AMERICAN THYROID ASSOCIATION
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Clinical Thyroidology® for the Public

VOLUME 10 | ISSUE 10 | OCTOBER 2017

THYROID CANCER
Environmental toxicants and thyroid cancer

There has been a steady rise of thyroid cancers over the past several decades. Some of this is likely due to the increased use of imaging such as CT scans. However, it is likely that other factors play a role as well, including chemicals in our environment. This study was performed to examine whether exposure to flame retardant chemicals in the environment might be associated with the rise in thyroid cancer.

Hoffman K et al.. Exposure to flame retardant chemicals and occurrence and severity of papillary thyroid cancer: A case-control study. Environ Int 2017 Oct;107:235-242.

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How often does a thyroid cancer patient need to undergo surveillance with cervical ultrasound?

Ultrasound is a standard method of evaluating a thyroid cancer patient over time. Current guidelines released by expert groups recommend ultrasounds of the neck to be done at 6-12 months after surgery and then periodically or at yearly intervals. However, the evidence for recommending ultrasounds at these short intervals is not particularly strong. The aim of this study was to determine the best interval to perform ultrasounds after surgery for thyroid cancer.

Ryoo I et al Analysis of postoperative ultrasonography surveillance after total thyroidectomy in patients with papillary thyroid carcinoma: a multicenter study. Acta Radiol. January 1, 2017 [Epub ahead of print]. doi:10.1177/0284185117700448

THYROID CANCER
Is I-124 PET/CT useful in identifying thyroid cancer that may take up radioactive iodine?

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Santhanam P et al. Utility of I-124 PET/CT in identifying radioiodine avid lesions in differentiated thyroid cancer: a systematic review and meta-analysis. Clin Endocrinol (Oxf) 2017 May;86:645-51. Epub February 28, 2017.

THYROID CANCER
Distant metastases from low risk thyroid cancer are rare and associated with RAS and/or TERT Mutations

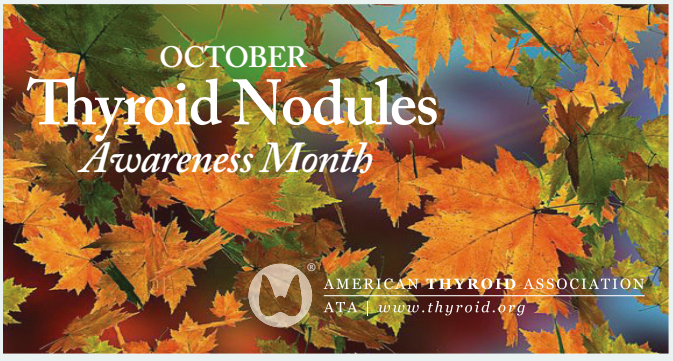
Spread of thyroid cancer outside the neck is rare, occurring in between 1.2 and 13% of patients. While most patients who develop distant metastases from their thyroid cancer have evidence of aggressive features noted after surgery, some are low risk cancers. The goal of the study is done to evaluate the features of low risk papillary thyroid cancer that develops distant metastases.

Xu B et al. Primary thyroid carcinoma with low-risk histology and distant metastases: clinicopathologic and molecular characteristics. Thyroid. May 2017, 27(5): 632-640.

THYROID AND PREGNANCY
Pregnant women of African descent have a lower TSH concentration and a lower rate of thyroid autoimmunity

Thyroid hormone levels in the mother often change during pregnancy, with the serum level of TSH generally being lower in pregnancy. Previous research has shown differences in the range of thyroid tests and TPO antibodies between healthy women of different ethnic groups. This study has been done to investigate the range of TSH in pregnant women of different ethnic groups.

Veltri F et al Maternal thyroid parameters in pregnant women with different ethnic backgrounds: do ethnicity-specific reference ranges improve the diagnosis of subclinical hypothyroidism? Clin Endocrinol (Oxf). March 27, 2017. Epub ahead of print.



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Clinical Thyroidology® for the Public

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www.thyroid.org

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*.

October is Thyroid Nodule Awareness Month.

