



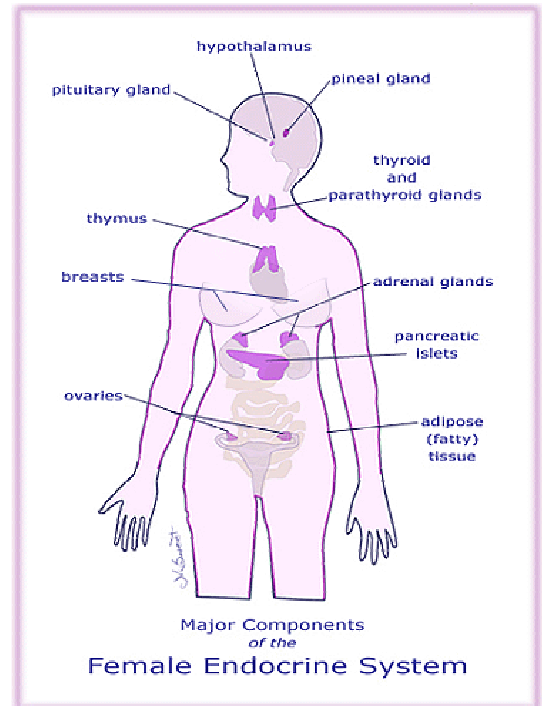
The Thyroid – The Master Gland

The thyroid gland is a butterfly-shaped gland situated at the front of the neck under the larynx (voice box) and behind the trachea (windpipe). The thyroid gland acts as the body's metabolic thermostat, and controls the rate of the body's functions. It is part of the body's endocrine (hormonal) system.

It accomplishes this role by producing two hormones thyroxine ('T4') and triiodothyronine ('T3'). The production of these hormones is stimulated by another hormone – thyroid-stimulating hormone ('TSH') that is released by the pituitary gland in the brain.

The basal metabolic rate (BMR) is the level of energy required to keep the body's functioning normally when it is at rest, and is controlled by these thyroid hormones. Both under and overactivity of the thyroid gland can cause severe disruption to the body's metabolism and functions. This may result from a defect of the thyroid gland itself, malfunctions of the pituitary gland or autoimmune disease.

The thyroid gland can be healthy, underactive (hypothyroidism) more common, or hyperthyroidism (overactive) less common.



Diagnosis of Thyroid Disorders

In a recent Australian population study, 3504 adults aged 49 and over were surveyed and tested for thyroid disease (2007).

- 10% had diagnosed thyroid disease
- 3.6% had an undiagnosed thyroid condition
- 25% of those treated with conventional thyroid medication still had test results indicating insufficient thyroid activity

Thyroid disorders are becoming increasingly common with the latest data stating hypothyroidism affects up to 2.4% of the population, and 7-10% of the population have subclinical hypothyroidism. Subclinical hypothyroidism is defined as elevated thyroid stimulating with normal thyroid hormone levels.

Women are far more troubled with thyroid gland disorders than men, to a ratio of approximately 4:1. However a large number of cases are never properly diagnosed, as blood tests can be quite unreliable. It is important to look individually at a client's levels as they may well be in the 'normal' range whilst being quite symptomatic of thyroid disease.

"40 million dollars worth of thyroid function tests are ordered every year in Australia. Despite all this, recognition and treatment of thyroid diseases could still be much improved throughout Australia."

Duncan Topliss, Director, Department of Endocrinology and Diabetes,
The Alfred Hospital Melbourne, VIC

The thyroid plays an important role in hormone production therefore menstrual problems, infertility, miscarriage and hormone imbalance are often associated with disorders. Some women who have a history of miscarriage may be typically 'euthyroid' (normal thyroid function) but levels may become unpredictable with pregnancy. Other means of investigating thyroid function are:

Basal Temperature Charts - Basal temperature charting is very useful for detecting thyroid imbalance as it reflects the metabolic rate. If the temperatures are typically low, hypothyroidism may be related. Conversely, temperatures that are elevated throughout the cycle may reflect hyperthyroidism. Associated symptoms throughout the cycle can also help to both confirm to refute a diagnosis of poor thyroid function, and also help to monitor treatment progress. You may be asked to do this as an adjunct to your treatment.

