
THYROID
HEALTH
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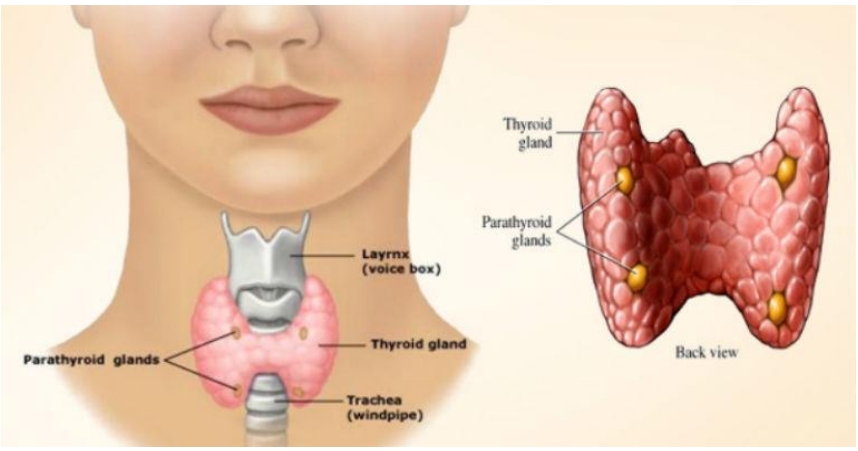
The Thyroid gland: Location, functions, how it works



The Thyroid gland is a double lobed butterfly shaped endocrine gland located in the front of the neck just below the Adams apple. It produces the hormones T3 (Triodothyronine) and T4 (Thyroxine), which work to control your metabolism. The ratio is around 80% T4 and 20% T3. T4 is converted to T3 which is a more active form of thyroid hormone and influences the activity of all cells and tissues in the body. It also produces calcitonin which works to reduce calcium and phosphorus levels in the blood.

The thyroid gland is controlled by the hypothalamus and pituitary gland located in the brain. When levels of T3 and T4 drop the hypothalamus produces thyroid stimulating releasing hormone (TSRH), which stimulates the pituitary gland to produce Thyroid stimulating hormone (TSH) which stimulates the thyroid to produce more hormones. This works on a negative feedback cycle so when adequate thyroid hormone levels are in the blood the hypothalamus TSRH down regulates and the pituitary stops producing TSH.

T3 and T4 control how much energy our cells use. They help us to regulate body temperature, are involved in the manufacture of proteins in the body and they also play a part in how much glucose and fat stores the body uses.

When the thyroid produces too much thyroid hormone one will exhibit symptoms of hyperthyroidism such as sudden weight loss, increased appetite, heart palpitations, anxiety and sweating, trembling and trouble sleeping.

When the thyroid does not produce enough thyroid hormones one will exhibit symptoms such as lethargy, weight gain, feeling cold, forgetful, feeling depressed, dry skin, puffy face, hoarseness of the voice, tender, stiff and swollen joints.

Types of thyroid disorders: hypo and hyperthyroidism and their symptoms

Hypothyroid symptoms:

-Firm, symmetrical enlargement of the thyroid gland that is not tender on palpation

-Goitre

-Slow pulse

-Unsteady gate (bumping into things)

-Lethargy

-Tiredness

-Sleeping more than usual

-Sluggishness

-Hoarseness/deep voice

-Slowed speech

-Puffy face

-Puffy eyes

-Puffy hands and feet

-Loss of eyebrows from the sides (outer third)

-Hair loss/brittle hair

-Drooping eyelids

-Intolerance to cold (fingers/hands/feet)

-Weight gain/gain weight easily

-Constipation

-Dry, scaly, thick, coarse hair

-Raised, thickened skin over the shins

-Carpal tunnel syndrome

-Confusion

-Depression

-Mood changes easily

-Poor memory

-Slower thinking

-Dementia

-Difficulty with math

-Headaches

-Muscle weakness/pain

-Joint pain

-Frequent muscle cramps

-Menstrual cramps

-Irregular menses (not 28 days)

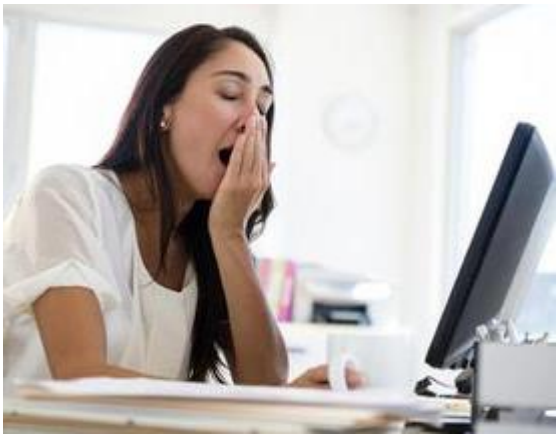
-Increased risk of miscarriage

-Heavier menses- clotting 3 + days

-Other menstrual disorders

-Low sex drive/impotence

Hypothyroidism is caused by:



- Under production of thyroid hormone,
- Deficiency of thyroid hormone cofactors: Selenium, Iodine, L-Tyrosine
- Decreased conversion of T4 to T3
- Too much production of reverse T3 (Wilson's syndrome)
- The body not using thyroid hormone efficiently
- Treatment of hyperthyroidism: radioactive iodine or partial or full removal of the thyroid gland
- Inherited enzymatic defects
- Chronic stress and adrenal exhaustion
- Toxicity – the thyroid gland is very susceptible to toxins, especially toxic metals
- Changes in hormone levels
- Autoimmunity

A large proportion of the population suffers some degree of hypothyroidism; however, the majority of those cases go undiagnosed. Hypothyroidism can occur in either sex at any age, although middle aged women are most commonly affected. The disease has a wide variety of symptoms, and they often reveal themselves slowly and subtly. Untreated, hypothyroidism can cause anaemia, a low body temperature, heart failure and, ultimately, a condition known as myxoedema coma. This type of coma triggered by exposure to cold, infection, or drugs such as sedatives and is potentially fatal. It leads to a slowdown in breathing, seizures, and a reduction in the flow of blood to the brain.

Hypothyroidism

Hypothyroidism is when the thyroid is under active. Causes of hypothyroidism include: deficiency of cofactors such as iodine, selenium and tyrosine. Adrenal fatigue, low iron, autoimmunity, toxicity, poor diet, oestrogen dominance, hormone imbalance, side effects of medication, radiation exposure and chlorinated tap water.

Hashimotos thyroiditis: this is an autoimmune condition caused by a dysfunctional immune system. Immune antibodies attack the thyroid gland tissue which results in inflammation and gradual reduction in thyroid size and changes in thyroid function. Initially blood results may show a hyperthyroid result but as the thyroid gland is gradually destroyed blood results will start to show hypothyroidism.

Testing: TSH, T3, T4, Thyroid antibodies, Thyroflex

Hyperthyroid symptoms

-Palpitations/heart skipping

-Insomnia

-Tachycardia/rapid heart beat

-Shakiness

-Increased sweating

-Brittle nails

-Loss of appetite

Graves' disease

An autoimmune condition caused by antibody thyroid stimulating immunoglobulin triggering hyperthyroidism. Causes can be environmental or genetic and include: having a pre-existing autoimmune condition, stress, toxicity, being a smoker or having a family member affected with graves,

Symptoms: muscle weakness, irritability, problems sleeping, not tolerating heat, diarrhoea, weight loss, bulging eyes (not all people develop this), thickening of shin skin, fast heart beat or heart palpitations, goitre and mood changes such as psychosis, mania, agitation, anxiety and depression.

Process: Thyroid stimulating immunoglobulin (TSI) works similar to TSH and results in the thyroid producing excess thyroid hormone. TSH levels decrease because the TSI is triggering the hypothalamus pituitary negative feedback loop. Blood tests will show excess T3 and T4 and low TSH (This occurs due to antibody thyroid-stimulating immunoglobulins (TSI) triggering the thyroid to make excess T3 and T4 which will reduce TSH levels). Also seen can be TSI antibodies and an increase in radioiodine uptake in the thyroid.

Testing: TSH, T3 and T4, TPO antibodies

Thyroflex test: This is a reflex test. The brachial reflex speed increases or decreases depending on thyroid function. Brachial reflex was the original way the thyroid was tested before blood markers were used. The Thyroflex is non-invasive. A reflex is measured from the middle finger reflex which is then electronically graphed. The shape of the graph correlates to thyroid function.

A GP may also order a radioactive iodine uptake and scan to measure the amount of Iodine your Thyroid absorbs and to show how much of your thyroid is working (partial or whole).

CT, MRI or Ultrasound may also be carried out of the eyes, eye sockets and muscles surrounding the eyes to ascertain the impact of Graves on the eyes and their surrounding structures.

How did I end up with a thyroid disorder?