In this issue, the studies ask the following questions:

- Do flame retardants found on furniture and electronics cause thyroid cancer?
- How often do thyroid cancer patients need neck ultrasounds?
- Can a new imaging tests identify thyroid cancer that will respond to radioactive iodine?
- Can we predict which low risk cancers really aren't low risk?
- Are African-American women at risk for thyroid problems 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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Clinical Thyroidology® for the Public

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THYROID CANCER

Environmental toxicants and thyroid cancer

BACKGROUND

There has been a steady rise of thyroid cancers (mostly as papillary thyroid cancers) over the past several decades. Over 62,000 new cases were diagnosed in the U.S. during 2016. The cause of this increase is unclear. Some of this is likely due to the increased use of imaging such as CT scans that identify small thyroid nodules that may never become concerning. However, it is likely that other factors play a role as well, including chemicals in our environment.

One possible group of chemicals in the environment are flame retardants called PBDEs, which were used commonly in electronics and furniture manufacturing practices. Although use of PBDEs has been mostly phased out, the chemicals still persist in the environment, mostly in household dust. It has been proposed that exposure to these and other endocrine-disrupting chemicals might increase the risk of thyroid cancer through increased or decreased thyroid hormone levels. This study was performed to examine whether exposure to flame retardant chemicals in the environment might be associated with the rise in thyroid cancer.

THE FULL ARTICLE TITLE

Hoffman K et al.. Exposure to flame retardant chemicals and occurrence and severity of papillary thyroid cancer: A case-control study. Environ Int 2017 Oct;107:235-242.

SUMMARY OF THE STUDY

The researchers studied 70 patients with papillary thyroid cancer and compared them against 70 patients without thyroid cancer. PBDE levels were measured in samples of dust collected from patients' households, as well as in patients' blood. There are many different types of PBDE flame retardant chemicals. This study measured 116 common ones in dust samples and 27 ones in patients' blood. The findings show that every household had detectable PBDE levels from the dust samples. Among the patients with papillary thyroid cancer, two of these chemicals measured in household dust were found to be in higher levels. Some of the chemicals also were associated with more aggressive forms of papillary thyroid cancer (for example, higher stage of the cancer). PBDE content in blood was either not present in most people or present in very low levels, such that this could not be studied.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

This was a relatively small study that examined whether flame retardant chemicals found in household dust might be related to papillary thyroid cancer. The findings suggest that there might be higher levels of at least some PBDEs in the local environment (household dust) of people with papillary thyroid cancer. However, PBDE levels were too low to detect in patients' blood.

The topic of chemicals that affect the thyroid is extremely complex. Additionally, the reasons for why thyroid cancer might be on the rise are numerous. This study is interesting, though, in at least starting to examine how chemicals in the environment might be related to thyroid cancers. Further studies are needed to better understand the role of endocrine-disrupting chemicals on the development of thyroid disease.

— Angela M. Leung, MD, MSc

ATA THYROID BROCHURE LINKS

Thyroid Cancer: https://www.thyroid.org/thyroid-cancer/

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).

Endocrine-disrupting chemicals: Chemical pollutants in the environment that can affect the action of endocrine glands. Examples include polybrominated diphenyl ethers (PBDEs), bisphenol A (BPA), polychlorinated biphenols (PCBs), perfluoroalkyl substances (PFAs), and organochlorines (OCs).

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THYROID CANCER

How often does a thyroid cancer patient need to undergo surveillance with cervical ultrasound?

BACKGROUND

The incidence of papillary thyroid cancer has been reported to have increased in the last 20 years. Although the overall prognosis of this type of cancer is excellent, it is known that approximately 30% of thyroid cancers can recur over time. The vast majority of thyroid cancer recurrence occurs in the neck. Even though recurrence of thyroid cancer in the neck can usually be effectively treated, it is associated with spread outside of the neck which dose carry a worse prognosis and an increased risk of death. Thus, it is important that patients continue to be appropriately evaluated after their surgery, regardless of the extent of surgery or other treatments received.

Ultrasound is a standard method of evaluating a thyroid cancer patient over time, because it is readily available, relatively inexpensive and does not expose patients to radiation. Current guidelines released by expert groups recommend ultrasounds of the neck to be done at 6-12 months after surgery and then periodically or at yearly intervals. However, the evidence for recommending ultrasounds at these short intervals to follow up patients with thyroid cancer is not particularly strong.

Unfortunately, the overuse of imaging studies after surgery can increase the number of visits of patients to a hospital and result in a substantial increase in stress and anxiety. There is no evidence that frequent imaging improve thyroid cancer survival rates. The aim of this study was to determine the best interval to perform ultrasounds after surgery for thyroid cancer.

