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What you need to know about Thyroid Cancer

This booklet has been designed to help you to learn more about your thyroid cancer. It covers the most important areas and answers some of the frequently asked questions about the thyroid and the treatment of thyroid cancer.

Most of the information in this booklet refers to the more common types of thyroid cancer, known as 'differentiated' or 'well differentiated' cancers. I am happy to talk with you further about anything mentioned in this booklet; just contact me via the office number listed on the cover or look at my website at www.endocrinesurgery.net.au

What is the thyroid gland?

The thyroid is a large butterfly-shaped gland in the neck that sits like a bow tie just below the voicebox (Fig. 1). It comprises two lobes that sit on either side of the windpipe.

The thyroid releases hormones into the bloodstream called T4 (thyroxine) and T3 that regulate the body's metabolism. Too much or too little thyroxine leads to a number of different symptoms affecting many parts of the body. Too much thyroxine speeds up the body's functions, while too little slows everything down, like 'having a flat battery'.

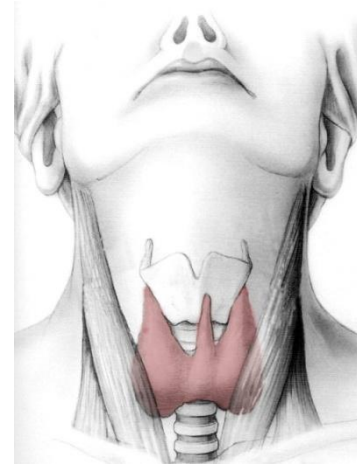


Figure 1: The thyroid gland - in the neck, just below the voice box.

Thyroid activity is controlled by a hormone called thyroid stimulating hormone (TSH), which is released from the pituitary gland in the brain. Thyroid blood tests measure this hormone as well as those released by the thyroid itself.

The thyroid and pituitary gland work together to control the release of thyroid hormone, rather like the thermostat controls the temperature of a room. Just like the thermometer in a thermostat senses the temperature in a room, the pituitary gland senses the level of thyroid hormone in your bloodstream.

If there is not enough thyroid hormone, the pituitary releases more TSH which tells the thyroid 'factory' to make more thyroid hormone and release it into the blood. Once the levels are back to normal the pituitary turns down the TSH signal again and continues its monitoring function.

What is thyroid cancer?

Thyroid cancer is a malignant or cancerous growth within the thyroid gland. Although it is not as common as breast or colon cancer, thyroid cancer is the most common endocrine cancer. According to the Australian Institute of Health and Welfare the incidence of thyroid cancer is increasing in Australia.

It is three times more common in women than in men, and can occur in all age groups.

There are five main types of thyroid cancer:

- Papillary (70-80%)
- Follicular (10-15%)
- Medullary (5%)
- Anaplastic (1%)
- Lymphoma and other cancers (<1%)

What is the outcome of thyroid cancer?

The overall outcome (prognosis) of thyroid cancer is better than almost all other cancers, and Australians have a better survival than most on an international comparison. Overall 5 year survival rate in Victoria in 2014 was 96%, the best of all cancers in women and 4th best in men.

In addition, the younger the patient presents with thyroid cancer, the better the survival, with rates over 98% in Australian patients under the age of 40 years. Deaths from thyroid cancer have been steadily decreasing in Australia for some years, and remain very low.

The survival rates for thyroid cancer also depend on the type of tumour. The most common types of thyroid cancer (Papillary and Follicular) have the best prognosis, with cure rates in the younger age group as high as 99%.

Medullary cancer has a worse prognosis. It tends to be more aggressive and spreads to lymph nodes at an early stage, so generally requires more extensive surgery. It also does not respond to radioactive iodine.

Anaplastic thyroid cancer (one of the rarest thyroid cancers, and found in older age groups) has the worst prognosis of all the thyroid cancers as it often presents after it has spread, and it grows very rapidly. An operation is rarely able to remove the entire tumour.

The prognosis for any given thyroid cancer patient depends mostly on the type of cancer, its location, if it has spread, and the age and sex of the patient at diagnosis. However it is important to note that up to 30% of cancers can recur, often many years after treatment. For this reason, **patients with thyroid cancer need life-long follow up checks** to make sure that the cancer does not come back or spread elsewhere.

What causes thyroid cancer?

Thyroid cancer is rare, accounting for less than 1% of all malignancies; there were only just over 600 new cases in 2015 in Victoria. Usually the cause is not known and thyroid cancer can occur in anyone, however there are a number of risk factors which make a thyroid nodule more likely to contain thyroid cancer:

- history of neck irradiation
- age younger than 20 years and older than 50 years
- history of previous benign thyroid disease
- family history of thyroid cancer or MEN syndrome
- syndromes – Gardner's, Cowden's and familial adenomatous polyposis (FAP)

Radiation

The relationship between radiation and thyroid cancer has been recognised since the 1950s. Radiation treatment was often given in the early to mid 20th century to treat enlargement of the tonsils, adenoids, thymus and lymph nodes in the neck, and even for skin conditions such as acne and tinea. It has been shown that radiation to the neck of children results years later in the development of thyroid cancers.

