-documents-about-potassium-iodide/*.

HOW IS THYROID CANCER DIAGNOSED?

A diagnosis of thyroid cancer can be suggested by the results of a fine needle aspiration biopsy of a thyroid nodule and can be definitively determined after a nodule is surgically excised (see *Thyroid Nodule brochure*). Although thyroid nodules are very common, less than 1 in 10 will be a thyroid cancer.

WHAT IS THE TREATMENT FOR THYROID CANCER?

Surgery. The primary therapy for all types of thyroid cancer is surgery (see *Thyroid Surgery brochure*). The extent of surgery for differentiated thyroid cancers (removing only the lobe involved with the cancer- called a lobectomy- or the entire thyroid – called a total thyroidectomy) will depend on the size of the tumor and on whether or not the tumor is confined to the thyroid. Sometimes findings either before surgery or at the time of surgery – such as spread of the tumor into surrounding areas or the presence of obviously involved lymph nodes – will indicate that a total thyroidectomy is a better option. Some patients will have thyroid cancer present in the lymph nodes of the neck (lymph node metastases). These lymph nodes can be removed at the time of the initial thyroid surgery or sometimes, as a later procedure if lymph node metastases become evident later on. For very small cancers (<1 cm) that are confined to the thyroid, involving only one lobe and without evidence of lymph node involvement a simple lobectomy (removal of only the involved lobe) is considered sufficient. Recent studies even suggest that small tumors – called micro papillary thyroid cancers – may be observed without surgery depending on their location in the thyroid. After surgery, most patients need to

FURTHER INFORMATION

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Thyroid Cancer
(Papillary and Follicular)

be on thyroid hormone for the rest of their life (see *Thyroid Hormone Treatment brochure*). Often, thyroid cancer is cured by surgery alone, especially if the cancer is small. If the cancer is larger, if it has spread to lymph nodes or if your doctor feels that you are at high risk for recurrent cancer, radioactive iodine may be used after the thyroid gland is removed.

Radioactive iodine therapy. (Also referred to as I-131 therapy). Thyroid cells and most differentiated thyroid cancers absorb and concentrate iodine. That is why radioactive iodine can be used to eliminate all remaining normal thyroid tissue and potentially destroy residual cancerous thyroid tissue after thyroidectomy (see *Radioactive Iodine brochure*). The procedure to eliminate residual thyroid tissue is called radioactive iodine ablation. This produces high concentrations of radioactive iodine in thyroid tissues, eventually causing the cells to die. Since most other tissues in the body do not efficiently absorb or concentrate iodine, radioactive iodine used during the ablation procedure usually has little or no effect on tissues outside of the thyroid. However, in some patients who receive larger doses of radioactive iodine for treatment of thyroid cancer metastases, radioactive iodine can affect the glands that produce saliva and result in dry mouth complications. If higher doses of radioactive iodine are necessary, there may also be a small risk of developing other cancers later in life. This risk is very small, and increases as the dose of radioactive iodine increases. The potential risks of treatment can be minimized by using the smallest dose possible. Balancing potential risks against the benefits of radioactive iodine therapy is an important discussion that you should have with your doctor if radioactive iodine therapy is recommended.

If your doctor recommends radioactive iodine therapy, your TSH will need to be elevated prior to the treatment. This can be done in one of two ways.

The first is by stopping thyroid hormone pills (levothyroxine) for 3-6 weeks. This causes high levels of TSH to be produced by your body naturally. This results in hypothyroidism, which may involve symptoms such as fatigue, cold intolerance and others, that can be significant. To minimize the symptoms of hypothyroidism your doctor may prescribe T3 (Cytomel®, liothyronine) which is a short acting form of thyroid hormone that is usually taken after the levothyroxine is stopped until the final 2 weeks before the radioactive iodine treatment.

Alternatively, TSH can be increased sufficiently without stopping thyroid hormone medication by injecting TSH into your body. Recombinant human TSH (rhTSH, Thyrogen®) can be given as two injections in the days prior to radioactive iodine treatment. The benefit of this approach is that you can stay on thyroid hormone and avoid possible symptoms related to hypothyroidism.

