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Clinical Thyroidology® for the Public

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Törring O et al 2019. Impaired quality of life after radioiodine therapy compared with antithyroid drugs or surgical treatment for Graves' hyperthyroidism: a long-term follow-up with the Thyroid-Related Patient-Reported Outcome Questionnaire and 36-Item Short Form Health Status Survey. Thyroid 29:322–331. PMID: 30667296.

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Nam JY et al (2018) The effect of neonatal hypothyroidism and low family income on intellectual disability: a population-based cohort study. PLoS One 13(11):e0205955. PMID: 30403688.

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Rao M eut al. Effect of levothyroxine supplementation on pregnancy outcomes in women with subclinical hypothyroidism and thyroid autoimmunity undergoing in vitro fertilization/intracytoplasmic sperm injection: an updated meta-analysis of randomized controlled trials. Reprod. Biol. Endocrinol. 2018. 16:92. PMID: 30249251.

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Yu CY et al 2018 A systematic review and meta-analysis of subsequent malignant neoplasm risk after radioactive iodine treatment of thyroid cancer. Thyroid. Epub 2018 Nov 27. PMID 30370820.

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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.

As we think of all those who make a difference in our lives, we thank you for being part of the ATA family and for all of the Friends of the ATA who support our mission and work throughout the year to support us. We invite you to help keep the ATA mission strong by choosing to make a donation that suits you — it takes just one moment to give online at: www.thyroid.org/donate and all donations are put to good work. The ATA is a 501(c)3 nonprofit organization and your gift is tax deductible.

April is Hashimoto's Disease Awareness Month.

In this issue, the studies ask the following questions:

- Is levothyroxine therapy overused?
- Do thyroid disorders affect your sex life?
- Does RAI for Graves' disease adversely affect quality of life?
- Are low-income children with hypothyroidism at risk for intellectual disability?
- Is levothyroxine therapy helpful to patients with subclinical hypothyroidism undergoing in vitro fertilization?
- Is there a risk of secondary cancers after RAI for thyroid cancer?

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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HYPOTHYROIDISM

Is levothyroxine therapy overused?

BACKGROUND

Thyroxine is the main hormone secreted by the thyroid gland. Levothyroxine is the synthetic form of thyroxine and is one of the most commonly prescribed medications in the world. The main indication for levothyroxine is for the treatment of hypothyroidism. Other indications for levothyroxine include for decreasing the size of thyroid nodules or of goiter, although this indication has largely been shown to be ineffective. Levothyroxine also has been inappropriately used for treatment of problems that are not related to the thyroid.

Sometimes patients have been prescribed levothyroxine for a long time, but it is not clear why it was started or if they still need to be taking it. Also, while most patients with hypothyroidism require life-long treatment, in some patients the hypothyroidism may resolve. The main goal of this study was to determine how often such patients had normal thyroid hormone levels off levothyroxine treatment, suggesting that levothyroxine treatment was no longer needed. The authors also compared the features of individuals who ultimately had normal thyroid hormone levels off treatment, compared to those who had abnormal levels (high TSH or low free T_4) consistent with ongoing hypothyroidism.

THE FULL ARTICLE TITLE

Livadas S et al 2018 Levothyroxine replacement therapy and overuse: a timely diagnostic approach. Thyroid. Epub 2018 Oct 23. PMID: 30351232.

SUMMARY OF THE STUDY

The authors recruited 291 levothyroxine-treated patients from an academic Endocrinology clinic in Athens, Greece in 2015 and 2016. The patients were taking levothyroine for more than a year and abnormal pre-treatment thyroid function studies were not clearly established in the medical record. All patients had normal thyroid hormone levels on levothyroxine treatment. The authors excluded individuals who had prior thyroid surgery, goiter (enlarged thyroid), patients who had abnormal thyroid hormone levels on L-T_4 treatment, individuals on medications that could alter thyroid hormone levels (such as lithium, steroids), and women planning to get pregnant or who had given birth in the last year. The investigators also evaluated thyroid hormone levels (TSH, free T_4) before and after stopping levothyroxine treatment. All patients had a neck ultrasound to evaluate the appearance of the thyroid. Most of the patients were women (84%) and the average age was 48 years.

