

What are thyroid nodules?

Thyroid nodules are lumps on the thyroid gland, which is located at the base of the neck below the larynx 'Adam's apple'. These lumps are caused by an overgrowth of thyroid cells. They can occur as single nodules or in multiples (called multi-nodular goitre).

Thyroid nodules are quite common, particularly in women and the elderly. It is hard to know exactly how common they are, as most nodules do not cause symptoms, and are therefore never found¹. They are often discovered by accident during other medical tests or procedures (e.g. X-ray, MRI, CT scan). When discovered this way, these nodules are called incidental thyroid nodules (or thyroid incidentalomas).

It is estimated around 5 in 100 people have a thyroid nodule that can be felt, while up to 76 in 100 older people (61 years or older) have a thyroid nodule visible on ultrasound.²

Most often, thyroid nodules are not noticeable or harmful.

Many nodules do not need treatment.^{3, 4}

Causes

What causes thyroid nodules?

Most nodules are caused by a local overgrowth of thyroid cells. Exactly why this happens is not clear. Nodules can get larger in pregnancy, or if the thyroid gland becomes inflamed (called thyroiditis).

There are several concerns that you or your doctor may have if thyroid nodules are found. These may include:

1. Thyroid cancer
2. Excess thyroid hormone production
3. Compression of structures in the neck (e.g. pressure on windpipe, food pipe)
4. Hashimoto's Disease
5. Cosmetic concerns (enlargement of the thyroid gland)

What causes Multi-Nodular Goitre?

Multi-nodular goitre can be caused by iodine deficiency. Iodine is an essential nutrient in the diet, found in seafood, seaweed, dairy products and commercial bread. Iodine is what the thyroid gland uses to make thyroid hormones. An iodine enriched diet is the best way to ensure you have enough iodine.

It is not advised to take an iodine supplement, to increase your iodine intake, unless you are of child bearing years. Discussing iodine intake and supplements with your doctor is essential, as too much iodine can be harmful.

Multi-nodular Goitre can be associated with autoimmune thyroiditis (Hashimoto's Disease). Hashimoto's Disease is an autoimmune disorder that causes inflammation of the thyroid gland and commonly leads to an underactive thyroid (hypothyroidism). Hashimoto's Disease can coexist with a multi-nodular goitre. Occasionally Hashimoto's Disease can cause thyroid nodules that need to be monitored in the same way as other thyroid nodules.

Thyroid Cancer and Nodules

Thyroid cancer is uncommon. Less than 5 in 100 nodules are cancerous.³ Early detection and treatment gives most patients with thyroid cancer an excellent chance of cure and long-term survival.

The risk of thyroid cancer is increased if there is a family history of thyroid cancer or following exposure to radiation in childhood or adolescence.¹



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Symptoms of Thyroid Nodules

Most thyroid nodules have no symptoms at all.

In some people, the size or position of the nodules can cause symptoms and may be of concern to you or your doctor. These include:

- A visible lump in the front of the neck
- The feeling of a lump in the throat when swallowing
- Difficulty swallowing or breathing
- Pain or discomfort in the throat
- A cough
- Voice change from pressure on nerves

However, thyroid nodules are not the only cause of these symptoms. For example, a cough may be caused by other conditions, such as postnasal

drip (mucus from your nose dripping down your throat), reflux (acid washup from the stomach) or certain prescribed medications. Seeing your doctor to determine the cause of your symptoms is important.

Sometimes symptoms occur because a thyroid nodule can cause an increase in the production of thyroid hormone. This can cause some people to:

- Lose weight without trying
- Feel tired or weak
- Feel upset or overly worried
- Have a very fast heart rate
- Have more frequent bowel movements
- Feel shaky and sweaty
- Have irregular periods (in women)

How are thyroid nodules diagnosed?

When lumps/nodules are first found, your doctor will take a medical history and do a physical examination. They then may order some tests to check if you need any treatment.

1. Medical History and Physical Examination

Your doctor will ask you questions about:

Your medical history (including if you are taking any medications, any previous tests or surgery, any previous irradiation exposure)

Your family's medical history (thyroid disorders, syndromes or cancer)

Any symptoms that might suggest your thyroid gland is overactive or presses on neck structures. These include an irregular heart rate, tremor, overactive reflexes, dry skin, facial swelling, choking sensation or difficulties in swallowing or breathing.

