



# Clinical Thyroidology<sup>®</sup> for the Public

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Grani G et al 2019 Reducing the number of unnecessary thyroid biopsies while improving diagnostic accuracy: toward the "right" TIRADS. *J Clin Endocrinol Metab* 104:95–102. PMID: 30299457.

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Wang H et al Incidence and malignancy rates of indeterminate pediatric thyroid nodules. *Cancer Cytopathology*. Epub 2019 Feb 15. PMID: 30768868.

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Hung CL et al 2018 Is partial or total thyroidectomy associated with risk of long-term osteoporosis: a nationwide population-based study. *World J Surg* 42:2864–2871. PMID: 29541822.

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Hou Y et al 2019 Different Thyroidal Response to Human Chorionic Gonadotropin Under Different Thyroid Peroxidase Antibody and/or Thyroglobulin Antibody Positivity Conditions During the First Half of Pregnancy. *Thyroid* 29(4):577-585

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[www.thyroid.org](http://www.thyroid.org)

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**Clinical Thyroidology for the Public**

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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*, *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.

June is [Differentiated Thyroid Cancer Awareness Month](#).

In this issue, the studies ask the following questions:

- What are the risk factors for a poor prognosis in medullary thyroid cancer?
- Can an ultrasound classification system help make a diagnosis of thyroid cancer?
- Are the rates of indeterminate nodules different between children and adults?
- Does levothyroxine therapy lead to osteoporosis?
- Do thyroid antibodies interfere with thyroid function 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





## MEDULLARY THYROID CANCER

### Patients with early-stage medullary thyroid cancer have similar survival to general population

#### BACKGROUND

Medullary thyroid cancer a relatively rare type of thyroid cancer that often runs in families. Even though medullary thyroid cancer accounts for only 2-5% of all thyroid cancers, it is responsible for a large percentage of deaths from thyroid cancer. The main reason for this is that radioactive iodine is not effective in treating this cancer. The primary treatment for medullary thyroid cancer is surgery. Patients can do well if the cancer is detected early, but have a poor prognosis once it has spread beyond the thyroid. This study looks at risk factors for a bad prognosis in a subset of patients with medullary thyroid cancer.

#### THE FULL ARTICLE TITLE

Mathiesen JS et al C 2019 Survival and long-term biochemical cure in medullary thyroid carcinoma in Denmark 1997-2014: a nationwide study. *Thyroid*. Epub 2019 Jan 31. PMID: 30618340.

#### SUMMARY OF THE STUDY

The study looked at 220 patients in the Danish Thyroid Cancer Database diagnosed with medullary thyroid cancer over a 20 year time period. Endpoints were overall and disease-specific survival and long-term biochemical cure as defined by undetectable calcitonin levels at last follow-up. Patients were compared to a group of healthy Danish controls that were matched by sex and age to the medullary thyroid cancer group.

Almost 25% of patients had hereditary medullary thyroid cancer and of those, 10/53 were identified by screening; most had a moderate-risk gene mutation causing the cancer. Hereditary cases were diagnosed at a younger age, and those diagnosed by screening presented at an earlier disease stage. Patients with hereditary medullary thyroid cancer diagnosed by screening had similar overall survival to that of the general population. Patients with both sporadic and hereditary medullary thyroid cancer diagnosed by symptoms had a decreased survival compared to the general population. However, the most important predictors of disease-specific survival were younger age at diagnosis and lack of spread beyond the thyroid and lymph node involvement was the most important predictor of biochemical cure, which was important for disease-specific survival.

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

Patients diagnosed with early-stage medullary thyroid cancer, including patients with hereditary medullary thyroid cancer detected by screening, have similar survival to that of the general population. However, patients that present with spread to the lymph nodes rarely achieve a biochemical cure, which confirms prior studies. Sharing this information with patients who present with spread to the lymph nodes can temper expectations for biochemical cure but provide reassurance about long-term survival even in the presence of persistently elevated calcitonin levels.