After stopping levothyroxine treatment for 6 to 8 weeks, 61% (177/291) of patients continued to have normal thyroid hormone levels. There was no significant difference in age, body mass index, duration of levothyroxine use, baseline thyroid hormone levels on levothyroxine (TSH, free T_4), levothyroxine dose, sex, family history of thyroid disease, or positivity of thyroid antibodies between patients who had normal thyroid hormone levels off levothyroxine compared to those whose levels became abnormal after pausing treatment. Irregular texture (heterogeneity) of the thyroid (an indication of inflammation in the thyroid) was seen more often in patients who had abnormal thyroid hormone levels off treatment (76%) compared to those whose levels remained normal (24%)

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

The authors concluded that a substantial proportion of individuals taking levothyroxine in whom the original indication for treatment is unclear, may not need to be taking this hormone. The authors highlighted the importance of ensuring that the original diagnosis of hypothyroidism is fully evaluated and documented in medical records and that levothyroxine use be periodically re-evaluated in treated patients.

An important implication for patients newly prescribed levothyroxine is to make sure to understand the medical reason for the treatment. It is also important for levothyroxine-treated individuals to note that these findings may not be applied to patient groups that were excluded from the study (e.g. patients with thyroid surgery, women planning to get pregnant, and others). Moreover,

HYPOTHYROIDISM, continued

individuals in this study were carefully medically monitored, and it is not advisable for patients to stop thyroid medication on their own, without consulting a healthcare practitioner. Also, patients in whom levothyroxine is discontinued still need to be followed to determine if they may eventually need to go back on levothyroxine at some point

— Anna Sawka, MD, PhD

ATA THYROID BROCHURE LINKS

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

ABBREVIATIONS & DEFINITIONS

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

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

Thyroid hormone therapy: patients with hypothyroidism are most often treated with Levothyroxine in order to return their thyroid hormone levels to normal. Replacement therapy means the goal is a TSH in the normal range and is the usual therapy. Suppressive therapy means that the goal is a TSH below the normal range and is used in thyroid cancer patients to prevent growth of any remaining cancer cells.

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

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

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).

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

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.

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THYROID DISORDERS

Thyroid disorders and impairment in sex life

BACKGROUND

Thyroid disorders (hypothyroidism, hypothyroidism, thyroid cancer) have been linked to a reduced quality of life in some clinical studies. Even fewer studies have looked at the effect of thyroid disorders on sexual function. To date, a few small studies have reported impaired sexual function in women with thyroid problems and in individuals with Hashimoto's thyroiditis. Only a single small study has examined the effect of nodular goiter on sexual function. This study examined how common impaired sex life was noted in a survey of patients with thyroid disorders.

THE FULL ARTICLE TITLE

Sawicka-Gutaj N et al 2018 Patients with benign thyroid diseases experience an impaired sex life. Thyroid. Epub; Jul 24

SUMMARY OF THE STUDY

This study was done in Denmark. The study included 877 patients with thyroid diseases who were recruited from two Danish university outpatient clinics in 2007–2008 as well as another 432 patients with newly diagnosed thyroid disorders recruited at the same clinics between 2008 and 2012 and followed for 6 months. Patients with thyroid nodules, hyperthyroidism, Graves' disease and autoimmune thyroid disease were included. Serum thyroid hormone levels were measured at baseline and were repeated at in those patients followed for 6 months. The Thyroid-Related Patient-Reported Outcome questionnaire (ThyPRO) and the general 36-Item Short Form Health Status Survey were done to understand the effect of these diseases on patients' sex life. The ThyPRO questionnaire included the question "During the past 4 weeks, have you felt your thyroid disease had a negative impact on your sex life?" The five response levels ranged from "not at all" to "very much."

