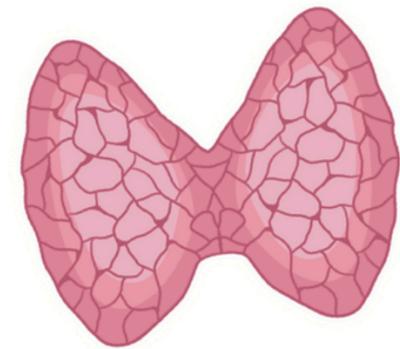


How to approach patient with thyroid nodule



Dr : Tareq Aladwan

Dony by :

Eiman Alrfou

Duha Altarawneh

Alaa Omar Altarawneh

Introduction

Discrete lesion within thyroid gland that is radiologically distinct from surrounding parenchyma, Noted by patient, or as an incidental finding.

May be:

- **Palpable or impalpable.**
- **Functioning or nonfunctioning (cold, warm, hot).**

Prevalence increases with:

- **Age**
- **Exposure to ionizing radiation (Nodule in radiated patient: 35-40% cancer)**
- **Pregnancy**

EPIDEMIOLOGY:

- **Ages → 35-59**
- **Women 6.4%**
- **Men → 1.5%**

They are found in 4%– 8% of adults by palpation and in 13%– 67% when ultrasound detection is used. In autopsy studies, they have a prevalence of approximately 50% .

- **Younger and older patients (m >40yrs and F >50yrs) more likely to have malignant thyroid nodule.**

- **Children may present with more advanced disease.**

- **Incidence F > M, but aggressiveness M > F**

- **Symptoms of hyperthyroidism and hypothyroidism should be explored:**

- **Family history**

- **H/o previous head and neck radiation exposure**

- **H/o medullary carcinoma, pheochromocytoma, or hyperparathyroidism (MEN syndromes).**

Rapid growth of a preexisting or new thyroid nodule (hemorrhage into cyst / carcinoma).

Throat or neck pain (hemorrhage into benign nodule, rarely as/w carcinoma).

- **Compressive or invasive symptoms like:**

- ▶ **Voice change**

- ▶ **Hoarseness**

- ▶ **Dysphagia**

- ▶ **Dyspnea**

Represents a wide spectrum of disease

➤ **Most are:**

● **Colloid nodules,**

● **Adenomas**

● **Cysts,**

● **Focal thyroiditis**

➤ **Only 5-6% are malignant**

Table 28.12 Causes of thyroid nodules.

Benign	Malignant
Colloid cyst	Papillary carcinoma
Simple cyst	Follicular carcinoma
Subacute thyroiditis	Medullary carcinoma
Infection, e.g. TB	Nonthyroidal malignancy
Lymphoma	Metastases
Follicular adenoma	Breast
Hurthle cell adenoma	Renal

Table 28.13 Factors suggesting malignancy in a thyroid nodule.