Hair Tissue Trace Mineral Analysis (HTMA) - can also be quite helpful with diagnosing thyroid disease. Certain mineral patterns (particularly calcium, magnesium, sodium and potassium) of absorption can be clear indicators of slow or fast metabolism. Hair analysis is very useful where a thyroid disorder is suspected despite a blood hormone profile that may be quite normal. Hair analysis will also indicate any deficiencies or toxicities that may be associated with the condition or the person's immunity.

Autoimmune diseases (Hashimoto's, Grave's disease) of the thyroid largely result from causes unknown; however past infections, and associated or family history of autoimmune disease, often play a role.

If the thyroid is overactive (hyperthyroid) there will be an increased production of thyroid hormone and a consequent acceleration of the body's cellular processes. If the thyroid is underactive (hypothyroid), there is a slowing of the body's reactions and processes.

Common Hypothyroidism symptoms:

Mental slowness/Impaired memory	
Lethargy	Bilateral carpal tunnel
Dry skin and hair	Hypotension (low blood pressure)
Constipation	Slow pulse (bradycardia)
Cold intolerance	Possible muscle and joint pain
Weight gain	Fingernails may be thin & brittle
Hair loss	Hands & feet may be puffy and swollen
Facial puffiness	Feeling clumsy & uncoordinated
Depression, psychosis	Absence of sweating
Loss of sex drive	
Menorrhagia (heavy periods)	
Menstrual abnormalities	
Anaemia	
Amenorrhoea (absence of periods) – can be associated with high prolactin levels	
Swelling of the thyroid gland and surrounding lymph nodes	
Husky voice	

Common Hyperthyroidism symptoms:

Weight loss	Restlessness, hyperactivity
Tremor	Sweating
Tachycardia (increased heart rate)	Frequent bowel motions
Heat intolerance, warm peripheries	Anxiety, irritability, restlessness
Palpitations	Increased pulse
Exophthalmos (bulging eyes)	Increased temperature
Hypertension (high blood pressure)	Menstrual irregularities

Female conditions associated with reduced thyroid hormone production and/or utilisation:

- Infertility, recurrent miscarriage
- Endometriosis
- PCOS
- Low birth weight/pre-term birth
- Postpartum depression
- PMS
- Fibrocystic breasts
- Painful periods
- Heavy periods
- Anaemia: iron & B12
- Obesity/Insulin Resistance
- Metabolic syndrome
- Osteoporosis
- Depression/Bipolar disorders
- Fibromyalgia, CFS, Carpal Tunnel
- Autoimmune disorders: RA, AS, Coeliac
- Sleep apnoea
- Anxiety/Panic attacks
- Poor concentration/memory
- Cardiovascular disease; elevated cholesterol/lipids
- Congestive heart failure
- Tinnitus

If you have presented with any of these symptoms/conditions a **thyroid hormone profile** will usually be requested. This is take home DIY kit that uses a finger prick blood sample collection. It is then sent to ARL Pathology in Melbourne for analysis.

The fluid retention/puffiness in hypothyroidism is due to the substance, mucin. The body over produces mucin - this mucin invades the tissues and literally glues the skin to the tissue. This can result in a puffy nose, and the area under the eyes and/or the face in general. Try the arm pinch test. The 'thyroid collar' is a double line around the mid to lower neck with or without swelling.

Treatment options

The orthodox treatments of thyroid disorders are fairly limited to drugs or surgery. These treatments are aimed at eliminating thyroid tissue or effecting hormone levels. Natural therapies and complementary medicines can play a significant role here for their ability to address the patient's immune condition, latent infections, nutritional issues and associated symptoms. **Subclinical hypothyroidism or thyroid resistance** are conditions that must be investigated if the patient is not responding to typical treatment. This is discussed shortly.

Convention treatment of hypothyroidism:

If you have been diagnosed with an underactive thyroid (hypothyroidism) you will typically be put on a dose of thyroxine or desiccated thyroid depending on your doctor. Desiccated thyroid often works more efficiently than thyroxine (for some people), however it may not be appropriate for everyone. Those with Hashimotos thyroiditis need to be monitored closely if on this type of thyroxine as it is thyroid extract from pig sources and the body may also create antibodies to that.