Your doctor will examine your neck to identify nodules or enlargement of the thyroid gland.



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How are thyroid nodules diagnosed? (cont'd)

2. Thyroid function tests

The next test your doctor may do is a blood test to measure the level of thyroid stimulating hormone (TSH) to help decide whether you need any further tests. This test involves taking a small amount of blood and sending it to the lab for tests. If the TSH level is not normal, further blood tests, such as measurement of the thyroid hormones (T3 and T4) and measurement of thyroid auto-antibodies are usually not necessary.

What do the results mean?

Normal levels – no further treatment may be needed. Your doctor will most likely arrange a check-up in 6-12 months' time to monitor the nodules and blood results.

Low levels of TSH – suggest some nodules are actively making too much thyroid hormone. This is usually confirmed by a thyroid nuclear medicine scan.

High levels of TSH – suggest the thyroid is inflamed, which can be caused by an overactive immune system. If certain thyroid auto-antibodies are elevated in your blood, this is diagnosed as Hashimoto's thyroiditis. Treatment for Hashimoto's thyroiditis may be needed if it has caused a decrease in thyroid hormone production.

3. Ultrasound

An ultrasound may be used to check the size, shape, position and number of nodules on the thyroid. Sometimes the ultrasound detects additional nodules that cannot be felt during the physical neck examination. This is very common and no reason to worry. During an ultrasound, a gel is spread over the skin of the neck and a hand-held probe is pressed and moved over the gel to scan the thyroid. This is a painless procedure. The ultrasound produces images that can see whether the lumps are nodules (made up of thyroid tissue) or cysts (fluid filled pouches).

Each nodule is checked for any imaging characteristics that look suspicious of malignancy (cancer). Your doctor will also check the size and shape of the lymph nodes at the back of the neck.

What do the results mean?

If the lumps are cysts, your doctor will most likely recommend no treatment, unless they are causing pain or discomfort. Sometimes cysts can be drained using a very fine needle or can be removed surgically.

If the lumps are nodules with no suspicious characteristics and are not very large and not causing symptoms, your doctor may recommend no treatment. A check-up may be scheduled in 6-12 months to make sure the nodules haven't changed. A fine needle aspiration may be considered depending on other factors.

If the lumps are nodules and appear suspicious (unusual shape, speckles of calcium, increased blood flow, invading into surrounding tissue, enlarged lymph nodes), a fine needle aspiration may be needed to rule out cancer, even for smaller nodules (less than 1cm in size).

If the lumps are nodules and are 1-4 cm in size, a fine needle aspiration may be considered, depending on the nodule features.



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How are thyroid nodules diagnosed? (*cont'd*)

4. Fine-Needle Aspiration (FNA)

The main reason for doing a FNA is to avoid doing unnecessary surgery on nodules that are not malignant (cancerous). Commonly, this is only done on larger nodules (1-4cm) unless there are other symptoms, or the ultrasound results suggest malignancy (cancer). There is generally no need to do a FNA on thyroid nodules unless they are greater than 1-2cm in size or the ultrasound shows certain characteristics.

The FNA procedure involves inserting a fine needle into the nodule and removing some cells. These cells are sent to the laboratory for inspection under the microscope. A specialist will determine whether the cells look benign (not cancerous), or whether there are features that are suspicious or suggest a possible malignancy. This is done using an ultrasound to locate the nodules. This procedure takes around 20 minutes.

What do the results mean?

If cells are **benign** (not cancer) – your doctor will recommend further treatment based on your symptoms. If symptoms exist, this may be medication or surgery. If there are no symptoms, no treatment may be required.

If cells are **cancerous** – your doctor will recommend surgery. This decision will depend on the number and location of the nodules. Most thyroid cancers can be easily removed and are not life threatening.

If the results are **indeterminate** – this means the results cannot reliably say whether there were cancerous cells or not. A repeat fine needle aspiration, ultrasound or surgery may be recommended.

Sometimes, the sample contains insufficient cells and needs to be repeated. This can happen even if the doctor performing the procedure is experienced and skilled.