THE FULL ARTICLE TITLE

Ryoo I et al Analysis of postoperative ultrasonography surveillance after total thyroidectomy in patients with papillary thyroid carcinoma: a multicenter study. Acta Radiol. January 1, 2017 [Epub ahead of print]. doi:10.1177/0284185117700448

SUMMARY OF THE STUDY

This study was carried out in South Korea, using data collected from seven high complexity hospitals. It was a retrospective study which included 200 consecutive patients from each hospital who met certain criteria, for a total of 1400 patients.

All patients had the entire thyroid gland taken out (total thyroidectomy), and most patients also had the lymph nodes of the central area of the neck removed during the surgery. Radioactive iodine therapy was given to patients who were found to have cancer in those nodes, or if it was felt that the thyroid cancer was not completely removed. As is the case with thyroid cancer, most patients (1197) were women. To be included in the study, patients needed to have documentation of at least two ultrasounds during at least 5 years of follow up. Ultrasounds were performed by radiologists specialized in head and neck imaging or radiologists who were in a head and neck fellowship program.

Of the 1400 patients, 115 (8.2%) were found to have either recurrent or persistent thyroid cancer. A total of 92 of these patients (80%) had spread of the cancer to lymph nodes in the neck, while 22 (19%) had disease in the thyroid bed and one patient had both. Approximately 66% of patients were diagnosed with their recurrence or persistence within 2 years of their total thyroidectomy (31% in the first year), 28% within 2-5 years and 6% after 5 years. In 89 of these 115 patients, ultrasound was the method by which the recurrence or persistence of the cancer was found. In the remaining 26 patients, the recurrence or persistence was initially detected by other tests such as serum thyroglobulin levels and PET or CT scans.

Assuming that the first ultrasound done after surgery was done at 24 months and the second at 5 years, there would have been 65 (4.7%) patients who would have had a delayed diagnosis when comparing with those who had ultrasounds done yearly. The time lag in diagnosing a recurrence would have been 15.1 months. The authors conclude that the optimal interval for the first ultrasound follow up may be 1 or 2 years after having thyroid surgery,

THYROID CANCER, continued

and that the appropriate number of examinations with ultrasound within the first 5 years may only be one or two.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

The large and growing number of patients who carry a diagnosis of papillary thyroid cancer creates an important health economic problem: For how long do these patients need to be monitored and how often?

Recent studies support the concept that less intensive monitoring may be appropriate for patients who have low risk cancers who are disease free after one year. However, more intensive follow up is still needed for patients who have more advanced or aggressive cancers in whom the risk for recurrence ranges between 5-14% even when they are considered to be free of cancer after initial treatment.

The limitations of this study are that it was retrospective and that the follow up schedule at the different hospitals was not uniform. Also, the study did not try to distinguish between recurrent and persistent disease. A positive thing about this study is that it was limited to papillary thyroid cancer because it is rare for other types of thyroid cancer (follicular type) to consistently invade the lymph nodes.

— Jessie Block-Galarza, MD

THYROID BROCHURE LINKS

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

ABBREVIATIONS & DEFINITIONS

Thyroid Ultrasound: a common imaging test used to evaluate the structure of the thyroid gland. Ultrasound uses soundwaves to create a picture of the structure of the thyroid gland and accurately identify and characterize nodules within the thyroid. Ultrasound is also frequently used to guide the needle into a nodule during a thyroid nodule biopsy.

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

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

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

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

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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THYROID CANCER

Is I-124 PET/CT useful in identifying thyroid cancer that may take up radioactive iodine?

BACKGROUND

In patients who have had surgery (total thyroidectomy) for thyroid cancer, diagnostic whole body radioactive iodine (I-123 or I-131) scans are used to look for residual normal thyroid tissue or recurrent thyroid cancer that may be treated with radioactive iodine therapy. However, sometimes thyroid cancer lesions may be missed on traditional diagnostic radioactive iodine scans. In this study, a systematic review of the literature and pooled analysis of published data was performed, to determine how effective I-124 PET/CT is in identifying thyroid cancer lesions that may be able to be treated with radioactive iodine, as confirmed by a post-therapy scan (after radioactive iodine treatment).