— Melanie Goldfarb MD, MS, FACS, FACE

#### ATA THYROID BROCHURE LINKS

Medullary Thyroid Cancer: <https://www.thyroid.org/medullary-thyroid-cancer/>





**MEDULLARY THYROID CANCER, continued**

**ABBREVIATIONS & DEFINITIONS**

**Medullary thyroid cancer:** a relatively rare type of thyroid cancer that often runs in families. Medullary cancer arises from the C-cells in the thyroid.

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

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

**Calcitonin:** a hormone that is secreted by cells in the thyroid (C-cells) that has a minor effect on blood calcium levels. Calcitonin levels are increased in patients with medullary thyroid cancer.

**Differentiated Thyroid Cancer**  
*June Awareness Month*

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## THYROID NODULES

# Can a standard scoring system of thyroid ultrasound findings accurately determine the need for a biopsy?

### BACKGROUND:

Thyroid nodules are very common. The main concern about a thyroid nodule is whether it is a cancer. Fortunately, ~95% of thyroid nodules are benign (non-cancer). Thyroid biopsy is the best test outside of surgery in determining whether thyroid nodule is cancerous or not. Thyroid ultrasound plays a key role in characterization of thyroid nodules. Selection of thyroid nodules for biopsy is based on their ultrasound characterization. Several ultrasound-based risk stratification systems have been developed to determine which nodules should be referred for biopsy. Most commonly used are classifications from the American Thyroid Association, the American Association of Clinical Endocrinologists, the American College of Radiology Thyroid Imaging Reporting and Data System (ACR-TIRADS), the European Thyroid Association, and the Korean Society of Thyroid Radiology Thyroid Imaging Reporting and Data System (K-TIRADS). The TIRADS system provides points on size, margins, structure/composition, echotexture, calcifications and extension outside of the thyroid and based on that system, biopsy is recommended on a point basis. The goal of this study was to compare the ability of the 5 most widely used ultrasound-based risk-stratification systems to identify nodules that do not need further evaluation with thyroid biopsy without missing cancerous nodules.

### THE FULL ARTICLE TITLE

Grani G et al 2019 Reducing the number of unnecessary thyroid biopsies while improving diagnostic accuracy: toward the “right” TIRADS. *J Clin Endocrinol Metab* 104:95–102. PMID: 30299457.

### SUMMARY OF THE STUDY

This is a study of 520 nodules in 477 patients that were referred for thyroid biopsy to a single center in Italy. Prior

to biopsy, each nodule was evaluated by two experienced clinicians and classified according to five ultrasound-based risk-stratifications. Final diagnosis was determined based on the results of cell analysis after biopsy or tissue analysis if surgery was done. Small thyroid nodules less than 1 cm were excluded from the analysis. Thyroid nodules with inconclusive diagnosis (non-diagnostic and indeterminate thyroid nodules) were excluded as well. Biopsies that were done for nodules that did not meet criteria for biopsy based on risk-stratification system were considered “unnecessary”. The percentages of “unnecessary” biopsies were compared among risk-stratification systems.

A total of 36 nodules (7.2%) were determined to be cancerous. All ultrasound-based risk stratification systems reduced the number of thyroid biopsies. The greatest reduction (53.4%) was seen with the ACR-TIRADS classification and the least reduction (17%) was with the K-TIRADS. Other classifications were similar to ACR-TIRADS. Based in ultrasound criteria alone, 11 cancers would have been missed by at least one of TIRADS systems and 3 cancers would have been missed by all of the classifications.

### WHAT ARE THE IMPLICATIONS OF THIS STUDY?

The ACR TIRADS classification system helps better to determine the need for thyroid biopsy without significant compromise in accuracy of the cancer diagnosis. These systems are helpful in reducing the number of benign biopsies. Understanding diagnostic tests characteristics may help clinicians to decide which classification system to use. The results should be used with caution since indeterminate nodules were excluded and the findings cannot be universally applied to all the patients.

—Valentina D. Tarasova, M.D.