The importance of conversion from T4 to T3:

Being on thyroxine medication may not be sufficient in addressing the cause and secondary effects of hypothyroidism. Although the levels of TSH or T4 may come back to within normal range, it does not mean that it is **effective at a cellular level**. There are many factors playing a role in the effective uptake and the use of thyroid hormones and these must be addressed to ensure optimal response to the medication.

For example, the conversion of T4 (thyroxine) to T3 (the active form of thyroxine) is dependent on adequate levels of **zinc, iodine, vitamin A and selenium** (a mineral that is extremely deficient in Australian soils). Studies have shown iodine deficiency is also rapidly increasing. The decline in iodine intake in Australia appears to be due to changes within the dairy industry, with chlorine-containing sanitisers now replacing iodine-containing sanitisers. Combined with this is the decreasing consumption of iodised salt. To our knowledge, few if any food manufacturers used iodine salt in the preparation and manufacture of foods.

This essential conversion of the T4 hormone to the more potent and active T3 will not happen adequately without these essential minerals present for the uptake.

What is Thyroid Resistance?

Thyroid gland problems are far more common in women than they are in men, and the perimenopausal years are a common time for thyroid problems to first manifest. It seems that the loss of sex hormones production from the ovaries can in some way trigger or be associated with under-activity of the thyroid gland.

The term 'thyroid resistance' describes the condition of a patient who is taking thyroid medication and yet despite this, is still experiencing the symptoms of an under-active thyroid gland. A study in 2007 showed 25% of those treated with conventional thyroid medication still had test results indicating insufficient thyroid activity - obviously the person is not responding adequately to the thyroid medication, or in words is resistant to the thyroid medication. The condition of thyroid resistance is not uncommon and is responsible for a lot of chronic physical symptoms and psychological frustration.

What causes thyroid resistance?

Lack of conversion – the patient is not able to convert the thyroid medication (thyroxine or 'T4') into its form active form (triiodothyronine or 'T3'). This happens in the liver and muscle primarily. Thyroid resistance is more common in patients who have had their whole thyroid gland surgically removed, or who have had radioactive iodine therapy or radiation therapy to the area of the neck where the thyroid gland is situated. The reduced ability to convert T4 into the more potent T3 may be due to deficiencies of minerals such as **selenium, zinc, vitamin A or iodine**.

Poor cell response – in some patients there is a poor response of the body's cells to the thyroid hormone despite the use of increasing doses of thyroxine (T4) tablets. Deficiencies of **essential fatty acids, antioxidant vitamins and minerals**, can lead to unhealthy cell membranes which causes poor cell response to thyroid hormone.

Diabetics or those with Syndrome X have elevated blood sugar levels, which can impair the function and structure of their cell membranes, and thus they become prone to hormonal resistance.

Excessive oestrogen can lower thyroid hormone production – Salivary Hormone Testing can assess this.

Blood tests for thyroid resistance

If thyroid resistance is suspected it is important to have a blood test that will check the levels of ALL the thyroid hormones – namely TSH, free T4 and free T3. Is it very important to stress your concerns about this to your doctor and 'assertively request' the further testing (of T4 and T3). If your body is not efficiently converting the T4 into T3, your doctor will find that the level of free T3 in your blood test is abnormally low. In such cases your T4 levels will be normal or even high, and your TSH levels may be normal or elevated.

If you don't have much luck getting the tests from your doctor – ARL Pathology offer take home kits using a finger prick blood sample you send off to the lab in Melbourne for analysis.

The important thing to find in cases of poor conversion is a low level of free T3 – that clinches the diagnosis!

Symptoms of thyroid resistance may include - weight excess, inability to lose weight, dry skin and hair, hair loss from the scalp, weakness of the muscles, fatigue, constipation, mental slowness, depression, shortness of breath and poor exercise tolerance.

Because thyroid resistance patients appears to be 'thyroid underactive', she/he is often given excess doses of thyroxine (T4), however this will not work very well, as the patient is unable to respond to the T4. The very high doses of T4 may cause the patient to become toxic, which causes agitation, racing heart beat, palpitations, muscle weakness, poor sleep and fatigue. In such cases the dose of T4 needs to be reduced, and some T3 tablets plus nutritional supplements, needs to be given instead.