The average ages of men and women in the study ranged from 51-56 years. The average duration of thyroid disease in the cross-sectional sample was 29 months in women and 15 months in men. A total of 29-34% of the men and women in the different samples had nontoxic goiter, 16-26% had toxic nodular goiter, 15-22% had Graves' disease without eye disease, 8-11% had Graves' with eye disease and 12-23% had Hashimoto's hypothyroidism. Results showed that 36-42% of women and 31-33% of men reported impairments in their sex life. In women, nodular goiter was less likely to be associated with sex life impairment than autoimmune thyroid diseases. In addition, there was a link between how high the T_3 hormone level was and the effect on sexual function in patients with Graves' disease.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

The authors concluded that based on the results of this study, ~40% of patients with thyroid disorders also note impairment of their sex life. This was slightly more common in women. This study shows that the effect of treatment of thyroid diseases on quality of life and sexual function also needs to be studies in more detail. It also brings awareness of this issue to physicians and indicates this area should be addressed with their patients.

—Vibhavasu Sharma, MD, FACE

ATA THYROID BROCHURE LINKS

Graves' Disease: https://www.thyroid.org/graves-disease/
Hashimoto's Thyroiditis: https://www.thyroid.org/hashimotos-thyroiditis/
Hyperthyroidism (Overactive): https://www.thyroid.org/hyperthyroidism/
Hypothyroidism (Underactive): https://www.thyroid.org/hypothyroidism/

THYROID DISORDERS, 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.

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

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

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

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

Toxic nodular goiter: characterized by one or more nodules or lumps in the thyroid that may gradually grow and increase their activity so that the total output of thyroid hormone in the blood is greater than normal.

Triiodothyronine (T3): the active thyroid hormone, usually produced from thyroxine.

Thyroid-Related Patient-Reported Outcome questionnaire (ThyPRO): a validated questionnaire in determining quality of life in patients with thyroid disorders

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HYPERTHYROIDISM

Quality of life is worse at 6-10 years after radioactive iodine therapy of Graves' disease compared with treatment with antithyroid drugs or surgery.

BACKGROUND

Graves' disease is a common cause of an overactive thyroid gland (hyperthyroidism). Studies have shown that having Graves' disease may have negative impact on patient's quality of life. Graves' disease is usually treated with antithyroid drugs, radioactive iodine therapy, or surgery. Previous studies have reported that general-health quality of life among patients treated with three treatment methods as similar, but they were limited by a smaller number of participants or a shorter duration of follow up. This study assessed long-term quality of life in patients with Graves' disease who have been treated in a routine clinical setting.

THE FULL ARTICLE TITLE

Törring O et al 2019. Impaired quality of life after radioiodine therapy compared with antithyroid drugs or surgical treatment for Graves' hyperthyroidism: a long-term follow-up with the Thyroid-Related Patient-Reported Outcome Questionnaire and 36-Item Short Form Health Status Survey. Thyroid 29:322–331. PMID: 30667296.

SUMMARY OF THE STUDY

A total of 1186 patients with Graves' disease diagnosed between 2003 and 2005 in southern Sweden were included in the study. Patients were divided into three groups: (i) 347 patients treated with antithyroid drugs only, (ii) 395 patients treated with radioactive iodine therapy (with or without previous treatment with antithyroid drugs), but not surgery, and (iii) 233 patients treated with surgery to remove thyroid gland (with or without previous treatment with antithyroid drugs or radioactive iodine therapy). Quality of life was assessed using two different questionnaire: Thyroid-Related Patient-Reported Outcome questionnaire (ThyPRO in 975 patients) and general 36-Item Short Form Health Status Survey (SF-36 in 964 patients). Age, sex, and presence of other medical conditions that may affect quality of life were also assessed.

Patients were assessed at an average of 8 years after the diagnosis of Graves' disease. Patients in surgery group were generally younger (average age 35 years, compared to 43 years for the antithyroid drug group and 54 years for the radioactive iodine therapy group). More patients in radioactive iodine therapy group had other medical conditions that may affect quality of life (44%, compared to 29% in the antithyroid drug group and 33% in the surgery group).

