

## Thyroid nodular disease



- Nodule in the central of neck at the location of thyroid gland this called **thyroid nodule**.

- A lump in area of thyroid gland that moves with gland upon swallowing this called **thyroid nodule or thyroid lump**.

★ **The most common palpable thyroid nodule is: prominent /dominant / the biggest nodule of multi nodular goiter (MNG)**

- **Multinodular goiter is more common > than solitary nodule**

- If you have nodules in thyroid don't think it's solitary, it can be the biggest nodule but there is multi nodule.

- MNG It is not the only diagnosis.

✳ **Other differential diagnosis DDX of thyroid nodule as following:- (very important) (NOT EVERY lump located in the thyroid area is a thyroid nodule ) IT COULD BE:**

**1) Lymphadenopathy (pathological lymph node)**

**2) Tracheal sarcoma**

**3) Parathyroid carcinoma**

**4) Thyroid nodule MNG**

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- The **most common lump** in central of neck upon swelling is → thyroid lump Or thyroid nodule.

- Even if there was 1ry primary hyperparathyroidism + lump in the neck this is most likely NOT parathyroid carcinoma this still a thyroid nodule .

● **What is the next step to do with a patient you think he has a thyroid nodule, what is the next approach to him?**

▶ You have to know the major of this nodule → is it benign or malignant.

▶ THE FIRST THING TO DO WHEN YOU APPROACH PATIENT WITH THYROID NODULE IS TO **ASSESS THE FUNCTIONAL STATUS OF NODULE** OF THE THYROID.

WHICH MEANS YOU MUST DO **Thyroid function test**

TSH  
T3  
T4

→ Your plan of the management will be differ according to the condition and the state of your patient and the result of the thyroid functional test whether your patient is hyperthyroidism or hypothyroidism or Euthyroid . Each has it's own management and treatment.

**HYPERTHYROID: TSH↓ ,, so what I will do?**

You need to assess the functional status of nodule,, why?

Because **99%** of toxic hyperthyroidism nodules are **BENIGN**. So you **don't need fine needle aspiration "FNA"** or biopsy for them .

● **It's important to know thyroid gland toxic or the nodule is toxic.**

▶ NEXT STEP IS: We do **thyroid scan**

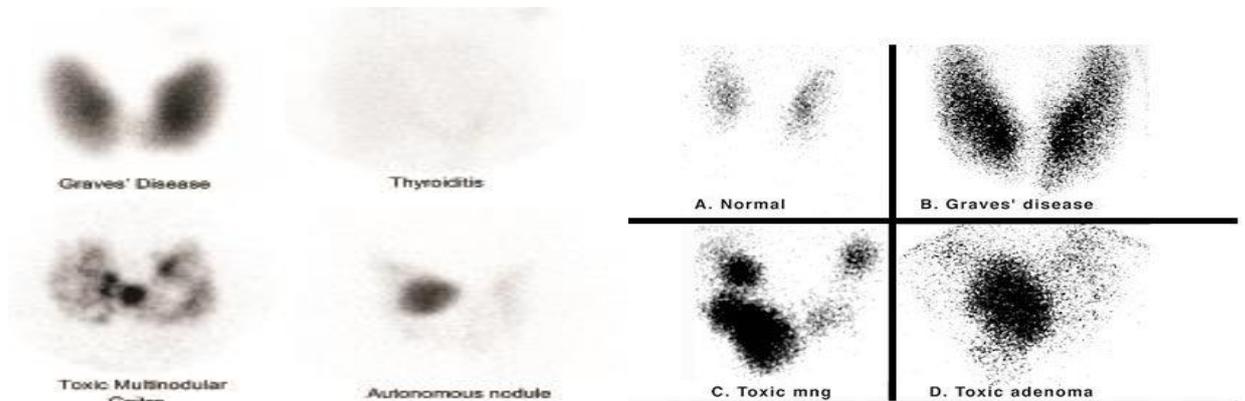
➤ So this patient with a thyroid toxic state you **MUST HAVE** to know if is the nodule itself toxic?

Or thyroid gland is toxic?