## THYROID NODULES, continued

### ATA WEB BROCHURE LINKS:

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

Fine Needle Aspiration Biopsy of Thyroid Nodules: <https://www.thyroid.org/fna-thyroid-nodules/>

### ABBREVIATION AND 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.

**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.





## THYROID CANCER

### Cancer rates in children with indeterminate thyroid nodules

#### BACKGROUND

Thyroid nodules are uncommon in children; however, the risk of cancer in a thyroid nodule is higher when compared to adults. As in adults, thyroid biopsy and cytology are used to evaluate thyroid nodules. Approximately 35% of thyroid nodules in children are reported as indeterminate by biopsy. Indeterminate thyroid nodules include classification groups: 1) atypia of undetermined significance/follicular lesion of undetermined significance (AUS/FLUS); 2) follicular neoplasm/suspicious for a follicular neoplasm (FN/SFN); and 3) suspicious for a malignancy (SM). In children, cancer rates have been reported to be 28% in nodules with AUS/FLUS cytology, 58% in FN/SFN, and 100% in SM. In contrast, recent data in adults suggest cancer rates of 6 to 18% for AUS/FLUS, 10 to 40% for FN/SFN, and 45 to 60% for SM.

The current American Thyroid Association guidelines recommend removal of the entire thyroid gland (thyroidectomy) or removal of one lobe of the thyroid (lobectomy) in children with indeterminate thyroid nodules. The objective of this study is to evaluate the cancer rate for indeterminate thyroid nodules in pediatrics.

#### THE FULL ARTICLE TITLE

Wang H et al Incidence and malignancy rates of indeterminate pediatric thyroid nodules. *Cancer Cytopathology*. Epub 2019 Feb 15. PMID: 30768868.

#### SUMMARY OF THE STUDY

This study analyzed 302 thyroid biopsies in patients less than or equal to 21 years of age at the time of the

biopsy. A total of 41 nodules (14%) were reported as indeterminate and 104 nodules were surgically removed. Cancer rates were determined for different classifications of thyroid nodules. Cancer was reported in 3 of the 15 (20%) of the AUS/FLUS nodules, 2 of the 8 (25%) with FN/SFN, and 5 of the 5 (100%) diagnosed as SM.

The authors also reviewed 6 previously published studies on thyroid biopsies in children and found similar results. When adding this study to the 6 others, the data showed an average rate of indeterminate thyroid nodules of 20%. The rate of cancer was different for the various types of indeterminate nodules. Thus, the rates of indeterminate nodules in pediatrics and rates of cancer for indeterminate nodules may be lower than previously reported.

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

This largest study to date of thyroid nodules in children suggests that the rate of cancer is lower than previously reported for indeterminate thyroid nodules in children and more specific management may be needed compared to the current recommendations of up-front surgery for these nodules. This study did not include evaluation of molecular markers in the indeterminate nodules, as is common practice in adults with indeterminate nodules. Thus, adding molecular marker analysis to a study such as this would be helpful to guide management of these nodules.

—Priya Mahajan, MD

#### ATA THYROID BROCHURE LINKS

Fine Needle Aspiration Biopsy of Thyroid Nodules: <https://www.thyroid.org/fna-thyroid-nodules/>

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

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





## THYROID CANCER, continued

### 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 biopsy:** 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 or lobectomy.

**Molecular markers:** genes and microRNAs that are expressed in benign or cancerous cells. Molecular markers can be used in thyroid biopsy specimens to either to diagnose cancer or to determine that the nodule is benign. The two most common molecular marker tests are the Afirma™ Gene Expression Classifier and Thyroseq™.