Overall, patients with treated Graves' disease had worse thyroid-related quality of life scores than the general population. Among the three treatment groups, patients who received radioactive iodine therapy had worse thyroid-specific quality of life scores than patients treated with antithyroid drugs or surgery, as measured by ThyPRO. The radioactive iodine therapy group had worse scores for goiter symptoms, hyperthyroid symptoms, tiredness, anxiety, depression, emotional susceptibility, impaired social life, impaired daily life, and impaired sex life than the antithyroid drug and surgery groups. In addition, the radioactive iodine therapy group had worse scores in hypothyroid symptoms, eye symptoms, and appearance than the antithyroid drug group. A similar pattern was found in general quality of life measures as assessed with the SF-36 questionnaire, with worse scores in radioactive iodine therapy group compared to the antithyroid drug or surgery groups.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

In this study, quality of life scores were worse in patients with Graves' disease treated with radioactive iodine therapy compared to antithyroid drugs or surgery at 6-10 years after treatment. This is different from previous studies of quality of life in patients treated for Graves' disease which showed similar quality of life in patients treated with three treatment methods. This study had a larger number of participants and a longer duration

HYPERTHYROIDISM, continued

of follow up than previous studies. If these findings are confirmed in other studies in other countries, it would suggest that radioactive iodine therapy may be less desirable in the long term as compared to antithyroid drugs or surgery

— Sun Y. Lee, MD

ATA THYROID BROCHURE LINKS

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

ABBREVIATIONS & DEFINITIONS

Hyperthyroidism: a condition where the thyroid gland is overactive and produces too much thyroid hormone. Hyperthyroidism may be treated with antithyroid meds (Methimazole, Propylthiouracil), radioactive iodine or surgery.

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

Radioactive iodine: this plays a valuable role in diagnosing and treating thyroid problems since it is taken up only by the thyroid gland. I-131 is the destructive form used to destroy thyroid tissue in the treatment of thyroid cancer and with an overactive thyroid.

Thyroid-Related Patient-Reported Outcome questionnaire (ThyPRO): a validated questionnaire in determining quality of life in patients with thyroid disorders

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HYPOTHYROIDISM

Neonatal hypothyroidism and low family income are associated with an increased risk of intellectual disability

BACKGROUND

Congenital hypothyroidism is hypothyroidism that exists at birth either because the thyroid did not develop properly or because the thyroid has problems in one of the needed steps to make thyroid hormones. This occurs in ~1:1700 births. Neonatal hypothyroidism is hypothyroidism occurring in the 1st year of life, with congenital hypothyroidism being the main cause. Failure to treat congenital and neonatal hypothyroidism within the 1st 3 months of life can cause permanent brain damage, causing intellectual disability (a decrease in the ability to learn and practice daily skills). Indeed, congenital hypothyroidism is the major cause of preventable mental retardation worldwide. It is also the reason that all babies born in the United States are tested for congenital hypothyroidism at birth.

People living in low-income households frequently encounter many challenges, including getting adequate nutrition and accessing appropriate health care. Additionally, children in low-income households are more likely to have intellectual disability due to a variety of factors. The goal of this study is to evaluate the link between neonatal hypothyroidism, family income, and intellectual disability.

THE FULL ARTICLE TITLE

Nam JY et al (2018) The effect of neonatal hypothyroidism and low family income on intellectual disability: a population-based cohort study. PLoS One 13(11):e0205955. PMID: 30403688.

SUMMARY OF THE STUDY

This study reviewed data in a large national database (National Health-Insurance Service-National Sample Cohort). Information including presence of intellectual disability, newborn hypothyroidism, and family income (based on average monthly insurance premiums) was evaluated. Analyses were completed to determine whether intellectual disability was related to hypothyroidism and/or low income. Of the 91,247 infants, 208 were identified as having intellectual disability. The study included 129 infants with neonatal hypothyroidism and demonstrated that neonatal hypothyroidism increases the risk of intellectual disability. Additionally, the risk of intellectual disability was higher in infants of low-income households when compared to high-income families. The study concluded that neonatal hypothyroidism when combined with low family income greatly increases the risk of intellectual disability.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

It is clear that individuals living in low income households are at high risk of developing health problems. This study shows that living in a low income household in the first year of life combined with having neonatal hypothyroidism was associated with a substantially increased risk for the diagnosis of intellectual disability in childhood. It is important to identify these at-risk children with hypothyroidism to ensure that they receive adequate treatment.

— Priya Mahajan, MD

ATA THYROID BROCHURE LINKS

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

HYPOTHYROIDISM, continued

ABBREVIATIONS & DEFINITIONS

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

Congenital hypothyroidism: hypothyroidism that exists at birth either because the thyroid did not develop properly (thyroid dysgenesis) or because the thyroid has problems in one of the needed steps to make thyroid hormones (thyroid dyshormonogenesis). Congenital hypothyroidism is estimated to occur in 1:1700 newborns.