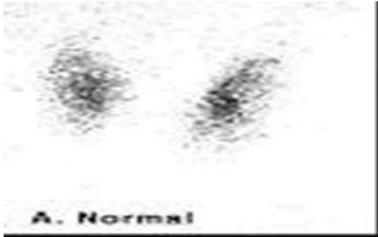
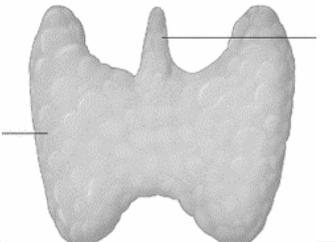
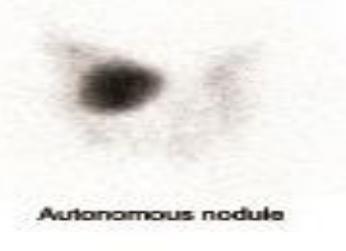
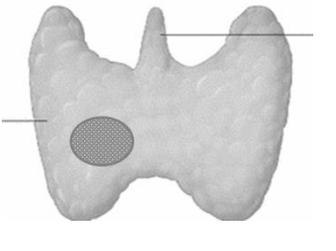
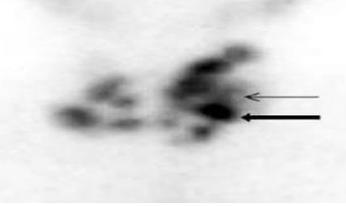
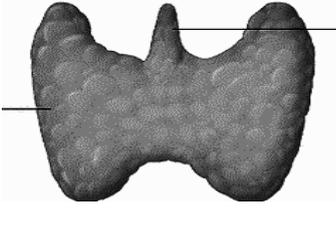
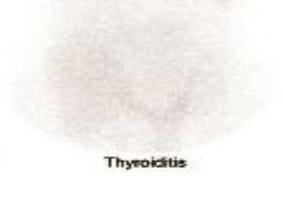
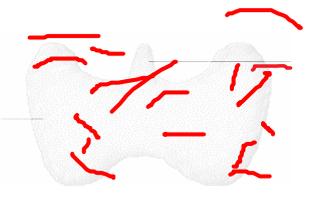
Because if the nodule itself is toxic → 99% is benign so no need biopsy.

● **What is a thyroid scan? ((Important))**

Specialized imaging procedure for examining your thyroid the patient take a dye using small amounts of radioactive material to diagnose disease. The radioactive iodine builds up in your thyroid tissue (It's uptake by thyroid gland).



# Thyroid scan:

<p><b>1</b></p>	<p><b>Normally</b> thyroid gland uptakes all this dye in normally condition. ALL Thyroid gland homogeneously Uptake 4%</p>		
<p><b>2</b></p>	<p><b>Solitary Toxic nodule (Solitary Toxic adenoma)</b> ((here only one single nodule is colored))  ▶ Lobectomy</p>		
<p><b>3</b></p>	<p><b>Toxic multinodular nodule</b> -Plummer's syndrome ((Several multiple nodules were colored while the rest of gland didn't colored)) ▶ Total Thyroidectomy</p>		
<p><b>4</b></p>	<p><b>Gravis disease</b> Note overall increased uptake of iodine abnormally. VERY HIGH UPTAKE IODINE Uptake 9% ▶ Total Thyroidectomy</p>		
<p><b>5</b></p>	<p><b>Thyroiditis</b> <b>Cells are destroyed → there is no uptake at all , IT DOSE NOT appears,, NOTHING shown ON thyroid scan</b>  ▶ Total Thyroidectomy</p>		

▶ If one lobe has toxic nodule we do → lobectomy.

Lobectomy: 1/2 half of isthmus is removed.

Thyroidectomy: Total Gland is removed.

## Why you don't give radioactive iodine in toxic multinodular goiter (Plummer's syndrome)?

Because nodules are different in size, if you give radioactive iodine → it will non-uniformly diffuse ( the size is differ so the uptake of iodine will differ,, some nodule take it , some not take it ) ,, the patient will have very bad chance of recurrence .

## Why you can treat Graves disease by radioactive iodine but you can't treat or use radioactive iodine in toxic MNG "MULTI-NODULAR-GOITER"?