THE FULL ARTICLE TITLE

Santhanam P et al. Utility of I-124 PET/CT in identifying radioiodine avid lesions in differentiated thyroid cancer: a systematic review and meta-analysis. Clin Endocrinol (Oxf) 2017 May;86:645-51. Epub February 28, 2017.

SUMMARY OF THE STUDY

The authors did an electronic search of MEDLINE/PUBMED and EMBASE databases for relevant articles on the use of "I-124" and "differentiated thyroid cancer", and then reviewed 118 published reports. The authors included 8 studies that met their criteria for the review. In these studies, I-124 PET/CT scans were performed prior to radioactive iodine treatment and the results were compared to the post-therapy scans. The authors included data from a total of 141 patients and 415 thyroid cancer lesions. The authors reported that there was significant variability among included studies with respect to variables such as radioactive iodine treatment dose activity and diagnostic scanning techniques. The authors combined the data from the reviewed studies and reported that the following pooled diagnostic accuracy data for I-124 PET/CT in detection of thyroid cancer lesions. The results show that the sensitivity 94·2% and specificity 49·0% (34·8-63·4%)

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

The authors concluded that I-124 PET/CT is a sensitive technique to identify thyroid cancer lesions that may be able to respond to treatment by radioactive iodine. Further research confirming these findings is needed, ideally including larger numbers of patients and standardized techniques across studies. Moreover, more research is needed to determine whether the use of I-124 PET/CT to guide radioactive iodine treatment decisions may improve long-term patient outcomes. These findings may be important to patients as they demonstrate emerging evidence on the diagnostic accuracy of I-124/PET-CT scanning.

— Anna M. Sawka, MD

ATA THYROID BROCHURE LINKS

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

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

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.

Diagnostic Whole Body Scans: these radioactive iodine scans are performed under TSH stimulation, either after thyroid hormone withdrawal or after injections of recombinant human TSH (Thyrogen), and usually include measuring serum thyroglobulin levels.

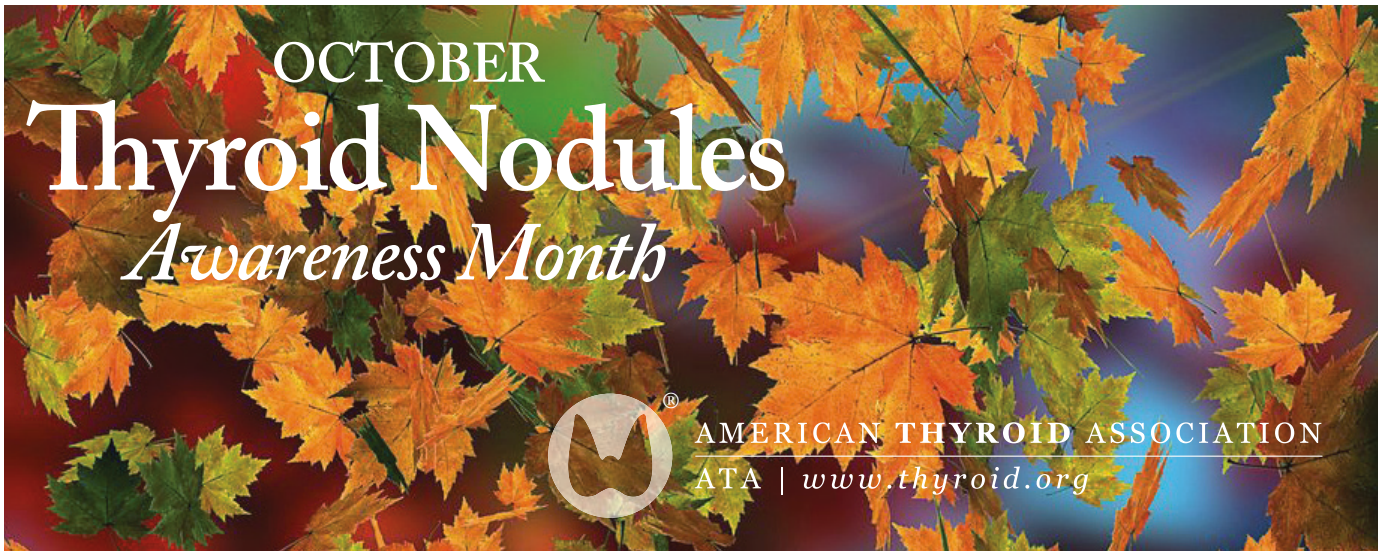
THYROID CANCER, continued

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

Test sensitivity: the proportion of patients with a certain disease in whom the test used to diagnose that disease is positive.