In the future, genetic testing of the thyroid cells removed during the fine needle aspiration may

help to clarify indeterminate results. However, such testing needs further research and is not yet commonly available.

5. Thyroid uptake scan

A thyroid uptake scan (also called a nuclear medicine scan, or scintiscan) is used to check whether one or more thyroid nodules are producing excess thyroid hormones. It is usually done only if your blood tests show your thyroid is overactive (hyperthyroidism), and the information gained from your scan will help your doctor decide the best treatment. This scan involves injecting a radioactive substance into a vein in the arm. This substance emits energy, which can be seen with a special camera. After 20 minutes, images are taken of the thyroid (neck) area while you are lying down with your neck outstretched. These images take about 20 minutes to take. The images show whether the nodules are producing hormone (i.e. are “hot”), or whether they are inactive (“cold”).

This scan is not suitable for pregnant women and is only done under certain circumstances when breast-feeding.

Before a Nuclear Medicine Scan, it is important to speak to the doctor about any heart conditions or if your thyroid gland is producing excessive amounts of thyroid hormone.

What do the results mean?

If one or more “hot” nodules are found, treatment may involve medication to reduce the levels of thyroid hormone, and/or a small (and harmless) dose of radioactive iodine to reduce nodular thyroid hormone production. In some cases surgery to remove the thyroid gland may also be recommended. The risk of cancer with hot nodules is extremely low.

If one or more “cold” nodules are found, further investigation or treatment may be required depending on your symptoms. This may involve no treatment, follow-up ultrasound or fine needle aspiration. The risk of cancer with cold nodules is around 20%, or 1 in 5.

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How are thyroid nodules treated?

Your doctor will treat your thyroid nodules based on your symptoms and test results.

Benign thyroid nodules (not cancer)

Observation

Most patients do not need any treatment at all, or at least not right away. If the nodules are small and do not look serious, your doctor may organise a check-up in 6 – 12 months to make sure the nodules haven't changed. An earlier check-up is needed if symptoms increase or worsen.

Anti-thyroid medication

If your thyroid hormone production is too high, anti-thyroid medication may be given. These medications contain a product that lowers the amount of thyroid hormones made.

Radioactive iodine

Radioactive iodine may be used to reduce excess thyroid hormone production from hot thyroid nodules. For most patients, this is a single treatment, taken as a pill that releases radioactive iodine. The thyroid gland absorbs the iodine, and in most cases, the radiation damages and destroys the overactive thyroid cells. Other parts of your body are not affected by the radiation, as they do not use iodine like the thyroid gland. Symptoms generally improve within a month, although the radioactive iodine keeps working for about 6 months. If symptoms continue after 6 months or anti-thyroid medications are still required, a second dose might be needed in the future.

Regular follow-up is needed to make sure your thyroid hormone levels go back to normal. Sometimes thyroid hormones levels drop too low and thyroid hormone replacement therapy (levothyroxine) is needed.

This treatment should not be used if you are pregnant, considering pregnancy over the next 6 months or breast feeding.

Surgery

Surgery is sometimes required to remove part ('thyroid lobectomy') or all the thyroid gland ('thyroidectomy'). This is usually only done if the thyroid nodules are causing pressure, obstructing breathing or swallowing or are producing too much thyroid hormone. This surgery is done as an inpatient in hospital. It will leave a small scar at the base of the front of the neck near the top of the breast bone. Thyroid hormone levels will be tested following surgery and lifelong thyroid hormone replacement therapy may be needed to make sure your body has enough thyroid hormone to work properly. This requires taking a pill containing thyroid hormone every day and this is generally well tolerated and keeps the body functioning in the same way as when the thyroid gland was present. Your doctor will organise regular blood tests to make sure the medication dose is enough to keep your thyroid hormones in the normal range.



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How are thyroid nodules treated? (cont'd)

Malignant Thyroid Nodules (Cancer)

Surgery

Surgery is sometimes required to remove part ('thyroid lobectomy') or all the thyroid gland ('thyroidectomy'). This is usually only done if the thyroid nodules are causing pressure, obstructing breathing or swallowing, are producing too much thyroid hormone. This surgery is done as an inpatient in hospital. It will leave a small scar at the base of the front of the neck near the top of the breast bone. Thyroid hormone levels will be tested following surgery and lifelong thyroid hormone replacement therapy may be needed to make sure your body has enough thyroid hormone to work properly. This requires taking a pill containing thyroid hormone (thyroxine; T4) every day and this is generally well tolerated and keeps the body functioning in the same way as when the thyroid gland was present. Your doctor will organise regular blood tests to make sure the medication dose is enough to keep your thyroid hormones in the normal range.