There are many factors which lead to a dysfunctional thyroid these include:

- Long term stress
- Adrenal fatigue
- Poor diet
- Past illness or infection
- Toxicity/Heavy metal exposure
- Hormone imbalance such as oestrogen dominance
- Underlying inflammatory conditions
- Food intolerances
- Mineral imbalances
- Immune disorders
- Medication use
- Radiation exposure
- Partial or total thyroid removal
- Iodine deficiency
- Gastrointestinal dysfunction
- Pre-existing autoimmune condition

Thyroid tests

Traditionally when a person suspects that they may have an underactive thyroid and are exhibiting multiple hypothyroid symptoms a GP will order a thyroid stimulating hormone blood test (TSH levels).

This test generally has a TSH level of 0.5-5 (depending which clinic runs your test). However, if you fall within this level you are deemed to have a proper functioning thyroid even though you may be suffering with numerous symptoms such as fatigue, weight gain, brain fog, sore throat, anxiety etc.

According to Wartofsky and Dickey 2005 the evidence for a narrower TSH range is compelling and that it is clear that previous accepted reference ranges are no longer valid due to reference populations which were previously considered normal now containing individuals with various degrees of thyroid dysfunction. Due to these clients with ranges of TSH of as low as 2.5 are now considered possibly hypothyroid even though it sits in the resting range of 0.5-5.

How a naturopath works is if your TSH is 2.5 or higher and/or you have a number of thyroid symptoms we carry out further tests to see if you do in fact have an underactive thyroid.

Other tests we consider are T3 and T4 levels, thyroid antibodies, reverse t3, urinary spot iodine test, basal body temperature and Thyroflex testing.

According to Dr R.I.S Bayliss a famous endocrinologist at his speech at Medical Society's Transactions he stated that traditionally a person's thyroid was tested via the patient's pulse rate, sense of wellbeing, their skin texture, cold tolerance, bowel function and the speed of which the patient's deep tendon reflexes relax.

According to Derry 2006 to adequately test for thyroid hormone levels it needs to be done by clinical assessment not blood tests alone.

Depending on your symptomology we will test accordingly. Keep in mind there are many factors that affect thyroid function. These include: inflammation, toxicity, hormone imbalance, nutritional factors, immune dysfunction, adrenal dysfunction and gastrointestinal dysfunction.

Tests available

TSH- Thyroid stimulating hormone- This test lets you know how much thyroid stimulating hormone you have. TSH signals the thyroid to produce the hormones t3 (triiodothyronine) and t4 (thyroxine) which act by stimulating the metabolism of tissues in the body. TSH alone is not accurate as there are other factors which effect it.

Basal body temperature: temperature is measured via the armpit upon waking for 3 consecutive days and an average is taken (not to be taken on first day of menstruation). A normal thyroid function will give a reading of 36.4-37.1 C. A temperature 36.4C or lower can indicate an underactive thyroid.

Thyroid antibody test: this test will indicate if there is an autoimmune reaction occurring against the thyroid gland. The test will give reading of TPO (Thyroid peroxidase antibodies) and TG (Thyroglobulin antibodies)

Thyroid-stimulating immunoglobulin: (TSI) is a type of antibody which can be present in people with Graves' disease

T3 and T4: T3 and T4 are regulated by TSH levels. T4 (Thyroxine) is converted into T3, which is your active thyroid hormone that acts on the body's tissues to control metabolism.

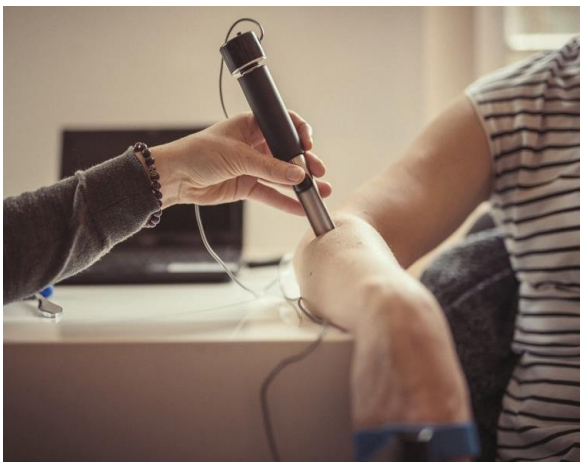
Low T4 and/or elevated TSH may indicate hypothyroidism

High T3/T4 and low TSH: may indicate Graves' disease

Free T3: 4.0-8.0 pmol/L

Free T4: 10-25 pmol/L

Subclinical hypothyroidism: 2.5-4.0 mIIU/L (or if exhibiting multiple thyroid symptoms)



Reverse T3: High reverse T3 levels down regulates conversion of t4 to t3 with more RT3 being produced then t3 hence a reduction in metabolism. Reverse T3 is an inactive hormone so having high amounts of it will reduce thyroid function (Note you need to find out the ratio between RT3 and Free/total T3). Some causes of high reverse T3 include low iron, high or low cortisol and low b12.