Regardless of whether you go hypothyroid (stop thyroid hormone) or use recombinant TSH therapy, you may also be asked to go on a low iodine diet for 1 to 2 weeks prior to treatment (see *Low Iodine Diet FAQ*), which will result in improved absorption of radioactive iodine, maximizing the treatment effect.

TREATMENT OF ADVANCED THYROID CANCER.

Thyroid cancer that spreads (metastasizes) outside the neck area is rare, but can be a serious problem. Surgery and radioactive iodine remain the best way to treat such cancers as long as these treatments continue to work. However, for more advanced cancers, or when radioactive iodine therapy is no longer effective, other forms of treatment are needed. External beam radiation directs precisely focused X-rays to areas that need to be treated—often tumor that has recurred locally or spread to bones or other organs. This can kill or slow the growth of those tumors. Cancer that has spread more widely requires additional treatment.

New chemotherapy agents that have shown promise treating other advanced cancers are becoming more widely available for treatment of thyroid cancer. These drugs rarely cure advanced cancers that have spread widely throughout the body but they can slow down or partially reverse the growth of the cancer. These treatments are usually given by an oncologist (cancer specialist) and often require care at a regional or university medical center.

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WHAT IS THE FOLLOW-UP FOR PATIENTS WITH THYROID CANCER?

Periodic follow-up examinations are essential for all patients with thyroid cancer because the thyroid cancer can return—sometimes several years after successful initial treatment. These follow-up visits include a careful history and physical examination, with particular attention to the neck area. Neck ultrasound is an important tool to view the neck and look for nodules, lumps or cancerous lymph nodes that might indicate the cancer has returned. Blood tests are also important for thyroid cancer patients. Most patients who have had a thyroidectomy for cancer require thyroid hormone replacement with levothyroxine once the thyroid is removed (see *Thyroid Hormone Treatment brochure*). The dose of levothyroxine prescribed by your doctor will in part be determined by the initial extent of your thyroid cancer. More advanced cancers usually require higher doses of levothyroxine to suppress TSH (lower the TSH below the low end of the normal range). In cases of minimal or very low risk cancers, it's typically safe to keep TSH in the normal range. The TSH level is a good indicator of whether the levothyroxine dose is correctly adjusted and should be followed periodically by your doctor.

Another important blood test is measurement of thyroglobulin (Tg). Thyroglobulin is a protein produced by normal thyroid tissue and thyroid cancer cells, and is usually checked at least once a year. Following thyroidectomy and radioactive iodine ablation, thyroglobulin levels usually become very low or undetectable when all tumor cells are gone. Therefore, a rising thyroglobulin level should raise concern for possible cancer recurrence. Some patients will have thyroglobulin antibodies (TgAb) which can make it difficult to rely on the Tg result, as this may be inaccurate.

In addition to routine blood tests, your doctor may want to repeat a whole-body iodine scan to determine if any thyroid cells remain. Increasingly, these scans are only done for high risk patients and have been largely replaced by routine neck ultrasound and thyroglobulin measurements that are more accurate to detect cancer recurrence, especially when done together.

WHAT IS THE PROGNOSIS OF THYROID CANCER?

Overall, the prognosis of differentiated thyroid cancer is excellent, especially for patients younger than 45 years of age and those with small cancers. Patients with papillary thyroid cancer who have a primary tumor that is limited to the thyroid gland have an excellent outlook. Ten year survival for such patients is 100% and death from thyroid cancer anytime thereafter is extremely rare. For patients older than 45 years of age, or those with larger or more aggressive tumors, the prognosis remains very good, but the risk of cancer recurrence is higher. The prognosis may not be quite as good in patients whose cancer is more advanced and cannot be completely removed with surgery or destroyed with radioactive iodine treatment. Nonetheless, these patients often are able to live a long time and feel well, despite the fact that they continue to live with cancer. It is important to talk to your doctor about your individual profile of cancer and expected prognosis. It will be necessary to have lifelong monitoring, even after successful treatment.

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