Treatment for subclinical hypothyroidism, thyroid resistance and poor conversion

In patients who are **poor converters** of T4 into T3, or who have **subclinical hypothyroidism** we can first try a course of nutritional supplements to increase the conversion. This is a product called **ThyroBalance** (a balanced formula for thyroid production and conversion).

Including culinary seaweeds (arame, wakame, dulse, kombu, nori) in the diet is also an easy way to obtain iodine and trace minerals, and can be used in stir-fries, salads, soups, stews etc.

An individual treatment plan will be devised for you. Other supplements which help you to improve your cell membranes include: *Essential fatty acids from oily fish, salmon oil, avocados, cold pressed flaxseed oil and raw nuts and seeds, antioxidants (selenium, zinc, vitamin E and vitamin C).*

For those with **overt hypothyroidism** particularly due to autoimmune disease (eg. Hashimotos) if after several months of nutritional supplementation, the blood levels of free T3 are still abnormally low; it is best to add another type of hormone tablet to the thyroxine tablets. This is called Tertroxin and contains pure T3 (known as triiodothyronine). This usually works very well and typical doses are 10mcg (1/2 tablet), 2 to 3 times daily. You will still need to continue on thyroxine (T4) tablets, although your doctor will probably eventually need to reduce the dosage of thyroxine (T4), often considerably once the effect of the Tertroxin kicks in. Discuss this option with your doctor.

In patients with symptoms of **thyroid resistance**, who have normal blood levels of all the thyroid hormones, we need to work on improving the cell membranes. If you are over weight or have high blood sugar levels and Syndrome X, it is important to lose weight and it is recommended you follow an eating plan specific to your problem. Ask for more information regarding this.

Nutritional notes re thyroid function

- Iodine is an essential element required for normal thyroid function and growth and for normal development and functioning of the brain and body. The thyroid gland contains about 70-80% of iodine in the body. The rest is distributed throughout the body, particularly the ovaries, muscles and blood.

Dietary iodine intake (and deficiency) can be assessed via the **Urinary Iodine Test**.

- Hypothyroidism can be associated with increased risk factors for heart disease such as increased cholesterol and blood lipids. These risk factors can be significantly reduced by **vitamin E & carnitine**.
- Fatty acid metabolism is also impaired by hypothyroid states so supplementation with **Omega 3,6,9 fatty acids** is essential. These fatty acids maintain cell membrane integrity and fluidity in the thyroid gland.
- **Zinc** and B6 have been found to be deficient or poorly absorbed in a high number of hypothyroid patients.
- You may have read that you need to avoid foods that are **goitrogens** (which block binding of iodine to thyroglobulin). Goitrogens are present in the Brassica food family: broccoli, cauliflower, cabbage, turnips, mustard greens, spinach, radish, brussel sprouts, kohlrabi and horseradish. However, this is not true if you have adequate iodine on board.
- **Thiocyanates** inhibit concentration of iodine in the thyroid gland. Foods that can produce thiocyanate are walnuts, sorghum, almonds and apples. Again, adequate iodine in the body counteracts these affects.
- **Soy products** also inhibit the uptake of free thyroxine in the blood and so should be limited or avoided. Again, adequate iodine in the body counteracts these affects.
- **Coconut milk** is said to be good for an underactive thyroid. Choose organic varieties free from preservatives or additives.
- **Cigarette** smoking decreases both thyroid hormone secretion and its action.
- **Chlorinated compounds** such as pesticides and biphenyls compete with thyroid hormones or proteins that carry hormones. They can initiate autoimmune reactions against the thyroid gland as well.
- **Autoimmune based hypothyroidism** - will require balancing the excessive T-helper 1 cell dominance. See **Immune System** handout for more info.

Thyroid problems & Anaemia

Anaemia is diagnosed in 20 – 60% of patients with hypothyroidism.

Microcytic anaemia (red blood cell are smaller than normal) is caused by malabsorption of iron and loss of iron by menorrhagia.

Macrocytic anaemia (red blood cells are larger than normal) is caused by malabsorption of vitamin B12, folic acid, pernicious anaemia and inadequate nutrition.

Pernicious anaemia occurs 20 times more frequently in patients with hypothyroidism.

It is essential your doctor screen your blood for **Iron Studies, not just haemoglobin levels**.