Although the prognosis for thyroid cancer is very good, all patients with previous thyroid cancer will require long term follow up with a specialist.

Multi-nodular Goitre

Observation

Most often, no treatment is needed for multi-nodular goitre, unless either symptoms cause discomfort, or the thyroid is not working properly. A 12-month check-up may be planned to make sure the nodules haven't changed. At this check-up, a blood test and ultrasound may be performed. If symptoms get worse, you should make an earlier appointment with your doctor.

Thyroid hormone medications

Medications may be needed to control an overactive thyroid (anti-thyroid medication) or an underactive thyroid (thyroid hormone replacement – levothyroxine).

What can I do to help?

Taking iodine supplements can be dangerous for some patients with thyroid nodules.

Before starting any dietary supplementation, discuss this with your doctor. Your doctor will advise whether you need supplements or which supplements will be best for you. An iodine enriched diet is the most effective way of reaching a daily iodine intake, so please speak to your doctor.

The chance of having a thyroid nodule is increased with cigarette smoking and being overweight⁵. The best way to maintain good health is to engage in healthy lifestyle behaviours. This includes having a good diet, avoiding excess weight gain and not smoking. It is also important to take any prescribed medications as advised by your doctor.

For help with giving up smoking, go to Quitline: <http://www.quit.org.au/>.

For practical advice and tips with losing weight, go to <https://livelighter.com.au/Top-Tips/>

For current information about a healthy diet, see the Australian dietary guidelines: <https://www.eatforhealth.gov.au/guidelines/about-australian-dietary-guidelines>.



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FAQs about thyroid nodules

Do I need a fine needle aspiration (FNA)?

Your doctor will do an ultrasound to check the size and position of your thyroid nodules. Nodules larger than 1cm generally need a fine needle aspiration (FNA) to rule out cancer. Most small nodules (<1cm) don't generally need to have a FNA. Your doctor may monitor their size and appearance at regular check-ups using ultrasound.

Do nodules feel smaller after fine needle aspiration?

Not usually. This is because only a very small amount of the nodule is removed during the fine needle aspiration procedure. Sometimes the nodule can feel a little larger immediately after due to local swelling. This will resolve with time.

Can a benign nodule turn into cancer?

Most nodules are not cancerous and will never become cancer. It is not always possible to be 100% sure a nodule is benign, even after ultrasound and FNA. If warranted, your doctor may conduct check-ups to keep track of your thyroid nodules and order more tests if necessary.

Can I take thyroid medications if I want to get pregnant and while I'm pregnant?

Your doctor can discuss with you the best medications to control your thyroid hormones when trying to get pregnant and throughout pregnancy. This will keep you and your baby safe, as some medicines can harm unborn babies (e.g. radioactive iodine), while other medications are important to keep you and your baby healthy (e.g. levothyroxine). If you take anti-thyroid hormones and plan to become pregnant, you should consult with your doctor to see whether they are still needed. It is important to check with your doctor if your medications are safe to use before and during pregnancy.

How quickly do thyroid cysts become smaller after being drained?

It takes a while for cysts to feel smaller after being drained, even if a lot of fluid is removed. This is because, like many procedures, there is some swelling around where the needle has been inserted. This is a completely normal part of the recovery process. Cysts generally feel smaller after 2 weeks. Sometimes cysts can refill and need to be drained again. Talk to your doctor if your symptoms don't go away or if you are worried.

Where to go for more information and support?

Visit your doctor (GP)

Find an Endocrinologist: <http://www.hormones-australia.org.au/find-an-endocrinologist/>

The Australian Thyroid foundation: <https://www.thyroidfoundation.org.au/>

For support, visit...