## HYPOTHYROIDISM

# Levothyroxine use following a partial thyroidectomy may increase the risk of osteoporosis

### BACKGROUND

Thyroid hormone has important effect on bone turnover. In hyperthyroidism, or when taking high doses of levothyroxine, bone turnover is increased and can lead to bone loss. Some studies have shown an increased risk of osteoporosis after thyroidectomy, especially when patients are treated with high doses of levothyroxine as is done in patients with thyroid cancer. After discovering the connection between osteoporosis and low TSH levels in thyroid cancer patients, the practice of prescribing thyroid hormone after thyroid cancer surgery was changed. Nowadays, only patients with aggressive forms of thyroid cancer receive higher doses of levothyroxine to suppress TSH levels and most thyroid cancer patients are treated with a dose of levothyroxine that is sufficient to maintain a low normal or slightly low TSH level. This present study was done to investigate the risk of osteoporosis after thyroid surgery of any kind.

### THE FULL ARTICLE TITLE

Hung CL et al 2018 Is partial or total thyroidectomy associated with risk of long-term osteoporosis: a nationwide population-based study. *World J Surg* 42:2864–2871. PMID: 29541822.

### SUMMARY OF THE STUDY

The study was done in Taiwan. In Taiwan, universal health insurance is offered and extensive information regarding different medical problems in Taiwanese population is available. The authors of this study found 1426 patients who had partial or complete thyroid surgery from year 2000 to 2005. They compared these patients to 5704 other patients who had never had thyroid surgery or any

other form of thyroid disease but had similar age, sex and medical problems other than thyroid. None of the patients at either group had diagnosis of osteoporosis or fracture related to osteoporosis before the year 2000. They compared the rate of osteoporosis and fractures related to osteoporosis developed afterward in these two groups.

The study found more osteoporosis in patients who started taking levothyroxine after surgery than patients who never had thyroid surgery. The risk of developing osteoporosis was about 1.4 times higher in patients with thyroid surgery. The higher risk was mainly detected in females and in patients who were 20 to 49 year old at the time of surgery. The risk of fractures related to osteoporosis was not affected.

### WHAT ARE THE IMPLICATIONS OF THIS STUDY?

This study suggests that requiring levothyroxine after thyroid surgery, even partial thyroid surgery, may increase the possibility of osteoporosis for women, especially those who are younger than 50. However, this study was done based on general information that was available in population health records and the details regarding the levothyroxine dose and the thyroid hormone and TSH levels of patients in study were not included. The finding of this study should be confirmed. However, it is important for physicians and patients to know that treatment with levothyroxine may increase the risk of osteoporosis and attention to proper dosing should be given.

— Shirin Haddady, MD

### ATA THYROID BROCHURE LINKS

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

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

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





## 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.

**Partial thyroidectomy:** surgery that removes only part of the thyroid gland (usually one lobe with or without the isthmus).

**Osteoporosis:** a decrease in bone mineral density in which the individual is at a significantly increased risk for fractures with little or no trauma or force. This occurs with a bone mineral density T score of  $>-2.5$ . The areas at highest risk for osteoporotic fractures are the wrist, spine and hip.

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

**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.

## Watch how your donations help find answers to thyroid cancer



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Medullary Thyroid Cancer – Help the ATA Find a Cure  
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April 17, 2016

♥ 11

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## THYROID AND PREGNANCY

### High levels of thyroid antibody is associated with decreased response of thyroid gland to the main pregnancy hormone early in pregnancy

#### BACKGROUND

The main pregnancy hormone is human chorionic gonadotropin (hCG). This hormone is made by placenta during early pregnancy and is the basis for a positive pregnancy test. The highest levels of hCG are seen in the first trimester. This hormone can also bind to the thyroid gland and stimulate it, similar to TSH but much weaker. During pregnancy, hCG stimulates the thyroid gland of the pregnant mother to make more thyroid hormone, which is important for normal development of the baby. TSH levels in the mother decrease as hCG levels rise. However, if the mother has autoimmune thyroid disease with high levels of antibodies to thyroid gland, such as thyroid peroxidase antibody (TPOAb) or thyroglobulin antibody (TgAb), the thyroid gland may not respond as well to hCG. Because of this, TSH levels may not decrease as much as would be seen in the absence of these antibodies. This study was done to assess response of thyroid gland to hCG in pregnant women with and without thyroid antibodies during the first 20 weeks of pregnancy.