Intellectual disability: a decrease in the ability to learn and practice daily skills.

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THYROID AND PREGNANCY

Thyroid hormone therapy and infertility

BACKGROUND

Thyroid hormone plays a major role in both achieving pregnancy and carrying a successful pregnancy to term. Women with hypothyroidism have an increased risk of infertility and are more likely to require assisted reproductive technologies (ART), such as in vitro fertilization, to achieve pregnancy. This is also true in women with thyroid autoimmunity (having positive anti thyroid peroxidase (TPO) antibodies) and thyroid hormone levels in the normal range. It is clear that treating overt hypothyroidism (high TSH and low T_4) improves the success of pregnancies achieved through ART and decreases the miscarriage rate. Whether women with subclinical hypothyroidism (high TSH but normal T_4) or with only TPO antibodies should also be treated prior to starting ART is less clear. Several initial small studies showed that levothyroxine decreased miscarriage rates and improved live birth rates. Subsequently, a much larger trial showed no benefit of levothyroxine therapy before ART in women with positive TPO antibodies. This study examined all of the studies (meta-analysis) to date to clarify the effect of levothyroxine on birth rates in women with subclinical hypothyroidism and/or positive TPO antibodies using ART to achieve pregnancy.

THE FULL ARTICLE TITLE:

Rao M eut al. Effect of levothyroxine supplementation on pregnancy outcomes in women with subclinical hypothyroidism and thyroid autoimmunity undergoing in vitro fertilization/intracytoplasmic sperm injection: an updated meta-analysis of randomized controlled trials. Reprod. Biol. Endocrinol. 2018. 16:92. PMID: 30249251.

SUMMARY OF THE STUDY:

These investigators combined information from 4 clinical trials examining the effect of thyroid hormone treatment of women with subclinical hypothyroidism and/or autoimmune thyroid disease characterized by positive TPO antibodies who underwent ART to achieve pregnancy. The 4 studies were published between 2005 and 2017. Two studies included women who had autoimmune thyroid disease based on positive thyroid peroxidase antibodies and 2 included women who had subclinical hypothyroidism defined as a TSH greater than 4-4.5. The causes of infertility and fertility treatment protocols were similar across trials and all studies treated women with thyroid hormone throughout the pregnancy.

These 4 trials individually demonstrated variable effects of thyroid hormone therapy on pregnancy outcomes. When the data were combined and analyzed, the results indicated that levothyroxine therapy in women with subclinical hypothyroidism or autoimmune thyroid disease undergoing ART did not improve most pregnancy outcome measures. Thyroid hormone treatment did not affect pregnancy rates, live births, or preterm births, but did decrease miscarriages.

WHAT ARE THE IMPLICATIONS OF THE STUDY?

This study suggests the thyroid hormone therapy given to women with subclinical hypothyroidism and/or autoimmune thyroid disease does not improve the clinical pregnancy rate, live birth rate or preterm birth rate in women achieving pregnancy using ART. However, thyroid hormone supplementation did improve the miscarriage rate relative to women who did not receive therapy. This study suggests that thyroid hormone therapy in some women with subclinical hypothyroidism and/or autoimmune thyroid disease undergoing ART may be beneficial, but that further studies are needed to determine the appropriate timing and dosing of thyroid hormone as well as the type of patient that would benefit the most.

—Whitney Woodmansee MD

THYROID AND PREGNANCY, continued

ATA THYROID BROCHURE LINKS

Hypothyroidism (Underactive): https://www.thyroid.org/hypothyroidism/
Thyroid Hormone Treatment: https://www.thyroid.org/thyroid-hormone-treatment/
Pregnancy and Thyroid Disease: https://www.thyroid.org/thyroid-disease-pregnancy/

ABBREVIATIONS & DEFINITIONS

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

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

Overt Hypothyroidism: clear hypothyroidism an increased TSH and a decreased T_4 level. All patients with overt hypothyroidism are usually treated with thyroid hormone pills.

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.

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.