Nuclear fallout from the atomic bombing of Japan in 1945 and accidents such as Chernobyl in 1986 resulted in an increased incidence of thyroid cancer in the affected population. Two thirds of radiation induced tumours are benign, and one third malignant, most of which (70-95%) are papillary cancers.

High dose radiation can also induce cancers in the thyroid even when exposure to radiation has been elsewhere in the body from the neck, such as in treatment for Hodgkins lymphoma, cervical cancer or childhood abdominal tumours.

However, Iodine-131 (^{131}I) treatment of thyrotoxicosis or its low-dose use in scanning, is not associated with an increase in thyroid cancer.

How is thyroid cancer diagnosed?

Thyroid cancer may be discovered by the patient or the doctor, and usually causes a nodule or lump in the neck. This may be either as a single nodule in an otherwise normal thyroid gland, or when one nodule in a goitre grows bigger and becomes more obvious (dominant).

It is important to realise that thyroid nodules are common, but less than 3% of all thyroid nodules are malignant.

The clinical features vary depending on the time of presentation. An early presentation may be with just a neck lump and no symptoms. A later presentation may have additional features of hoarseness due to pressure on the nerve to the voicebox (recurrent laryngeal nerve) or difficulty in swallowing and eating. Sometimes the lymph glands in the neck will also have tumour in them.

Diagnosis of thyroid nodules can usually be made by taking a medical history and performing a physical examination with little or no discomfort. Once these have been done, it is usually necessary to arrange some more tests, such as:

- Blood tests (to measure thyroid hormone levels)
- Ultrasound (to take a picture of the gland)
- Needle thyroid biopsy (to check the lump for cancer cells)

Needle biopsy (FNA)

The first step to determine whether the nodule is malignant or benign is to perform fine needle aspiration cytology (FNA). In this test, a very fine needle is inserted into the nodule and a few cells removed for the cytologist to study under a microscope. The cytologist then determines whether the nodule is benign or malignant.

Usually only nodules greater than 1cm in diameter will be biopsied, or anything that looks more suspicious on the ultrasound.

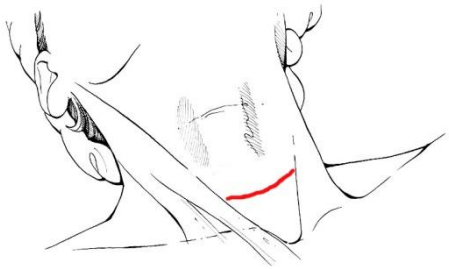
Cytology is relatively painless, can be performed with or without local anaesthesia, and will be performed under ultrasound control. It takes very little time to perform, so is all over quickly.

What if the tests show I have thyroid cancer?

In most cases thyroid cancer cells grow very slowly and the outcome of treatment is excellent. There are three parts to the treatment in many cases:

1. Thyroid surgery (thyroidectomy)
2. Radioactive iodine therapy (in some cases)
3. Thyroxine (thyroid hormone tablets)

Thyroid surgery



Most thyroid cancers can be treated with surgery, by either removing all of the thyroid (total thyroidectomy), or, in the case of very low risk cancers just half of the thyroid (hemithyroidectomy).

Figure 2: Thyroid surgery incision

Both operations will also involve sampling the lymph glands in the neck on the same side as the cancer, to gain more information. If any glands are known to be involved before surgery, then these will be removed at the same operation. Details will be discussed prior to the operation, but the surgery can usually be performed with minimally invasive (small incision) techniques (Fig. 2).

Radioactive iodine

Surgery is the majority of the treatment, but it is sometimes followed by treatment with radioactive iodine which will destroy any remaining microscopic normal and cancerous thyroid cells. Radioactive iodine is given by swallowing a single capsule, is painless, and only requires a day or two in hospital. It is *not* given to those low-risk patients only having half the thyroid removed, as it is unnecessary.

The advantage of radioactive iodine is that it acts as a 'targeted treatment' because thyroid tissue selectively takes up iodine from the blood stream. By attaching a radioactive particle to the iodine molecule, this allows a targeted dose of radiation to treat only the thyroid cells, including any malignant thyroid tissue, with little damage to the surrounding structures.

Radioactive iodine is used in three separate situations:

- After surgery to destroy any residual thyroid cancer cells or residual normal thyroid tissue.
- To treat thyroid cancer that has spread to the lymph nodes, lungs or bones.
- To treat thyroid cancer that has come back after initial treatment by surgery or previous radioactive iodine or both.

Prior to treatment the blood TSH must be elevated so there is maximum take up of the radioactive iodine by the remaining thyroid cells. This can be done in two ways: the traditional method is to stop thyroid medication until the TSH is grossly elevated, although this takes 3 weeks and can make you feel very weak and tired.

To avoid this problem it is now possible to instead stay on thyroxine and have intramuscular recombinant TSH (rhTSH or 'Thyrogen') administered prior to the radioactive iodine, which has the same effect of raising the TSH level, and still allows an effective uptake of radioactive iodine by thyroid tissue.