#### THE FULL ARTICLE TITLE

Hou Y et al 2019 Different Thyroidal Response to Human Chorionic Gonadotropin Under Different Thyroid Peroxidase Antibody and/or Thyroglobulin Antibody Positivity Conditions During the First Half of Pregnancy. *Thyroid* 29(4):577-585

#### SUMMARY OF THE STUDY

A total of 822 pregnant women in 7-20 weeks of pregnancy in three cities in China were included in the study. All women had normal serum TSH levels by the pregnancy-specific normal ranges. None of the women had twin or higher order pregnancy, history of thyroid disease, or took medications that might affect thyroid

function. Blood levels of hCG, TSH, free thyroxine (FT<sub>4</sub>), TPOAb, and TgAb were measured when they enrolled in the study. Pregnant women were divided into 4 groups: group 1 had both TPOAb and TgAb, group 2 had TPOAb only, group 3 had TgAb only, and group 4 did not have TPOAb or TgAb. There were 128 pregnant women in group 1, 90 women in group 2, 188 women in group 3, and 416 women in group 4. For group 2 and group 3, pregnant women were further divided into three groups each, from lowest level of thyroid antibody to highest level of thyroid antibody.

Higher hCG levels correlated with lower TSH levels in all groups. However, hCG level did not correlated with TSH levels in pregnant women with highest levels of TPOAb in group 2 and in pregnant women with highest levels of TgAb in group 3. Higher hCG levels correlated with higher FT<sub>4</sub> levels in group 2 and group 4, but not in group 1 (pregnant women with both TPOAb and TgAb). However, hCG level did not correlated with FT<sub>4</sub> level in pregnant women with highest levels of TgAb in group 3.

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

In pregnant women with normal TSH levels in pregnancy, high levels of thyroid antibodies, including TPOAb and TgAB, were associated with decreased response of thyroid gland to hCG. The findings of this study suggest that having high levels of thyroid antibodies may interfere with increased thyroid hormone production caused by high levels of pregnancy hormone in early pregnancy. More studies are needed to confirm the findings of current study and to study possible effects of high levels of thyroid antibody in pregnancy with normal TSH levels.

— Sun Lee, MD

#### ATA THYROID BROCHURE LINKS

Pregnancy and Thyroid Disease: <https://www.thyroid.org/thyroid-disease-pregnancy/>  
Thyroid Function Tests: <https://www.thyroid.org/thyroid-function-tests/>





## THYROID AND PREGNANCY, continued

### ABBREVIATIONS & DEFINITIONS

**hCG: human chorionic gonadotropin** — the major hormone produced by the placenta which is closely related to thyroid stimulating hormone (TSH). hCG can bind to the TSH receptors present in thyroid tissue and act like a weak form of TSH to cause the thyroid to produce and release more thyroxine and triiodothyronine. hCG is the hormone measured in the pregnancy tests.

**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<sub>4</sub> gets converted to the active hormone T<sub>3</sub> in various tissues in the body.

**Free Thyroxine (FT4):** thyroxine (T<sub>4</sub>) that is not bound to thyroid-binding globulin. This is a more active form of thyroxine in the blood.

**Antibodies:** proteins that are produced by the body's immune cells that attack and destroy bacteria and viruses that cause infections. Occasionally the antibodies get confused and attack the body's own tissues, causing autoimmune disease.