Urinary Iodine test: checks the amount of Iodine in your body. Iodine is essential for Thyroid hormone production

Thyroflex test: A reflex test done via a Thyroflex machine. Reflexes are controlled by the thyroid and are the original testing method for thyroid function.

(Note testing references differ depending on the pathology lab you are testing at)

Other applicable tests: These will depend on what other factors are contributing to your thyroid disorder but can include: cortisol levels, CRP, liver function, iron, food intolerance testing, indican test, urinary organic acid testing, calcitonin levels, hormone testing, vitamin D, b12, folate, heavy metals, MTHFR, neurotransmitters and Candida.

Treatment: medications and why they don't fix the problem. Diet. Nutraceuticals. Naturopathy. Natural thyroid hormone. Other considerations

Pharmaceutical Treatments Thyroxine: synthetic versions of thyroid hormone such as thyroxine or liothyronine are generally used. There is also an animal-derived thyroid replacement available (Armour). Key to effective treatment is calibration of the medication. Particularly in older patients, treatment should start with small doses, gradually increasing the dose until the individual's blood level of thyroid-stimulating hormone returns to normal. This may take a couple of months.

My medication isn't making me feel any better

A healthy thyroid makes 5 thyroid hormones: T1, T2, T3, T4 and calcitonin. Most synthetic hormones such as Thyroxine only supplement with T4 (Remember T4 needs to convert to T3). If you only take T4 you are missing out on the other hormones that are usually present and you also need adequate cofactors for the T4 to be converted. Some of the problems that can be seen in ongoing treatment with T4 only, which is other issues such as issues with blood pressure, mood, weight and cholesterol.

Natural Desiccated Thyroid Hormone

At NatMed we prefer Natural Desiccated Thyroid Hormone (NDTH). It contains all the thyroid hormones needed not just T4 and has been found to be very effective in thyroid treatment.

Diet and Lifestyle

-Reduce exposure to heavy metal toxicity

-Reduce toxins in the body (carry out a detoxification program if needed)

-Remove food intolerances from the diet which can trigger immune responses

-Remove/Lower thyroid suppressing foods: broccoli, cabbage, Brussel sprouts, cauliflower, kale, spinach, turnips, soy, beans, and mustard greens. These vegetables contain isothiocyanates which may block iodine utilisation N.B studies have showed this to be the case with high amounts of raw Goitrogens e.g. a head of raw broccoli a day. Small servings of cooked goitrogenic foods are ok. Majority of soy studies have not taken into account Iodine deficiency. Small amounts of soy product have been deemed safe if Iodine levels are satisfactory.

Follow an anti-inflammatory diet

-Low GI diet

-Manage stress

-Exercise

-Supplementation: provide thyroid cofactors such as Iodine, tyrosine and selenium. Support nutrients which when low can interfere with proper thyroid function such as iron, D3 and B12. Support other organs, glands and body function needed for proper thyroid function such as balancing cortisol.

Could you be low in Iodine?

Some considerations for low Iodine are: not consuming Iodine foods or low seafood intake. History of fibrocystic breasts or ovarian cysts, goitre in the neck, slow speech, enlarged tongue, puffy face and hands or no usage of iodised salt.

Adrenals:

Adrenals and thyroid interact in regulating weight, energy, blood sugar, blood fats, neurotransmitters, sex hormones, inflammation and immune function

Iron:

Adequate iron is needed for proper thyroid function. There is a link between hypothyroidism and low stomach acid which is needed for iron absorption. There is also a link between hypothyroidism and heavier menstrual bleeding which also results in loss of iron. Low iron symptoms also mimic hypothyroid symptoms. Low iron also decreases the conversion of T4 to T3 by reducing thyroid peroxidase activity. Iron is also needed by the adrenal glands to produce cortisol. Low adrenal function has an adverse effect on thyroid function.

Reverse T3

One of the factors that can effect thyroid hormones from functioning properly in the body is reverse T3 (rt3).

T3 comes from the conversion of T4 to T3. T4 converts to rt3 to remove excess T4from the body which is a normal process to prevent T4 levels from rising to high.

On a daily basis the body converts a percentage of T4 to T3 and a percentage to T4 to rt3. The rt3 conversion is lower in the body then the T3 conversion unless an imbalance occurs in the body.