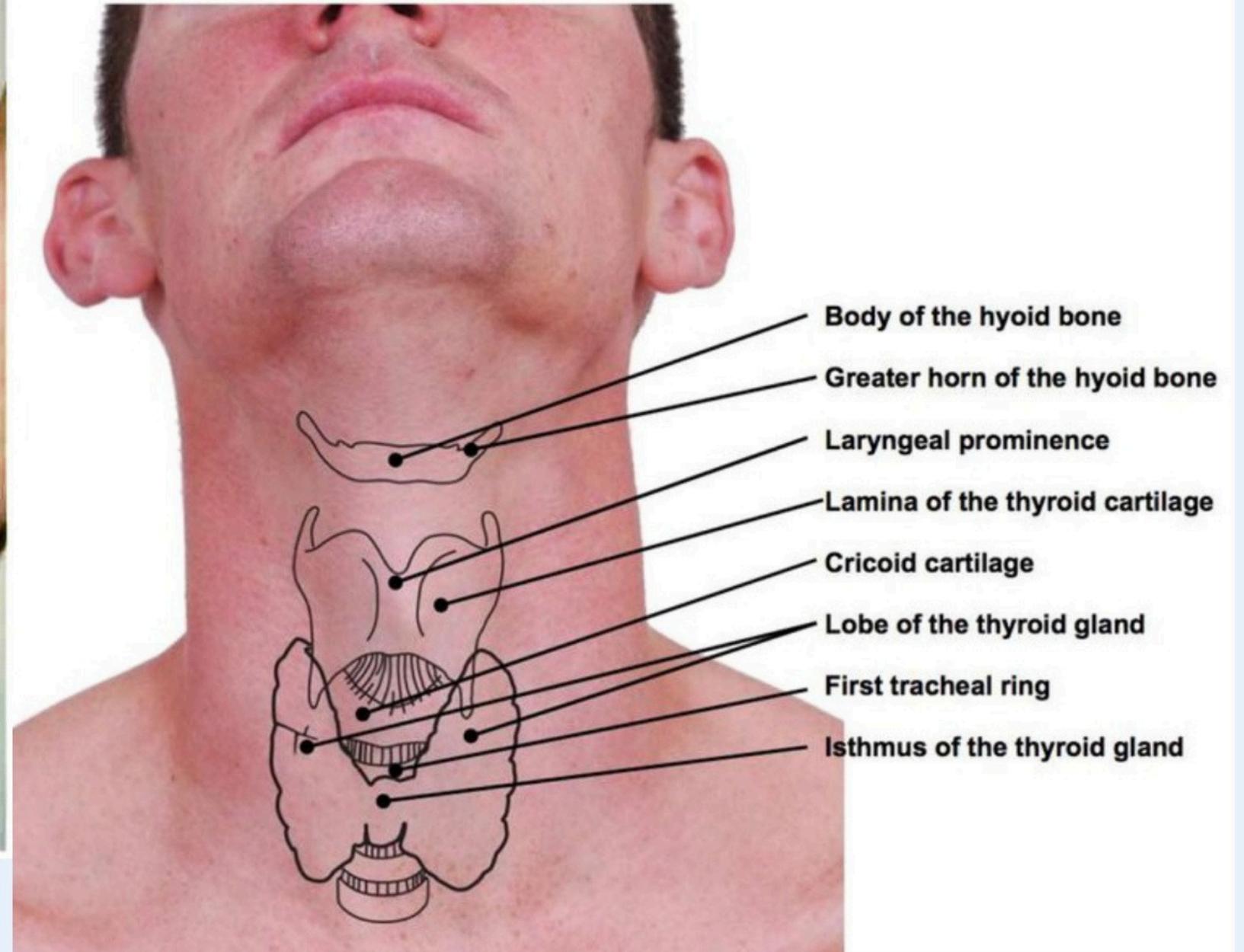
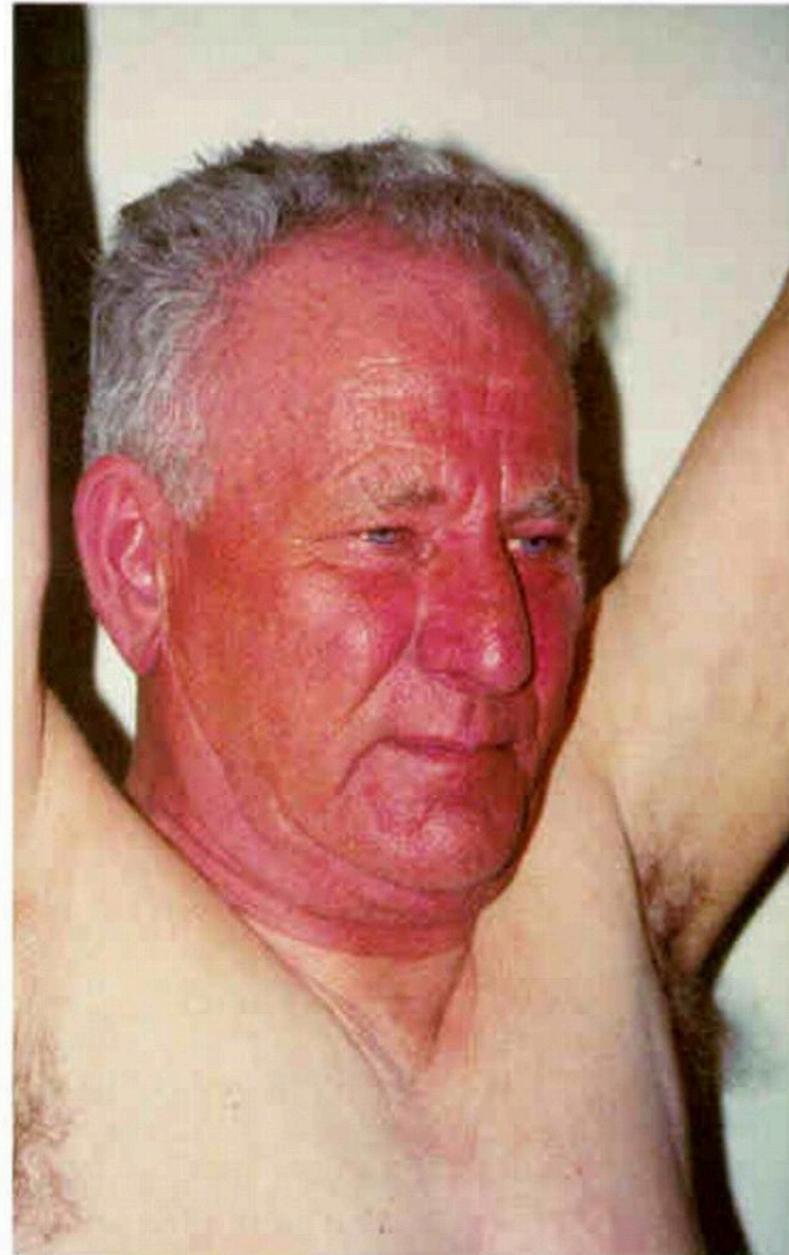
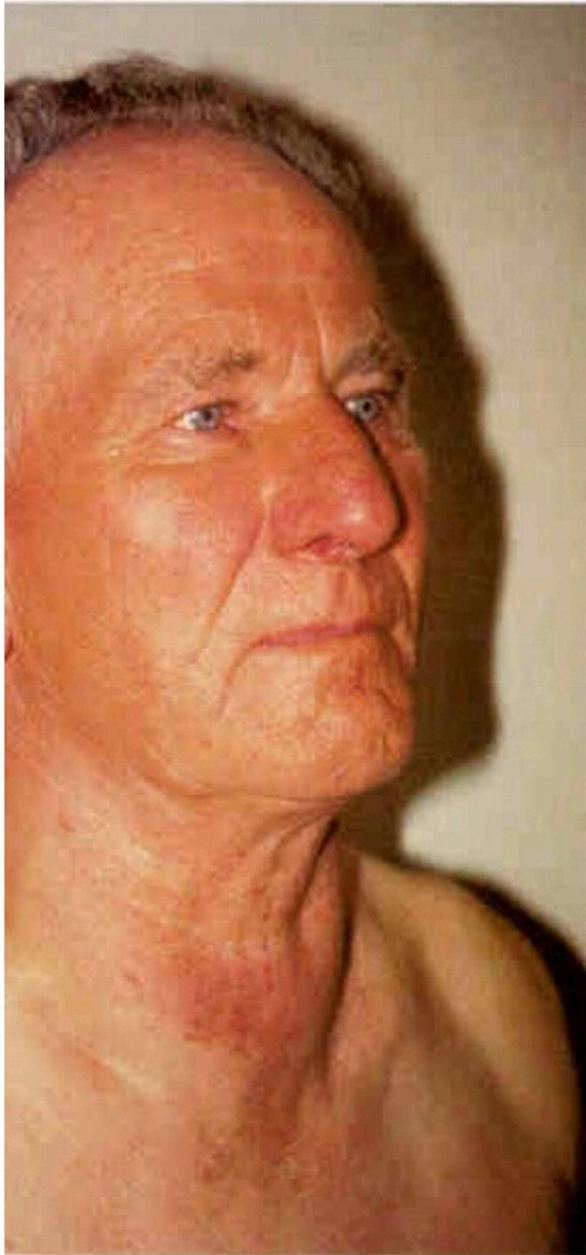
Highly suspicious	Moderately suspicious
Rapidly enlarging painless mass	Age <20 or >60
Firm or hard lesion	Male gender
Fixation to underlying structures	Solitary nodule
Vocal cord paralysis	Previous head or neck irradiation
Palpable lymphadenopathy	Compression symptoms, cough, dysphagia, dyspnoea
Family history of MEN 2a or 2b	Hashimoto's thyroiditis