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

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

Miscarriage: this occurs when a baby dies in the first few months of a pregnancy, usually before 22 weeks of pregnancy.

In-vitro fertilization: a procedure when an egg is fertilized outside of the body and then implanted in a woman to achieve a pregnancy

Meta-analysis: a statistical analysis of several separate but similar experiments or studies in order to test the pooled data for statistical significance

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THYROID CANCER

An increased but small absolute risk of leukemia can be attributed to radioactive iodine therapy for thyroid cancer

BACKGROUND

Thyroid cancer is the fastest rising cancer in women. Most thyroid cancers are treated with surgery alone. More advanced thyroid cancers require additional treatment with radioactive iodine. Radioactive iodine therapy is a well-tolerated and effective treatment for most types of thyroid cancer. It is taken up and concentrated by thyroid cells, both normal and cancerous, producing ionizing radiation that destroys the cells. While the highest amount of radioactive iodine is delivered to the thyroid cells, many other cells are exposed to low levels of ionizing radiation for a brief period of time. Any ionizing radiation has the potential to cause harm and the risk of cancer related to or caused by radioactive iodine has been studied but without clear conclusions. These cancers are called secondary malignancies, a cancer related to the treatment of another cancer.

This study was performed to gather more information on how much risk radioactive iodine has for the development of a secondary malignancy.

THE FULL ARTICLE TITLE

Yu CY et al 2018 A systematic review and meta-analysis of subsequent malignant neoplasm risk after radioactive iodine treatment of thyroid cancer. Thyroid. Epub 2018 Nov 27. PMID 30370820.

SUMMARY OF THE STUDY

This was a meta-analysis, a study that looks at the results of well-done previous studies on the same topic, combining the results to get a better overall picture and answer to the question of the risk of radioactive iodine. After reviewing all available studies, 17 were considered of high enough quality to be included in this meta-analysis.

Overall, there were 5-16 years of follow up for patients that received radioactive iodine for thyroid cancer. The average dose of radioactive iodine for these patients was 100-150 mCi. This comprehensive study did not show an increased risk of secondary malignancies after radioactive iodine when looking at all cancers. When individual types of cancers were examined more closely, there was a very slight increased risk of leukemia, a blood cancer.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

This study suggests that there may be a slight increased risk of developing leukemia later in life after receiving radioactive iodine for treatment of thyroid cancer. Importantly, relatively higher doses of radioactive iodine were used in this study. Current practice uses lower doses and it is unclear of these lower doses would have the same effect. Also, the routine use of radioactive iodine to treat all thyroid cancers has markedly decreased. Current guidelines from the American Thyroid Association recommend using radioactive iodine only for those advanced cancers that have an increased risk of recurrence. Certainly, patients should not use this information as a reason to not get radioactive iodine therapy for thyroid cancer if it is needed. It does, however, reinforce the fact that thyroid cancer patients do require life-long follow up and monitoring. Further, this study highlights the importance of giving the lowest effective dose of radioactive iodine and restricting its' use to the patients that would benefit the most.

— Joshua Klopper, MD

ATA THYROID BROCHURE LINKS

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

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

THYROID CANCER, continued

ABBREVIATIONS & DEFINITIONS

Radioactive iodine (RAI): this plays a valuable role in diagnosing and treating thyroid problems since it is taken up only by the thyroid gland. I-131 is the destructive form used to destroy thyroid tissue in the treatment of thyroid cancer and with an overactive thyroid. I-123 is the non-destructive form that does not damage the thyroid and is used in scans to take pictures of the thyroid (Thyroid Scan) or to take pictures of the whole body to look for thyroid cancer (Whole Body Scan).

mCi: millicurie, the units used for I-131

Ionizing radiation: radiation that can damage cells, causing cell death or mutation. It can originate from radioactive materials, x-ray tubes or specialized machines. It is invisible and not directly detectable by human senses.

AMERICAN THYROID ASSOCIATION
ATA | Founded 1923

Clinical Thyroidology® for the Public

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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:
www.thyroid.org/thyroid-information/
Find a Thyroid Specialist: www.thyroid.org
(Toll-free): 1-800-THYROID
thyroid@thyroid.org

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

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

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

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

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

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

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

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FOUNDED 2005

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- Updates on the latest patient resources through the ATA website and elsewhere on the world wide web
- Special e-mail alerts about thyroid topics of special interest to you and your family

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

www.thyroid.org

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Donate Now!