**TPO antibodies (TPOAb):** 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.

**Thyroglobulin antibodies (TgAb):** 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.

[www.thyroid.org/donate/](http://www.thyroid.org/donate/)



Support Thyroid Research





## 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](http://www.thyroid.org)

ATA Patient Resources:

[www.thyroid.org/thyroid-information/](http://www.thyroid.org/thyroid-information/)

Find a Thyroid Specialist: [www.thyroid.org](http://www.thyroid.org)

(Toll-free): 1-800-THYROID

[thyroid@thyroid.org](mailto:thyroid@thyroid.org)



#### Bite Me Cancer

[www.bitemecancer.org](http://www.bitemecancer.org)

[info@bitemecancer.org](mailto:info@bitemecancer.org)



#### Graves' Disease and Thyroid Foundation

[www.gdatf.org](http://www.gdatf.org)

(Toll-free): 877-643-3123

[info@ngdf.org](mailto:info@ngdf.org)



#### Light of Life Foundation

[checkyourneck.com](http://checkyourneck.com)

#### Light of Life Foundation

[www.checkyourneck.com](http://www.checkyourneck.com)

[info@checkyourneck.com](mailto:info@checkyourneck.com)



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[www.thyca.org](http://www.thyca.org)

(Toll-free): 877-588-7904

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#### Thyroid Cancer Alliance

[www.thyroidcanceralliance.org](http://www.thyroidcanceralliance.org)

[www.thyroidcancerpatientinfo.org](http://www.thyroidcancerpatientinfo.org)

Rotterdam, The Netherlands



Thyroid Cancer Canada  
Cancer de la thyroïde Canada

#### Thyroid Cancer Canada

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#### Thyroid Federation International

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AMERICAN  
**THYROID**  
ASSOCIATION  
ATA | *Founded 1923*

# Friends of the ATA

FOUNDED 2005



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## JOIN US

### 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.

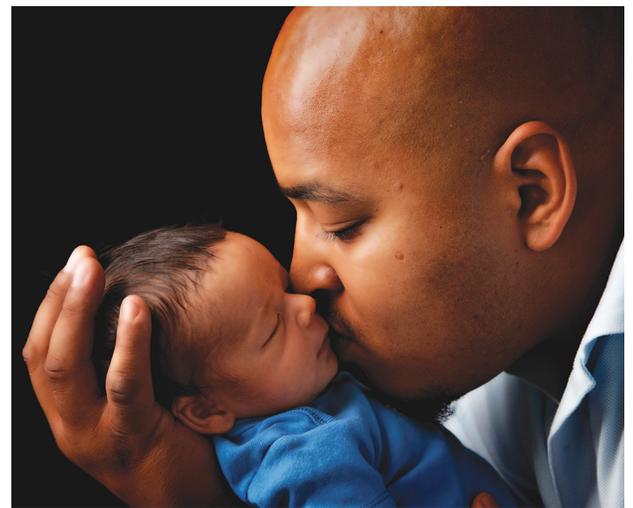


“The ATA was a valuable resource for our family when my dad was diagnosed with Anaplastic Thyroid Cancer. When you're faced with a detrimental diagnosis where even a few days can make the difference in life or death, understanding your options quickly is critical. The ATA website offers a one-stop shop 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

*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.



# 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

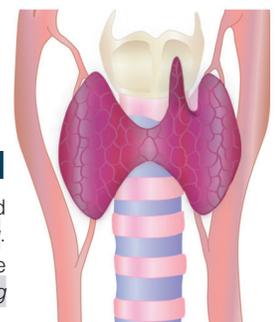
of a nuclear accident. If you live near a nuclear reactor and want more information about the role of potassium iodide, check the recommendations from your state at the following link: [www.thyroid.org/web-links-for-important-documents-about-potassium-iodide/](http://www.thyroid.org/web-links-for-important-documents-about-potassium-iodide/).

### 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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For information on thyroid patient support organizations, please visit the *Patient Support Links* section on the ATA website at [www.thyroid.org](http://www.thyroid.org)

# Iodine Deficiency

**PREGNANCY-RELATED PROBLEMS** – Iodine deficiency is especially important in women who are pregnant or nursing their infants. Severe iodine deficiency in the mother has been associated with miscarriages, stillbirth, preterm delivery, and congenital abnormalities in their babies. Children of mothers with severe iodine deficiency during pregnancy can have intellectual disabilities and problems with growth, hearing, and speech. In the most severe form, an underactive thyroid can result in cretinism (a syndrome characterized by permanent brain damage, intellectual disabilities, deaf mutism, spasticity, and short stature), though this is not seen in the United States. Congenital hypothyroidism due to iodine deficiency is the most common preventable cause of intellectual disabilities in the world. Even mild iodine deficiency during pregnancy, which may be present in some women in the United States, may be associated with low intelligence in children.