Physical Examination

Careful palpation of thyroid (solitary or dominant nodule in multinodular gland)

- **Firm nodule → 2-3 times increased risk of carcinoma**
- **Substernal extension estimated by relationship of inf aspect of mass to clavicle.**
 - **Thoracic inlet obstruction by Pemberton maneuver**
- **Physical findings suggesting possible malignancy include:**
 - **Vocal cord paralysis**
 - **Cervical lymphadenopathy (also in Hashimoto thyroiditis, Graves disease, or infection)**
 - **Fixation of nodule to surrounding tissues**

Thyroid Gland Anatomy



Lab investigations:

- **CBC, ESR for inflammatory or infectious thyroiditis**
 - **TFT, Most patients are euthyroid**
- **TSH is an independent risk factor for predicting malignancy**
- **TPO antibodies in pts with high TSH (Hashimoto's thyroiditis)**
- **Serum calcitonin is elevated in medullary carcinoma of thyroid**
- **24-hour urine for metanephrines and catecholamines**
 - **Serum calcium to exclude hyperparathyroidism**

Investigation

+ Diagnostic procedures :

- Radioactive iodine scan

- U/s

- FNA

+ Diagnosis of mets:

lung x- ray / liver u/s/bone scan / brain ct

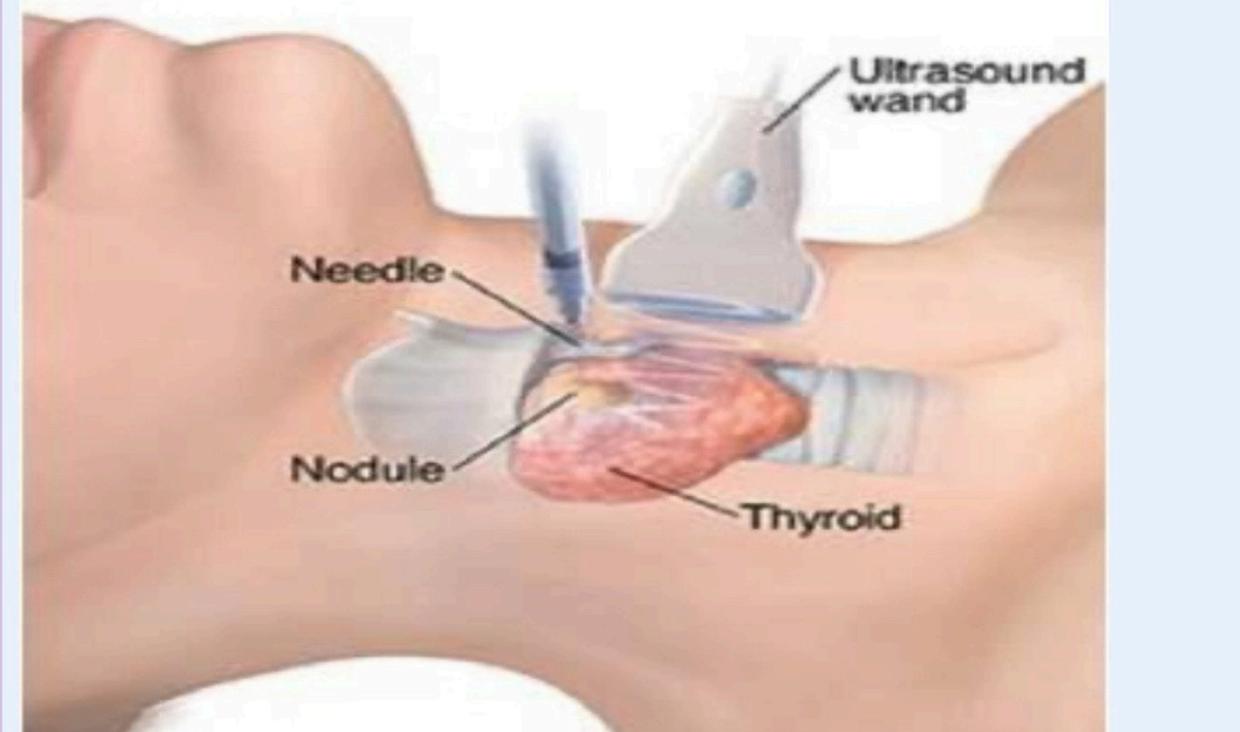
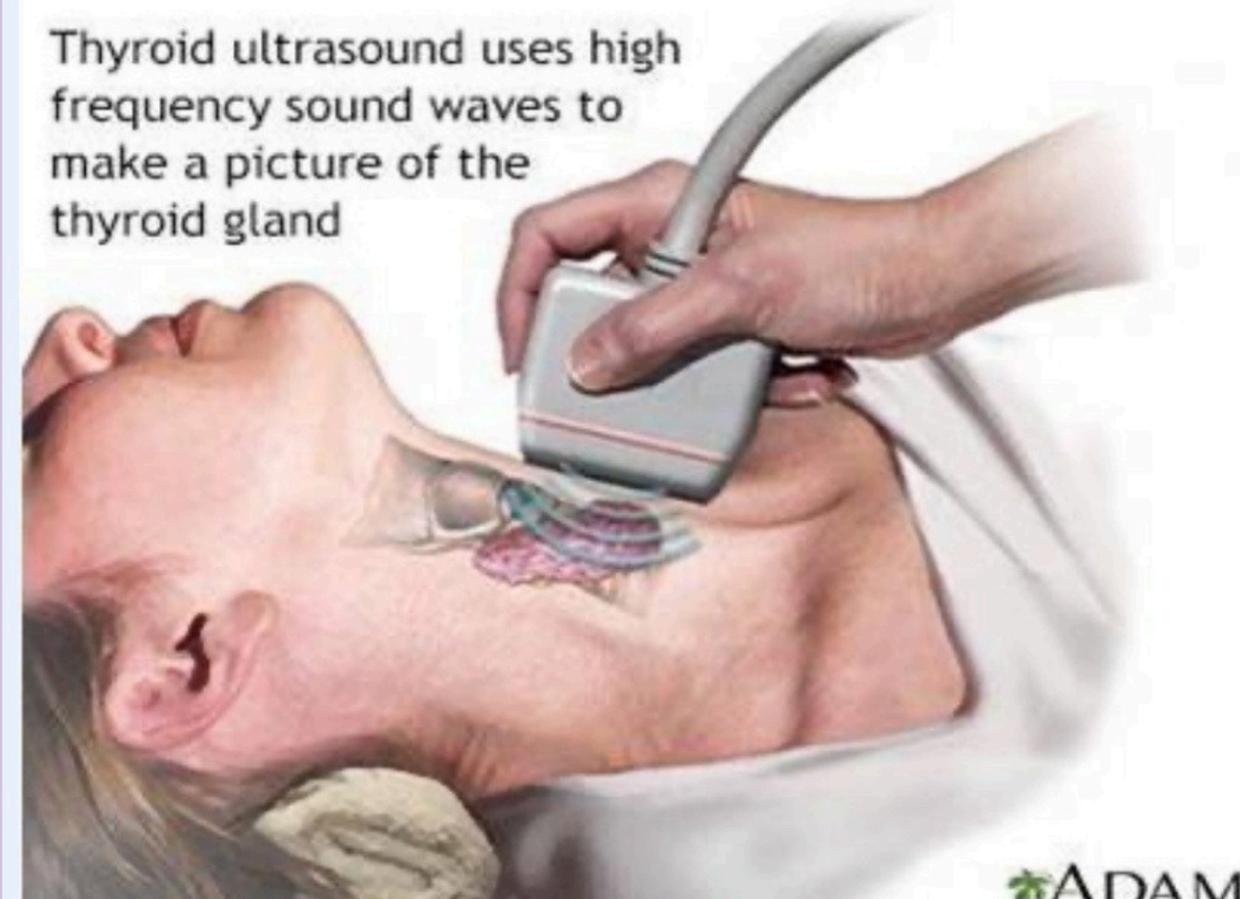
+ Diagnose of infiltration:

laryngoscopy / bronchoscopy

+ Tumor marker:

serum calcitonin / thyroglobulin

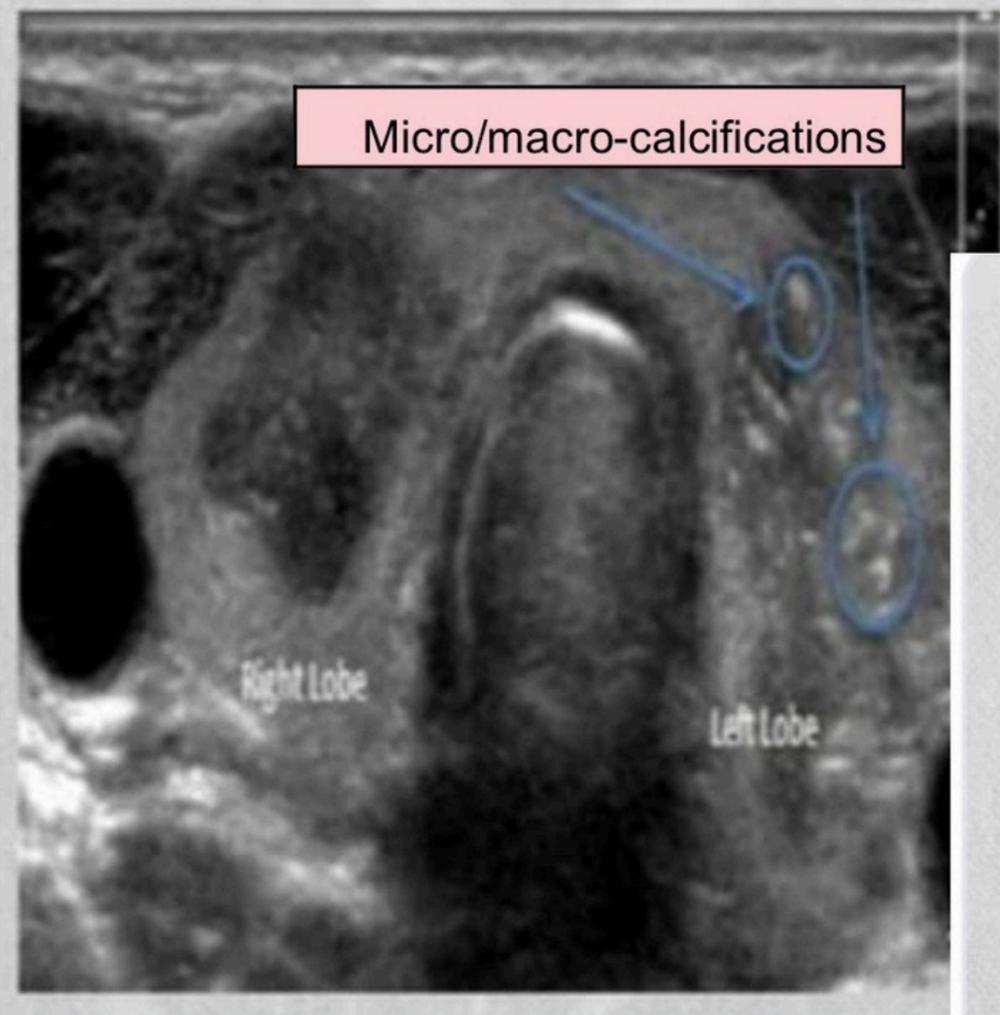
Thyroid ultrasound uses high frequency sound waves to make a picture of the thyroid gland