Test specificity: the proportion of patients without a certain disease in whom the test used to diagnose that disease is negative

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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THYROID CANCER

Distant metastases from low risk thyroid cancer are rare and associated with RAS and/or TERT Mutations

BACKGROUND

The rate of thyroid cancer has been increasing over the last 20 years. Most of this increase has been in papillary thyroid cancer, which is the most common type of thyroid cancer. Fortunately, the vast majority of patients with papillary thyroid cancer do well and death from papillary thyroid cancer is rare. Because of this, the most recent guidelines from the American Thyroid Association emphasize an assessment of risk of the patient for cancer recurrence to help guide treatment and follow up after the initial thyroid surgery. Most patients with papillary thyroid cancer fall into the low risk category.

Spread of the cancer into the lymph nodes of the neck and outside of the neck increases the risk of recurrence. Spread of thyroid cancer outside the neck (metastases) is rare, occurring in between 1.2 and 13% of patients. However, when present in older patients, distant metastases are associated with a higher risk for death. Most patients who develop distant metastases from their thyroid cancer have evidence of aggressive features noted after surgery. Some unusual cases of distant metastases from low risk papillary thyroid cancer without these aggressive features can be a surprise to clinicians and have not been studied in detail.

The goal of the study is done to evaluate the features of low risk papillary thyroid cancer that develops distant metastases.

THE FULL ARTICLE TITLE

Xu B et al. Primary thyroid carcinoma with low-risk histology and distant metastases: clinicopathologic and molecular characteristics. Thyroid. May 2017, 27(5): 632-640.

SUMMARY OF THE STUDY

The 1983-2009 institutional database of Memorial Sloan-Kettering Cancer Center, New York, NY, identified 123 patients with distant metastases. A total of 11 cases of low risk primary thyroid cancers who also had distant metastases were also retrieved from the pathology database at the same institution.

Of the initial group of 123 patients, 74 of the patients had distant metastases at presentation and 49 patients developed distant metastases and 97% (119 patients) were considered aggressive based the initial pathology. The remaining 4 were considered low risk based on pathology and these were added to the 11 additional patients low risk patients with distant metastases for further study.

The types of cancers were 1) encapsulated follicular variant of papillary thyroid cancer with invasion (8), 2) infiltrative follicular variant of papillary thyroid cancer (2), 3) papillary microcarcinoma infiltrative follicular variant (1), 4) encapsulated papillary thyroid cancer classical variant (1), 5) encapsulated follicular carcinoma (1), and 6) encapsulated Hurthle cell thyroid carcinoma (2). A total of 10 of the primary cancers were less than 2 cm in size, all 15 had negative surgical margins and 6 were multifocal. Of the 12 encapsulated tumors, 9 had focal capsular invasion and 3 had extensive capsular invasion

The metastatic sites included 12 bone metastases, 3 to the lung, 2 to the chest wall, and 2 to the liver, 1 to the brain, and 1 to the kidney, and 2 to the pelvic and buttock soft tissue. A total of 11 of the patients were symptomatic and the other 4 patients had incidental findings on imaging studies which demonstrated the metastases. Thyroglobulin levels post-operatively were noted in 6 patients and these levels varied from 1.2 to 7570 ng/mL.

The molecular testing was completed on 8 of the 15 cases. The results showed that 6 of these cancers had 2 or more mutations present. RAS mutations (4NRAS, 1HRAS) were present in 5 of the 8, 6 had TERT promoter mutations and in 4 of these 6 there were either BRAFV600E or RAS mutations present as well.

THYROID CANCER, continued

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

Patients with low risk thyroid cancer are unlikely to develop distant metastases but when they do, there is a high rate of TERT promoter mutations. Although initial pathology is currently an excellent predictor of risk of cancer recurrence, further information from molecular testing may allow for more certainty. Future direction for research will continue to focus on predicting risk earlier on in the disease process and may include testing for molecular mutations such as TERT promoter mutations.

— Julie Hallanger-Johnson, MD

ATA THYROID BROCHURE LINKS

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

ABBREVIATIONS & DEFINITIONS

Genes: a molecular unit of heredity of a living organism. Living beings depend on genes, as they code for all proteins and RNA chains that have functions in a cell. Genes hold the information to build and maintain an organism's cells and pass genetic traits to offspring.