Thyroxine therapy

The final part of the treatment is to replace the removed thyroid's function with thyroid hormone tablets. This also will suppress the release of TSH from the pituitary, which has the effect of preventing regrowth of any thyroid cells. This is given to patients who have undergone a total

thyroidectomy and some who have had only lobectomy (partial thyroidectomy).

In the low risk patient the aim is to get the TSH down to the low normal range, but in high risk patients more aggressive suppression is required, down to below the normal range. The initial dose of thyroxine is decided according to body weight, and thereafter adjusted according to the results of the blood tests of thyroid function. The first TSH check is usually done at about 6-8 weeks after treatment and the dose of thyroxine adjusted as necessary.

Life-long monitoring – is my cancer gone?

While most patients are cured by their treatment, thyroid cancer can recur or spread to other parts of the body, even many years after surgery. The most common site for recurrence is in the neck, usually in a lymph gland.

That is why regular follow up checks are needed for the rest of your life, especially in the first 5-10 years after surgery, when your risk of the cancer returning is highest. However, the first 2 years are the most critical time.

There are a number of tests that are used to monitor your progress:

1. Thyroglobulin blood test
2. Thyroid function test (to monitor thyroxine replacement levels)
3. Ultrasound
4. Whole body scan

Thyroglobulin blood test

A thyroglobulin (Tg) test measures the level of thyroglobulin in the blood. Thyroglobulin is a protein in the blood that stores thyroid hormone. Because thyroid cells (and thyroid cancer cells) are the only cells in the body that make thyroglobulin it is a very accurate measure of whether thyroid cancer cells are present somewhere in the body. If the Tg is

elevated then you may need an ultrasound or whole body scan to check for the source of the excess thyroglobulin. It cannot be used in patients with only half the thyroid removed however, as the remaining thyroid will continue to make thyroglobulin as normal, making the result meaningless.

Tg is usually measured while you are still taking thyroid tablets (so that your TSH is still suppressed), but occasionally it can be necessary to perform a 'stimulated Tg' by doing the test while the TSH is elevated. This is achieved by either stopping the thyroid tablets for a few weeks, or by using recombinant human TSH (rhTSH) or 'Thyrogen'.

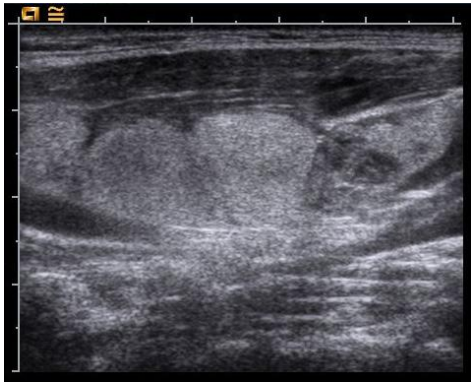


Figure 3: Ultrasound of enlarged lymph glands

Ultrasound is performed by using sound waves to search for lumps or enlarged lymph glands in the neck which might indicate a recurrence of the cancer (Fig. 3).

If something abnormal is found, a sample of the suspicious tissue can be taken by a needle biopsy .

Whole body scanning

Occasionally other tests (besides an ultrasound) are needed to search more widely for any return or spread of the cancer.

A whole body scan (WBS) requires you to swallow a pill or liquid that contains a small amount of radioactive iodine. You then lie down under a large camera that takes a scan of your body.

If any thyroid or thyroid cancer cells are present they will show up as 'hot spots' on the film (Fig. 4).

PET scanning is another form of whole body scanning, often done in conjunction with a whole body radioiodine scan, which is very effective in locating thyroid cancer cells.

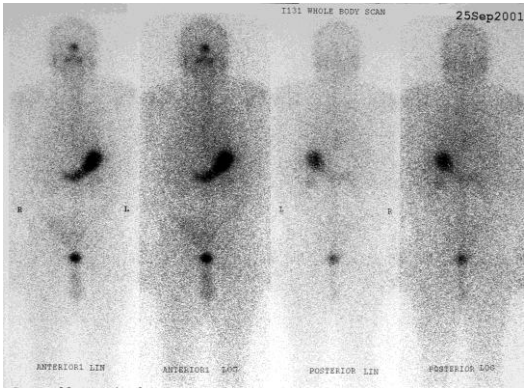


Figure 4: Whole body scan

How can I get on with my life after my diagnosis of thyroid cancer?

It can be scary for many people when they hear the word 'cancer', but after having your initial treatment, your life can just about return to normal. The cure rates for thyroid cancer are excellent, the risk of recurrence is low and targeted treatments are available, unlike many of the more common cancers. Very few people die of thyroid cancer.

So what can you do to help? Take good care of yourself by eating well, getting regular exercise and not dwelling on the diagnosis. It is important to not let the cancer 'rule your life'.

Having regular check-ups can help to reduce the stress, by making sure you remain cancer-free. It can also help to talk with other people, like your family and friends, about your fears and questions, or you might consider joining a cancer support group. I am very happy to talk with you about any questions or worries you may have.

You can also find more information on my website at www.endocrinesurgery.net.au or the website of the Australian Thyroid Foundation at www.thyroidfoundation.com.au