BECAUSE: -

★ IN TOXIC (MULTI-NODULAR-GOITER) : MULTIPLE UPTAKES → MULTIPLE SITE OF DESTRUCTION → UN-UNIFORMLY UPTAKE OF IODINE → PATIENT WILL HAVE A VERY BAD CHANCE OF RECUURANCE.

★ IN GRAVIS : UNIFORM ENLARGMENT → DIFFUSE UPTAKE → DIFFUSE OF TOTAL DESTRUCTION

**Table 4. Patterns Observed in Radioactive Iodine Uptake and Scan**

<i>Condition</i>	<i>Radioactive iodine uptake (normal = 15% to 25%)</i>	<i>Radiotracer distribution in the thyroid gland</i>
Graves disease	High	Homogeneous
Toxic adenoma	High	Iodine 123 is concentrated in one spot
Toxic multinodular goiter	High	Iodine 123 is concentrated in multiple spots
Thyroiditis	Low	Not applicable

# Gravis disease:

► Is an autoimmune disease characterized by hypertrophy + hyperplasia of thyrocyte and diffuse enlargement of thyroid follicles. It's also called (diffuse toxic goiter).

► In gravis disease the body of patient forms antibodies(Abs) that's similar to TSH (Thyroid stimulating hormone ).

► known as TSH-receptor -binding-antibody.

✿ There are three ways of treatment and management of gravis disease by:

**1- Radioactive iodine ablation** ( because it is uniform enlargement of thyroid gland & the uptake is similar )

**2- Antithyroid medications as:**

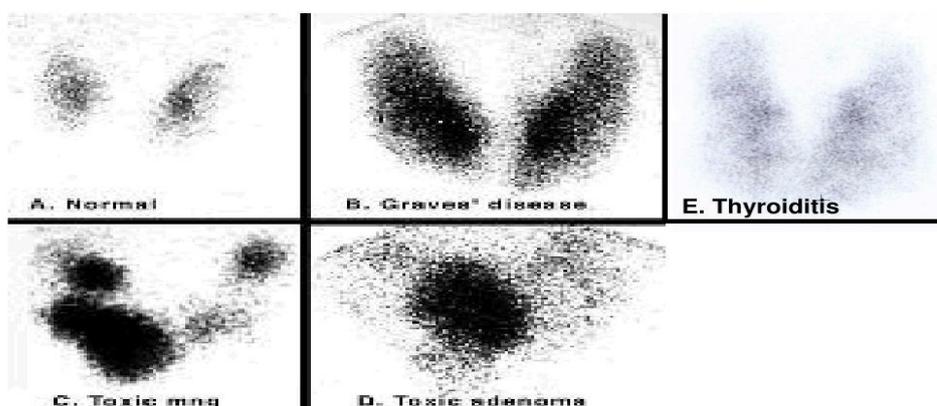
◆ **CARBIMAZOLE**    ◆ **METHIMAZOLE**    ◆ **PROPYLTHIOURACIL**

★ How these drugs act? → by inhibit enzyme of thyroid (thyroid peroxidase) BUT Propylthiouracil in addition to inhibit the enzyme, it has also one more extra step which is inhibit the Transformation of T3 into → T4 peripherally.

**3- Surgery.**

✿ **Radioactive iodine therapy + Surgery are LESS RECURRENCE**

## Thyroid Scan Results



🌸 No one choice is better than other ALL OF THEM ARE CONSIDER AS 1<sup>st</sup> line management according to the status of our patient we choose the most appropriate way to manage him.

### 🌸 EXAMPLES OF CHOOSING THE WAY OF MANAGEMENT:

➤ If patient was very elderly and extreme age he is unfit for surgery I would do → medically therapy for him.

➤ If it was female patient on childbearing age the management is → Surgery.

➤ Patient with exophthalmos ttt is by → Surgery, because radioactive iodine will significant increase the eye ministration

➤ Pregnant women : → Surgery because this is an indication for surgery. WE DON'T give radioactive iodine in pregnancy.

➤ Patient with gravis disease I will do surgery.