Cancer-associated genes: these are genes that are normally expressed in cells. Cancer cells frequently have mutations in these genes. It is unclear whether mutations in these genes cause the cancer or are just associated with the cancer cells. The cancer-associated genes important in thyroid cancer are BRAF, RET/PTC, TERT and RAS.

Mutation: A permanent change in one of the genes.

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™

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 **October** is **Thyroid Nodule 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 AND PREGNANCY

Pregnant women of African descent have a lower TSH concentration and a lower rate of thyroid autoimmunity

BACKGROUND

Thyroid hormone is important during pregnancy in both the mother and the developing baby. Thyroid hormone levels in the mother often change during pregnancy, with the serum level of TSH generally being lower in pregnancy. Finding the normal range of TSH in healthy pregnant women is important and it may have significant implications for diagnosis of thyroid disorders in pregnancy. Subclinical hypothyroidism is a mild state of hypothyroidism and is diagnosed when the TSH level is increased but thyroid hormone level is still within the normal range. Lots of attention has been given on how to diagnose and treat subclinical hypothyroidism in pregnancy as some clinical studies have shown problems with pregnancy outcomes related to this condition.

Autoimmune thyroid disease is the most common cause of thyroid problems in the United States. This occurs when the body makes antibodies that attack the thyroid and either block, stimulate or destroy the gland. The serum marker for autoimmune thyroid disease is TPO (thyroid peroxidase) antibodies.

Many endocrinology clinics now serve a multiethnic population. Previous research done in the United States and Netherland has shown differences in the range of thyroid tests and TPO antibodies between healthy women of different ethnic groups. This study has been done to investigate the range of TSH in pregnant women of different ethnic groups.

THE FULL ARTICLE TITLE

Veltri F et al Maternal thyroid parameters in pregnant women with different ethnic backgrounds: do ethnicity-specific reference ranges improve the diagnosis of subclinical hypothyroidism? Clin Endocrinol (Oxf). March 27, 2017. Epub ahead of print.

SUMMARY OF THE STUDY

The current study was done in CHU Saint-Pierre, a large referral center in Brussels, Belgium. Between 2013 and 2014, blood test for TSH, free T_4 and TPO antibody were obtained from 2261 pregnant women visiting in their first visit in Obstetric Clinics. Also information about age, Body mass index (BMI), smoking, drug use and parity as well as ethnicity (reported by patient) was collected. A total of 481 women from Sub-Saharan Africa, 754 women from North African descent, and 448 Caucasian women were entered into the study.

The study found that Caucasian women were younger, had a lower BMI but were more often smokers. Sub-Saharan and North African women had a slightly lower average TSH (1.3 mU/L for Sub-Saharan, 1.4 mU/L for North African and 1.5 mU/L for Caucasian women). Caucasian women had a higher rate of positive TPO antibodies.

Based on the TSH results obtained in this study, the authors calculated the normal range of TSH for each ethnic group. They compared the rate of diagnosis of subclinical hypothyroidism in each group once based on the normal range of TSH they had for their institution and once based on the normal range of TSH found in this study for each ethnic groups. No difference in the number of women diagnosed with subclinical hypothyroidism was found between the two groups.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

In this study of Belgian pregnant women, TSH level was lower in women of African decent. Also they had a lower rate of positive TPO antibodies. However, these changes did not lead to an increased risk of hypothyroidism. These result are interesting and further research is needed to determine the implication of these changes during pregnancy.

— Shirin Haddady, MD, MPH

ATA THYROID BROCHURE LINKS

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

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

THYROID AND PREGNANCY, continued

ABBREVIATIONS & DEFINITIONS

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.

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

Subclinical Hypothyroidism: a mild form of hypothyroidism where the only abnormal hormone level is an increased TSH. There is controversy as to whether this should be treated or not.

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).

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
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LIGHT OF LIFE FOUNDATION
www.checkyourneck.com
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THYCA: THYROID CANCER SURVIVORS' ASSOCIATION, INC.
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GRAVES' DISEASE & THYROID FOUNDATION

Thyroid Federation International

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

Thyroid Cancer Canada
Cancer de la thyroïde Canada

BITE ME CANCER!

Thyroid Nodules

WHAT IS THE THYROID GLAND?

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

WHAT IS A THYROID NODULE?