## HOW IS IODINE DEFICIENCY TREATED?

There are no tests to confirm if you have enough iodine in your body. When iodine deficiency is seen in an entire population, it is best managed by ensuring that common foods that people eat contain sufficient levels of iodine. Since even mild deficiency during pregnancy can have effects on delivery and the developing baby, all pregnant and breastfeeding women should take a multivitamin containing at least 150 µg iodine per day.

## HOW IS IODINE DEFICIENCY PREVENTED?

As with many diseases, it is better to prevent the problem rather than have to treat it. Over the last 80 years, worldwide efforts have been made to eliminate iodine deficiency. Indeed, elimination of iodine deficiency has been a major goal of the World Health Organization. Iodized salt has been the mainstay of treatment for iodine deficiency worldwide, including in the United States. Injections of iodized oil are occasionally used in regions of the world where widespread iodized salt use is not possible. Iodination of water supplies also has been effective in some places.

**UNITED STATES RECOMMENDATIONS** – The Institute of Medicine has set the Recommended Dietary Allowance (RDA) for iodine in adult men and women at 150 µg per day. Individuals who add table salt to their food regularly should use iodized salt. One teaspoon of iodized salt contains approximately 400 µg iodine. Most iodine-containing multivitamins have at least 150 µg iodine, but only about half of the types of multivitamins in the U.S. contain iodine.

**RECOMMENDATIONS FOR IODINE INTAKE DURING PREGNANCY AND BREAST FEEDING** – The RDA is 220 µg iodine per day for pregnant women and 290 µg iodine per day for breastfeeding women. Because the effects of iodine deficiency are most severe in pregnant women and their babies, the American Thyroid Association® has recommended that all pregnant and breastfeeding women in the U.S. and Canada take a prenatal multivitamin containing 150 µg iodine per day.

## ARE THERE PROBLEMS WITH TAKING TOO MUCH IODINE?

Taking too much iodine can also cause problems. This is especially true in individuals that already have thyroid problems, such as nodules, hyperthyroidism and autoimmune thyroid disease. Administration of large amounts of iodine through medications (i.e.: Amiodarone), radiology procedures (iodinated intravenous dye) and dietary excess (Dulse, kelp) can cause or worsen hyperthyroidism and hypothyroidism.

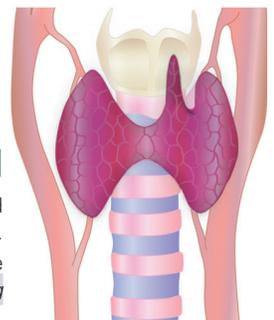
In addition, individuals who move from an iodine-deficient region (for example, parts of Europe) to a region with adequate iodine intake (for example, the United States) may also develop thyroid problems since their thyroids have become very good at taking up and using small amounts of iodine. In particular, these patients may develop iodine-induced hyperthyroidism (see [Hyperthyroidism brochure](#)).



## 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.

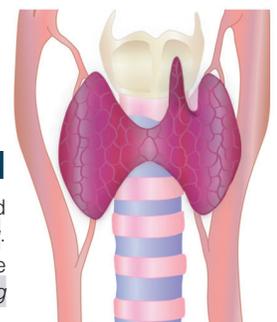
Alternatively, TSH can be increased sufficiently without stopping thyroid hormone medication by injecting TSH into your body. Recombinant human TSH (rhTSH, Thyrogen®) can be given as two injections in the days prior to radioactive iodine treatment. The benefit of this approach is that you can stay on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



## FURTHER INFORMATION

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# Thyroid Cancer

## (Papillary and Follicular)

### 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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