

THYROID NODULES

(LUMPS IN THE THYROID)

FACTS

- If 100 people get their neck examined by ultrasound in a fair, around **30%** or more of them will have thyroid nodules; however, most of these are small (< 3 mm \approx 1/8 of an inch \approx 1/5 of finger width).
- These nodules may not be seen or felt if they are small or deep inside the thyroid.
- **MOST** of the time, they are **BENIGN**, and cause no problems.
- If you happened to be **PREGNANT**, the chance of being cancer is not higher than in non-pregnant people; and workup and treatment can be deferred till after delivery.¹

SYMPTOMS

1. Most of the time, I feel **NOTHING**.
2. Sometimes, when I look at the mirror, I may notice my neck has a **BULGE**.
3. **A FRIEND OR A DOCTOR** may see it or feel it.
4. They may cause trouble with **breathing, swallowing or voice**.

IMPORTANT QUESTIONS

1. Are they **PRESSING** ON THINGS AROUND THEM, causing problem with breathing, swallowing or voice?
2. Are they making **TOO MUCH** THYROID HORMONE?
3. Are they **MALIGNANT**?

After full work-up, the answer usually is NO to all of these above questions. However, they have to be dealt with to ensure we not missing anything serious. So how do we do that?

1. ARE THEY PRESSING ON THINGS AROUND THEM?

1. Do I have difficulty with **BREATHING**? These nodules could be pressing on my windpipe (trachea).
2. Do I have difficulty with **SWALLOWING**? These nodules could be pressing on my esophagus.
3. Do I have hoarseness of **VOICE**? These nodules could be pressing on the nerves going to my voice box (larynx).
4. Doctor may order **CT** scan, **MRI** or **ultrasound** to find out if the thyroid is pressing on these things. However, such pressure on the surroundings could be too subtle to show up on these tests.

¹ Mahmood Moosa and Ernest L. Mazzaferri. Outcome of differentiated thyroid cancer diagnosed in pregnant women. Journal of Clinical Endocrinology and Metabolism. September 1997; volume 82 (issue 9): pages 2862-2866.
www.ncbi.nlm.nih.gov/pubmed/9284711

5. If any of the above problems is so bad, we may need to have part or the whole thyroid removed by **SURGERY** to relieve the pressure.
6. Alternatively, we could try to shrink the thyroid by **RADIOACTIVE IODINE TREATMENT** (RAI treatment). However, we may not be sure of how much it will shrink.
7. When it is not that bad, we could attempt shrinking the thyroid by using thyroid pills (**SYNTHROID**). However, it may not shrink it very well (or at all), and could have side effects.

2. ARE THEY MAKING TOO MUCH THYROID HORMONE?

- No Problem. The doctor may find out by doing some simple **BLOOD TESTS**.
- If they show too much thyroid hormones in the blood, the doctor may also do **RADIOACTIVE IODINE UPTAKE AND SCAN**, to find out if the nodule is overactive, thus responsible for the high level of thyroid hormone in the blood.
- If it is, it can be a **GOOD NEWS** in a way, as most overactive nodules are benign, we rarely need to have a biopsy to find out whether they are malignant; we may just have some treatment for thyroid overactivity. Besides, biopsy of overactive nodules could be misleading, because overactive cells could look like malignant cells (both kinds of cells are actively growing, and could look similar on biopsy).

3. ARE THEY MALIGNANT?

- **MOST** of nodules ($\approx 90\%$) are **BENIGN** (only 10% are malignant).
- Doctor usually orders an **ULTRASOUND** to better understand the nature of these nodules. Ultrasound is a simple test in which a technician touches the front of my neck with a small probe (transducer) after applying a lubricant jelly. The device emits sound waves that can tell about the structure of things inside my neck. It is safe and painless. It detects nodules that may not be seen or felt by the doctor. It also gives accurate measurement of their size.
- Nodules are **LESS LIKELY TO BE MALIGNANT IF** they are:
 1. In a woman (nodules in men are more likely to be malignant)
 2. **Small**: The smaller the better. As a reference, finger width of an average-size person is 15 mm $\approx 3/5$ inch. A nodule is less likely to be malignant if it is < 10 mm $\approx 2/5$ inch $\approx 2/3$ of finger width), especially if they are < 5 mm $\approx 1/5$ inch $\approx 1/3$ of finger width.
 3. **Cysts** (filled with liquid, not live tissue) -+
 4. **Multiple** (a single nodule is more likely to be malignant)
 5. Getting little blood going through them (not much alive), and
 6. Having no calcium deposits.
- There are **THREE OPTIONS** (mentioned below) that allow us to find out whether the nodules are malignant. Each options has its advantages and disadvantages.
- The specific characteristics of the nodule (e.g. size, shape, etc.), and the patient's perspective in life (“I don’t like to do much” versus “I want to get to the bottom of this”) may make you lean toward one way or another. The options we have are:

1. Sit tight, and watch

(Observation with serial ultrasound examinations)

- We watch to see if it is growing fast, or causing any further trouble.
- *Advantage* is that we do NOT have to do much (just an ultrasound every few weeks or months, and watching for things).
- *Disadvantage*: we are not quite sure; benign things could grow fast, and cause trouble, while cancer sometimes creeps slowly on us, without giving us much trouble, at least initially.