JOIN US

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

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

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

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

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

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

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

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

Hashimoto's Thyroiditis (Lymphocytic Thyroiditis)

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 HASHIMOTO'S THYROIDITIS?

The term "Thyroiditis" refers to "inflammation of the thyroid gland". There are many possible causes of thyroiditis (See *Thyroiditis* brochure). Hashimoto's thyroiditis, also known as chronic lymphocytic thyroiditis, is the most common cause of hypothyroidism in the United States. It is an autoimmune disorder in which antibodies directed against the thyroid gland lead to chronic inflammation. It is not known why some people make antibodies, although this condition tends to run in families. Over time, however, this results in impaired ability of the thyroid gland to produce thyroid hormones, leading to gradual decline in function and eventually an underactive thyroid (Hypothyroidism). Hashimoto's thyroiditis occurs most commonly in middle aged women, but can be seen at any age, and can also affect men, and children.

WHAT ARE THE SYMPTOMS OF HASHIMOTO'S THYROIDITIS?

There are no signs or symptoms that are unique to Hashimoto's thyroiditis.

Because the condition usually progresses very slowly over many years, people with Hashimoto's thyroiditis may not have any symptoms early on, even when the characteristic TPO (thyroid peroxidase) antibodies may be detected in blood tests. TPO is an enzyme that plays a role in the production of thyroid hormones. However, over time, thyroiditis causes slow and chronic cell damage leading to the development of a goiter (enlarged thyroid) with gradual thyroid failure, and most patients will eventually develop symptoms of hypothyroidism. (See *Hypothyroidism* brochure). Hypothyroid symptoms may include fatigue, weight gain, constipation, increased sensitivity to cold, dry skin, depression, muscle aches and reduced exercise tolerance, and irregular or heavy menses.

HOW IS THE DIAGNOSIS OF HASHIMOTO'S THYROIDITIS MADE?

The diagnosis of Hashimoto's thyroiditis is often made when patients present with symptoms of hypothyroidism, often accompanied by the finding of a goiter (an enlarged thyroid gland) on physical examination, and laboratory tests consistent with hypothyroidism, an elevated serum TSH with low thyroid hormone (Free thyroxine) levels. Antibodies against TPO, when measured, are usually elevated.

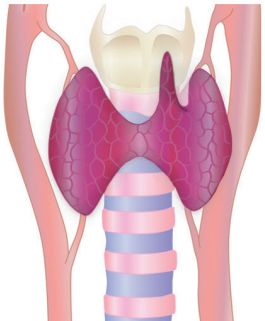
Occasionally, the disease may be diagnosed early on, especially in people with a strong family history of thyroid disease, during routine laboratory screening, even before the patient develops symptoms of hypothyroidism. In these cases, often isolated mild elevation of serum TSH is seen, with normal levels of thyroid hormones and positive TPO antibodies.

HOW IS HASHIMOTO THYROIDITIS TREATED?

Patients with elevated TPO antibodies but normal thyroid function tests (TSH and Free thyroxine) do not require treatment.

For those patients with overt hypothyroidism (elevated TSH and low thyroid hormone levels) treatment consists of thyroid hormone replacement (see *Thyroid Hormone Treatment* brochure). Synthetic levothyroxine taken orally at an appropriate dose, is inexpensive, very effective in restoring normal thyroid hormone levels and results in improvement of symptoms of hypothyroidism. Most patients with Hashimoto's thyroiditis will require lifelong treatment with levothyroxine. Finding the appropriate dose, particularly at the beginning may require testing with TSH every 6-8 weeks after any dose adjustment, until the correct dose is determined. After that, monitoring of TSH once a year is generally sufficient.

When levothyroxine is taken in the appropriate dose, it has no side effects. However, when an insufficient dose is taken, serum TSH remains elevated and patients may have persistent symptoms of hypothyroidism (See *Hypothyroidism* brochure). If the dose is excessive, serum TSH will become suppressed and patients may develop symptoms of hyperthyroidism (See *Hyperthyroidism* brochure).



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*