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Don't miss out that when you give a patient Carbimazole you must give full information and explanations and tell your patient (( if you develop any FLU-LIKE SYMPTOMS))

أو اذا صار عند المريض رشحه <<<< تقوله الله يرضى عليك تروح على الطوارئ لانو لازم نعملك CBC لأن هذا الدواء يعمل Agranuloctosis



You take a proper management according to your patient 😊

## ●Thyrotoxic VS Hyperthyroid

**Thyrotoxicity:** caused by excessive thyroid hormone in the system, usually resulting from over activity of the thyroid gland. **Hyper metabolic clinical state that result due to elevated circulatory levels of T3 - T4.**

●Is every thyrotoxicosis is caused by hyperthyroidism?

**No,, It could be either one of following:-**

- 1- because of **single nodule.**
- 2- because of **multiple nodules.**
- 3- because of **all the gland.**

●Q: Name other cause for Thyrotoxic State?

★★★ANSWER IS → Thyroiditis

thyroiditis cells are destroyed → there is no uptake at all of iodine , IT DOSE NOT appears,, NOTHING shown on thyroid scan

**Thyrotoxicosis:** Is caused only by find elevated circulatory levels of T3 - T4.

**Q: How T3 – T4 circulatory are elevated?**

- 1) Gland hyperfunctional
- 2) Damage under destroyed of cells

## ★ EXAM QUESTION:

### Approach to patient with a thyroid lump? "Very important"

Answer should be like this ⇒ First I need to assess the function status of thyroid gland by ordering the thyroid function test TSH – T3 – T4.

❖ If patient is hyperthyroidism (TSH ↓) ⇒ NEXT STEP IS I WILL DO A **THYROID SCAN**. Because I need to **assess the functional status of the nodule itself**.

❖ If patient is hypothyroidism or Euthyroid ⇒ then I need to determine the picture of nodule and I will proceed to **U/S & fine needle aspiration cytology**.

❖ If thyroid gland have nodule and the patient is Euthyroid (normal thyroid function test) ⇒ **fine needle aspiration cytology**.

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- **Cytology**: cells itself only.

- **Histology**: Cells and their related surrounding architecture.

### ★ What are the nuclear features of Papillary Ca ?

- 1- Optically clear nuclei and nuclear crowding.
- 2- Intranuclear cytoplasmic inclusions.
- 3- Nuclear groove.
- 4- Psammoma body.

## ☀ Bethesda system for reporting thyroid cytology score: (VERY IMPORTANT)

- Categories from 1-6
- beside each category recommendation what to do.
- has been updated in 2017 but doctor said we are required to know the old system not the new updated one
- each category tells how much property it could be malignant
- each category has its own management recommendation

## The Bethesda System for Reporting Thyroid Cytopathology

Category	Risk of Malignancy	Recommendation
I. Nondiagnostic or Unsatisfactory	1-4%	→REPEAT
II. Benign	0-3%	→OBSERVE /CLINICAL FOLLOWING
III. Atypia of undetermined significance or Follicular lesion of undetermined significance	~5-15%	REPEAT/ FNA
IV. Follicular Neoplasm or Suspicious for a Follicular Neoplasm	15-30%	→SURGICAL LOBECTOMY If no family history, no radioactive No hashimoto
V. Suspicious for Malignancy	60-75%	→TOTAL THYROIDECTOMY RISK 75%
VI. Malignant	97-99%	→TOTAL THYROIDECTOMY RISK100%

## Risk factors for malignancy in patients with thyroid nodules

- History of head and neck RT
- Familial cancer (medullary cancer, MEN2, papillary cancer)
- People younger than 14 or older than 70
- Male gender
- Increase in nodule size
- Hard or fixed nodule, Cervical lymph nodes
- Persistent dysphonia-dysphagia-dyspnea

### HISTORY

- External irradiation during childhood
- Age < 20 or > 60 years
- Male gender
- Family history of thyroid cancer
- Hoarseness, dysphagia
- Rapid growth

### PHYSICAL EXAMINATION

- Firm or hard
- Fixed to soft tissue
- Local symptoms
- Lymphadenopathy

Adapted from: Singer PA. Evaluation and management of the solitary thyroid nodule. *Otolaryngol Clin North Am* 1996;29: 577-592.