In an ideal metabolism the percentage of rt3 is lower than T3. When factors such as stress, illness, surgery or shock occur this ratio will change in order to conserve energy and focus on what is more important at the time.

High rt3 levels down regulate the conversion of T4 to T3 with more rt3 being produced then t3 hence a reduction in metabolism. rt3 is an inactive hormone so having high amounts of it will reduce thyroid function.

Causes of high reverse T3 include low iron, high or low cortisol and low b12, Wilsons syndrome, chronic stress, low glutathione status, chronic inflammation, chronic illness, abnormal liver function, use of some prescription drugs, T4 only thyroid medications and infection.

If rt3 is elevated, it steals catalysts known as deiodinase enzymes from the T4 to T3 conversion which decreases its clearance from the body.

If thyroid treatment is not having the desired outcome a blood test for rT3 may be requested. From this blood test the ratio between rt3 and total T3 is determined to see if rt3 is high and is in fact the causative factor for poor thyroid response.

The equation for working out the ratio of rt3 is: Level of T3 divided by rt3 multiplied by 100. (T3/rt3 x 100). The end result should be between (1.2-2.2). (Please note the rt3 and T3 need to be in the same unit of measurement first).

Treatment involves low dose t4 and high dose or slow release t3.

An example of this is someone that presents with normal thyroid function bloods tests. They have a normal thyroid questionnaire but a poor Thyroflex test response. When tested for rt3 it was found that it was high. Their treatment involved a low dose t4 and high dose t3 which resulted in normalising thyroid function.

Treatment

Finding out what pathway is blocking the conversion of t3 to t4.

Low dose T4, higher dose T3. Or slow release T3 to suppress TSH, limit T4 and boost T3.

Do I need to stay on thyroid hormone for life?

There is no straight forward answer to this as it all depends on what caused the thyroid function to decline in the first place. If there was a short term cause or nutritional imbalance thyroid hormone may be used only for a short term to correct levels. If there is an autoimmune component or you have undergone thyroid gland removal or radiation therapy, then thyroid replacement may be for life. Below is some examples of short term and lifelong thyroid hormone treatment.

- If you have had radiation therapy or have had your thyroid gland removed, you will need to stay on thyroid hormone
- If hypothyroidism was caused by Hashimotos thyroiditis depending on the trigger on your immune system continuing on thyroid hormone is very likely
- If a serious illness or infection triggered your hypothyroidism, your thyroid function most likely will return to normal when you recover. Thyroid medication may be stopped for a short while to check that thyroid is now able to function on its own. There may be a brief period of time where the thyroid function will be slightly under just after medication has been stopped and monitoring must be done to ensure it returns to normal. If hormone levels remain to low, then you will need to restart thyroid hormone.
- Some medicines may cause hypothyroidism. Your thyroid function may return to normal when you stop the medicines.
- If you have mild hypothyroidism, you may not need treatment but should be watched for signs of hypothyroidism getting worse then thyroid hormone may be advised

- If you have heart disease the dose of thyroid hormone will need to be watched carefully as thyroid hormone may increase chest pain or irregular heart beat

- If you develop hypothyroidism during pregnancy, treatment should be started immediately. If you have hypothyroidism before you become pregnant, your thyroid hormone levels need to be checked to make sure that you have the right dose of thyroid medicine. During pregnancy, your dose of medicine may need to be increased by 25% to 50%

- If you develop hypothyroidism after pregnancy (postpartum hypothyroidism), you also may need treatment. You will be retested for hypothyroidism if you become pregnant again. In some cases, hypothyroidism will go away on its own. In other cases, it is permanent and requires lifelong treatment and you are likely to need treatment for hypothyroidism from now on.

- For some people, hypothyroidism gets worse as they age and the dosage of thyroid medicine may have to be increased gradually as the thyroid function decreases

- Most people treated with thyroid hormone develop symptoms again if their medicine is stopped. If this occurs, medicine needs to be restarted.

- Thyroid hormone replacement for a limited time may occur in subacute thyroiditis when there is a temporary breakdown of thyroid cells and the release of thyroid hormone from the thyroid. As the condition improves the thyroid again makes and stores thyroid hormone and thyroid hormone is no longer necessary.

- Pregnancy and post-partum thyroid imbalances are common due to changes in hormone levels and also tend to rebalance after taking thyroid hormone for small durations on time.

- Other causes of thyroid imbalance include immune imbalance, adrenal imbalance, low iron, infection and hormone imbalance and the thyroid may again rebalance after treating these causes.

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