For more information and access to support groups visit The Australian Thyroid Foundation: <https://www.thyroidfoundation.org.au/>

For help with quitting smoking visit Quitline ((or call them at 137848): <https://www.quit.org.au/>

For help, advice and tips to live a healthier lifestyle visit Live Lighter: <https://livelighter.com.au/>



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When to see your doctor

You should see your doctor (GP) if you have symptoms of thyroid nodules. Your GP can refer you to an endocrinologist (a doctor specialising in hormones and glands) or an endocrine surgeon with expertise in thyroid nodule diagnosis/surgery.

If you have been diagnosed with thyroid nodules, see your doctor if symptoms develop, get worse, or return.

If you are currently taking thyroid replacement hormone (levothyroxine) and are planning a pregnancy, it is important to discuss this with your doctor. Your doctor can advise and monitor your thyroid hormone levels when trying to get pregnant, throughout pregnancy and while breastfeeding. This will keep you and your baby safe, as ensuring thyroid hormone levels are adequate during this time is essential for your baby's development.

Questions to ask your doctor

Seeing your doctor or having a medical problem can be stressful. It often takes time for information to sink in and it is very common to feel overwhelmed by what is happening.

Sometimes it is helpful to write down questions for your doctor before you go.

Some questions that might be useful for you are:

1. Do I need medication or treatment for my thyroid nodules?
2. How quickly should my medication work?
3. What treatments are available?
4. Should my symptoms worsen, or can they be controlled?
5. Does my medication have side effects?
6. Can I keep taking my medication during pregnancy?
7. Do I need to have an ultrasound?
8. What do I need to do before I have an ultrasound?
9. Do I need to have a fine needle aspiration?
10. Do I need to have a thyroid scan?
11. Do I need surgery?
12. Where does my procedure take place? How long does it take?
13. Are the procedures covered by Medicare?
14. How often should my nodules be monitored?
15. Do I need another appointment?



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Common terms and definitions

Adenoma – A non-cancerous tumour in glands.

Autoimmune disorder – A condition where the body's immune system attacks healthy cells.

Benign – not cancerous.

Cytology – A sample of cells is removed from the body. The cells are then inspected to see whether they look abnormal (cancerous).

Cyst – An enclosed pocket of fluid in the body.

Goitre – Enlargement of the thyroid gland.

Hashimoto's Disease – An autoimmune disease where the immune system attacks the thyroid gland. It causes inflammation of the thyroid gland, and can result in low thyroid hormone levels (hypothyroidism).

Hyperthyroidism – A condition caused by the thyroid making too much thyroid hormone (overactive thyroid).

Hypothyroidism – A condition caused by the thyroid not making enough thyroid hormone (underactive thyroid).

Malignant – Cancerous.

Nodule – An abnormal growth of cells.

Postnasal drip – When the mucus from a blocked nose or sinuses drips down the back of your throat, causing itchiness, a tickle in your throat or cough.

Thyroiditis – Inflammation of the thyroid gland.

Thyroid incidentaloma – A thyroid nodule discovered by imaging being carried out for non-thyroid reasons (e.g. ultrasound, CT scan or MRI).

Tumour – An abnormal swelling or growth in the body. Can be benign (non-cancerous) or malignant (cancerous).

References

1. Durante C, Grani G, Lamartina L, Filetti S, Mandel SJ, Cooper DS. The Diagnosis and Management of Thyroid Nodules: A Review. *JAMA*. 2018;319(9):914-924.
2. Guth S, Theune U, Aberle J, Galach A, Bamberger CM. Very high prevalence of thyroid nodules detected by high frequency (13 MHz) ultrasound examination. *Eur J Clin Invest*. 2009;39(8):699-706.
3. Walsh JP. Managing thyroid disease in general practice. *Med J Aust*. 2016;205(4):179-184.
4. Wong R, Farrell S, Grossman M. Thyroid nodules: Diagnosis and management. *Medical Journal of Australia*. 2018;in press.
5. Jiang H, Tian Y, Yan W, Kong Y, Wang H, Wang A, et al. The Prevalence of Thyroid Nodules and an Analysis of Related Lifestyle Factors in Beijing Communities. *Int J Environ Res Public Health*. 2016;13(4):442.

About this fact sheet

The content on this page was medically reviewed by Prof Mathis Grossmann, Dr Rosemary Wong, Prof John Walsh, Dr Don McLeod and Dr Morton Burt

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