The term thyroid nodule refers to an abnormal growth of thyroid cells that forms a lump within the thyroid gland. Although the vast majority of thyroid nodules are benign (noncancerous), a small proportion of thyroid nodules do contain thyroid cancer. In order to diagnose and treat thyroid cancer at the earliest stage, most thyroid nodules need some type of evaluation.

WHAT ARE THE SYMPTOMS OF A THYROID NODULE?

Most thyroid nodules do not cause symptoms. Often, thyroid nodules are discovered incidentally during a routine physical examination or on imaging tests like CT scans or 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. Abnormal thyroid function tests may occasionally be the reason a thyroid nodule is found. Thyroid nodules may produce excess amounts of thyroid hormone causing hyperthyroidism (see *Hyperthyroidism brochure*). However, most thyroid nodules, including those that cancerous, are actually non-functioning, meaning tests like TSH are normal. Rarely, patients with thyroid nodules 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 the nodule invades the nerve that controls the vocal cords but this is usually related to thyroid cancer.

The important points to remember are the following:

- Thyroid nodules generally do not cause symptoms.
- Thyroid tests are most typically normal—even when cancer is present in a nodule.
- The best way to find a thyroid nodule is to make sure your doctor checks your neck!

WHAT CAUSES THYROID NODULES AND HOW COMMON ARE THEY?

We do not know what causes most thyroid nodules but they are extremely common. By age 60, about one-half of all people have a thyroid nodule that can be found either through examination or with imaging. Fortunately, over 90% of such nodules are benign. *Hashimoto's thyroiditis*, which is the most common cause of hypothyroidism (see *Hypothyroidism brochure*), is associated with an increased risk of thyroid nodules. Iodine deficiency, which is very uncommon in the United States, is also known to cause thyroid nodules.

HOW IS A THYROID NODULE EVALUATED AND DIAGNOSED?

Once the nodule is discovered, your doctor will try to determine whether the rest of your thyroid is healthy or whether the entire thyroid gland has been affected by a more general condition such as hyperthyroidism or hypothyroidism. Your physician will feel the thyroid to see whether the entire gland is enlarged and whether a single or multiple nodules are present. The initial laboratory tests may include measurement of thyroid hormone (thyroxine, or T4) and thyroid-stimulating hormone (TSH) in your blood to determine whether your thyroid is functioning normally.

Since it's usually not possible to determine whether a thyroid nodule is cancerous by physical examination and blood tests alone, the evaluation of the thyroid nodules often includes specialized tests such as thyroid ultrasonography and fine needle biopsy.

Thyroid Nodules

THYROID ULTRASOUND:

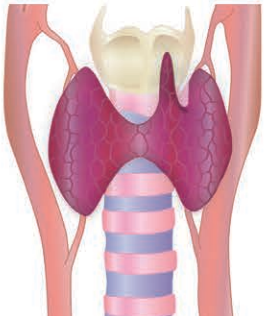
Thyroid ultrasound is a key tool for thyroid nodule evaluation. It uses high-frequency sound waves to obtain a picture of the thyroid. This very accurate test can easily determine if a nodule is solid or fluid filled (cystic), and it can determine the precise size of the nodule. Ultrasound can help identify suspicious nodules since some ultrasound characteristics of thyroid nodules are more frequent in thyroid cancer than in noncancerous nodules. Thyroid ultrasound can identify nodules that are too small to feel during a physical examination. Ultrasound can also be used to accurately guide a needle directly into a nodule when your doctor thinks a fine needle biopsy is needed. Once the initial evaluation is completed, thyroid ultrasound can be used to keep an eye on thyroid nodules that do not require surgery to determine if they are growing or shrinking over time. The ultrasound is a painless test which many doctors may be able to perform in their own office.

THYROID FINE NEEDLE ASPIRATION BIOPSY (FNA OR FNAB):

A fine needle biopsy of a thyroid nodule may sound frightening, but the needle used is very small and a local anesthetic may not even be necessary. This simple procedure is often done in the doctor's office. Sometimes, medications like blood thinners may need to be stopped for a few days before to the procedure. Otherwise, the biopsy does not usually require any other special preparation (no fasting). Patients typically return home or to work after the biopsy without even needing a bandaid! For a fine needle biopsy, your doctor will use a very thin needle to withdraw cells from the thyroid nodule. Ordinarily, several samples will be taken from different parts of the nodule to give your doctor the best chance of finding cancerous cells if they are present. The cells are then examined under a microscope by a pathologist.