Table 1. Risk factors for thyroid nodule malignancy (continued)

Risk factors	Score	
	1	2
Gender – male	√	
Age <20 years or >50 years	√	
History of radiation		√
Familial history of thyroid carcinoma or multiple endocrine neoplasia disease		√
Symptoms of local tumor invasion (hoarseness, dysphagia, difficulty breathing or dyspnea)		√
Rapid tumor growing without pain		√
Solitary nodule on isthmus	√	
Hard consistency		√
Regional lymph nodes enlargement		√
Diffuse margin of tumor	√	
Fixed tumor to surrounding tissue		√

## 2017 Bethesda System for Reporting Thyroid Cytopathology

Diagnostic Category	ROM if NIFTP not cancer	ROM if NIFTP is cancer	Management
<b>Nondiagnostic/unsatisfactory</b> Cyst fluid only Acellular specimen Other: Obscuring factors	5–10%	5–10%	Repeat fine needle aspiration under ultrasound guidance
<b>Benign</b> Benign follicular nodule Chronic lymphocytic (Hashimoto) thyroiditis, in proper clinical setting Granulomatous (subacute) thyroiditis	0–3%	0–3%	Clinical and US follow-up until two negative
<b>Atypia of undetermined significance/ follicular lesion of undetermined significance</b>	6–18%	10–30%	Repeat FNA, molecular testing, or lobectomy
<b>Follicular neoplasm/ suspicious for a follicular neoplasm</b> (Specify if Hürthle cell type)	10–40%	25–40%	Molecular testing, lobectomy
<b>Suspicious for malignancy</b>	45–60%	50–75%	Lobectomy or near-total thyroidectomy
<b>Malignant</b> Papillary thyroid carcinoma Medullary thyroid carcinoma Poorly differentiated carcinoma Undifferentiated (anaplastic) carcinoma Squamous cell carcinoma Carcinoma with mixed features Metastatic malignancy Non-Hodgkin lymphoma Other	94–96%	97–99%	Lobectomy or near-total thyroidectomy

**★ Properties that increase the possibility of malignancy (very important please go SLIDE 5-6) we have 16 reasons plz remember it :**

**1) Male sex.** Despite thyroid nodular disease and cancer being more common in females; a thyroid nodule in a male is more likely to be Malignant.

**2) The extremes of age.** The likelihood of malignancy is higher in Nodules found in patients younger than 20 years or older than 60 years than those found in patients between 20 and 60 years of age.

**3) Family History of thyroid cancer.**

**4) Voice changes (Hoarseness)** is an important indication of Malignancy)

**5) Associated cervical lymphadenopathy.**

**6) If the patient has Hypothyroidism from a long time and he is on L-thyroxine therapy,** then you're probably dealing with an autoimmune thyroiditis Pt.(Hashimoto's Thyroiditis )

Note : There is an association between Hashimoto's thyroiditis and Papillary Ca & thyroid Lymphoma Other than that it's not associated with other Carcinomas .

**7) Obesity:** is an independent risk factor for thyroid cancer.

**8) During the physical examination:** The only physical characteristic of a thyroid nodule indicative of malignancy is Fixation to the adjacent tissues. (Core Prognostic)

**9) History of radiation exposure.**

**10) Rapid/substantial growth.** Although growth is the natural history of both benign and malignant nodules. Rapid growth is in favor of the latter, particularly anaplastic carcinoma.

**Table 1. Clinical Findings Associated with an Increased Risk That a Thyroid Nodule Is Malignant.\***

History of differentiated thyroid cancer in at least one first-degree relative
History of external-beam radiation or exposure to ionizing radiation as a child or adolescent
Prior tissue or cytologic diagnosis of thyroid carcinoma
Male sex
Focal uptake of <sup>18</sup> F-fluorodeoxyglucose by the thyroid
Personal or family history of multiple endocrine neoplasia type 2 or familial medullary thyroid cancer
Serum calcitonin level >50 to 100 pg/ml
Residence near a nuclear-reactor accident

\* Adapted with permission from the American Thyroid Association (ATA) guidelines.<sup>4</sup>

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