2. Taking a Sample of Cells

(Fine Needle Aspiration Biopsy)¹

- **HOW DONE:**
 1. The doctor sticks a **needle** into the nodule (usually while watching it on the **ultrasound**),
 2. draws a few **drops** of liquid that hopefully contain cells from the nodule,
 3. spreads them on a **slide**, and
 4. sends them to be **examined** under the microscope to see if they have cancer cells.
 5. The doctor gets a **report** from the lab in a few days.
 6. The doctor then **discusses** with you what the next step should be.
- **POTENTIAL RESULTS:** The report can come back as:
 1. **Benign** (69%): Congratulations!
 - But the doctor may still need to follow it up by repeat examination and ultrasound every few months because the accuracy of biopsy is not 100% (see below), and what is benign now could change its nature later.
 - I should also check it regularly myself if I can feel it, and report to the doctor any increase in its size or change in the way it feels.
 2. **Malignant** (4%): We hopefully have caught it early. Cancer is always bad, but thyroid cancer is less dangerous than most other cancers. The doctor will refer me to surgery to start taking care of it.
 3. **Suspicious** (indeterminate) (10%): We have enough number of cells, but these cells have features that can be benign or malignant. The doctor usually recommends surgery anyway to remove the nodules, and ensure they are benign.
 4. **Inadequate** (nondiagnostic) (17%):
 - The number of cells in the specimen is not enough to confidently tell whether the nodule is benign or malignant.
 - This usually happens when:
 - a) the nodule is full of liquid (cyst), which have few cells,
 - b) the nodule is very small,
 - c) the nodule is very deep inside the thyroid, or
 - d) the doctor is not experienced in doing such a biopsy.
 - When the biopsy is inadequate, the doctor may repeat the biopsy, or go with something else (observation with ultrasound, or surgery).

1. Hossein Gharib and John R. Goellner. Fine-Needle Aspiration Biopsy of the Thyroid: An Appraisal. *Annals of Internal Medicine* 15 February 1993, Volume 118, Issue 4, Pages 282-289. <http://www.ncbi.nlm.nih.gov/pubmed/8420446>

- **FOLLOW-UP:** It's important to visit the doctor again after the report is back to discuss it, and decide on the future plan.
- **ACCURACY:**

When the report comes back BENIGN	The chance that it is true, i.e. the nodule really is benign (TRUE-NEGATIVE Rate, or Negative Predictive Value): 89% to 99%	The chance that it is false, i.e. the nodule actually is malignant (FALSE-NEGATIVE Rate): 1% to 11%
When the report comes back MALIGNANT	The chance that it is true, i.e. the nodule really is malignant (TRUE-POSITIVE Rate, or Positive Predictive Value): 92-99%	The chance that it is false, i.e. the nodule actually is benign (FALSE-NEGATIVE Rate): 1% to 8%

- Accuracy depends on:
 1. **Skills** of the doctor who does the **biopsy**
 2. **Expertise** of the doctor who examines the slides (the **Cytologist**)
 3. The **size** of the nodule: when the doctor does a biopsy a large nodule (e.g. 4 cm \approx 1 3/5 inch \approx 1 1/3 of finger width), the needle may hit only benign areas, missing the malignant areas of the nodule that may be there. This is not as much of a problem in smaller nodules, as by taking several samples of the nodule, there is a good chance that the needle hits most of the areas in the nodule.
- **PAIN:** The needle is very **small** (#25 gauge), even smaller than what you get in the lab for a blood test; however, since the doctor sticks it into your neck, you are more conscious of it. It's usually not very painful, especially if the doctor uses a numbing medicine.
- **POTENTIAL COMPLICATIONS:** Very few!
 1. **Bruise:** The most common problem is a small bruise that usually goes away in a few days or weeks. Very rarely, a larger blood vessel or an organ near the lump may be hit by the needle,
 2. **Infection** may occur, but it's rare.
- **RISK OF CANCER SPREAD:** Millions of specimens have been taken by fine-needle aspiration. Only a few cases of cancer have been reported on the needle path. Cancer spread is **NOT** a risk of fine-needle aspiration.

3. Surgery

- **Part** of the thyroid that contains the nodule is removed (usually half of the thyroid or more).
- Alternatively, according to what is found during surgery, the surgeon may decide to remove the **whole** thyroid.
- Regardless, whatever is removed will be sent to the lab to be examined under the **microscope** to ensure it is benign.
- **ADVANTAGES** include:
 1. **100% accuracy:** as not only some cells are examined (as it is the case with biopsy), but the whole thyroid is examined

2. Peace of mind: Whatever the nature of the nodule is, it will be out, we don't have to worry about it any more.
- **POTENTIAL COMPLICATIONS:**
 1. Low thyroid (Hypothyroidism) requiring thyroid hormone pills (Synthroid): It happens when the part of the thyroid left is too small to produce enough thyroid hormones. The doctor monitored the thyroid hormones in the blood regularly following surgery to find out.
 2. Regular surgical complications, like bleeding, infection and anesthesia problems, but these generally are uncommon.
 3. Low calcium in the blood (Hypocalcemia):
 - There is a group of glands near my thyroid, called Parathyroid Glands (para = neighbor of).
 - They ensure that calcium level in blood does not drop. Whenever they sense that calcium is dropping, they release their hormone, Parathyroid Hormone (PTH), which goes to bones to carve some calcium and put it in blood, and to the kidney to save more calcium from being dumped in the urine.
 - They have gentle blood supply. Surgery in that area may inadvertently disturb their blood supply, and make them lazy (Hypoparathyroidism).
 - This is uncommon, and usually transient; but it rarely is permanent.
 - If it happens, I need extra calcium and vitamin D to keep my calcium blood level up.
 4. Hoarseness of Voice:
 - There is a nerve (Recurrent Laryngeal Nerve) that passes near the thyroid gland, and works on the voice box (larynx).
 - This nerve is very gentle. Surgery in that area may inadvertently hurt it.
 - It is uncommon to happen, and usually transient; but it can be permanent, causing permanent hoarseness of voice.

THIS INFORMATION IS NOT A SUBSTITUTE FOR YOUR DOCTOR'S ADVICE