The report of a thyroid fine needle biopsy will usually indicate one of the following findings:

1. The nodule is benign (noncancerous).
   - This result is obtained in up to 80% of biopsies. The risk of overlooking a cancer when the biopsy is benign is generally less than 3 in 100 tests or 3%. This is even lower when the biopsy is reviewed by an experienced pathologist at a major medical center. Generally, benign thyroid nodules do not need to be removed unless they are causing symptoms like choking or difficulty swallowing. Follow up ultrasound exams are important. Occasionally, another biopsy may be required in the future, especially if the nodule grows over time.
2. The nodule is malignant (cancerous) or suspicious for malignancy .
   - A malignant result is obtained in about 5% of biopsies and is most often due to papillary cancer, which is the most common type of thyroid cancer. A suspicious biopsy has a 50-75% risk of cancer in the nodule. These diagnoses require surgical removal of the thyroid after consultation with your endocrinologist and surgeon.
3. The nodule is indeterminate. This is actually a group of several diagnoses that may occur in up to 20% of cases. An Indeterminate finding means that even though an adequate number of cells was removed during the fine needle biopsy, examination with a microscope cannot reliably classify the result as benign or cancer.
   - The biopsy may be indeterminate because the nodule is described as a Follicular Lesion. These nodules are cancerous 20-30% of the time. However, the diagnosis can only be made by surgery. Since the odds that the nodule is not a cancer are much better here (70-80%), only the side of the thyroid with the nodule is usually removed. If a cancer is found, the remaining thyroid gland usually must be removed as well. If the surgery confirms that no cancer is present, no additional surgery to "complete" the thyroidectomy is necessary.
   - The biopsy may also be indeterminate because the cells from the nodule have features that cannot be placed in one of the other diagnostic categories. This diagnosis is called atypia, or a follicular lesion of undetermined significance. Diagnoses in this category will contain cancer rarely, so repeat evaluation with FNA or surgical biopsy to remove half of the thyroid containing the nodule is usually recommended.
4. The biopsy may also be nondiagnostic or inadequate. This result is obtained in less than 5% of cases when an ultrasound is used to guide the FNA. This result indicates that not enough cells were obtained to make a diagnosis but is a common result if the nodule is a cyst. These nodules may require reevaluation with second fine needle biopsy, or may need to be removed surgically depending on the clinical judgment of your doctor.



FURTHER INFORMATION

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

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

Thyroid Nodules

NUCLEAR THYROID SCANS:

Nuclear scanning of the thyroid was frequently done in the past to evaluate thyroid nodules. However, use of thyroid ultrasound and biopsy have proven so accurate and sensitive, nuclear scanning is no longer considered a first-line method of evaluation. Nuclear scanning still has an important role in the evaluation of rare nodules that cause hyperthyroidism. In this situation, the nuclear thyroid scan may suggest that no further evaluation or biopsy is needed. In most other situations, neck ultrasound and biopsy remain the best and most accurate way to evaluate all types of thyroid nodules.

MOLECULAR DIAGNOSTICS:

Can any other tests assist in evaluation of thyroid nodules?

Yes, new tests that examine the genes in the DNA of thyroid nodules are currently available and more are being developed. These tests can provide helpful information about whether cancer may be present or absent. These tests are particularly helpful when the specimen evaluated by the pathologist is indeterminate. These specialized tests are done on samples obtained during the normal biopsy process. There are also specialized blood tests that can assist in the evaluation of thyroid nodules. These are currently available only at highly specialized medical centers, however, their availability is increasing rapidly. Ask your doctor if these tests are available and might be helpful for evaluating your thyroid nodule.

HOW ARE THYROID NODULES TREATED?

All thyroid nodules that are found to contain a thyroid cancer, or that are highly suspicious of containing a cancer, should be removed surgically by an experienced thyroid surgeon. Most thyroid cancers are curable and rarely cause life-threatening problems (see *Thyroid Cancer brochure*). Thyroid nodules that are benign by FNA or too small to biopsy should still be watched closely with ultrasound examination every 6 to 12 months and annual physical examination by your doctor. Surgery may still be recommended even for a nodule that is benign by FNA if it continues to grow, or develops worrisome features on ultrasound over the course of follow up.

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