Ultrasono graphy:

● Is helpful for detecting:

- o Non-palpable thyroid nodules.**
- o Differentiating solid from cystic nodules.**
- o Identifying adjacent lymphadenopathy and differentiating single from multiple nodule.**
- o Identify hemiagenesis and contralateral lobe hypertrophy misdiagnosed as thyroid nodule.**
- o Detect cervical nodes that may contain early clinically occult metastatic disease.**

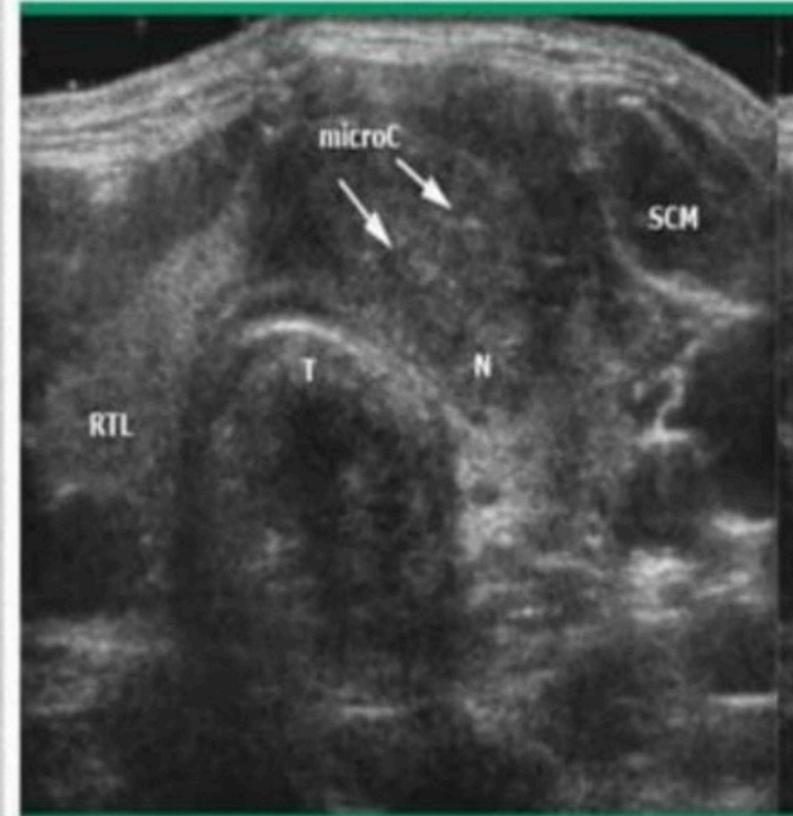


Thyroid ultrasound of a multinodular goiter



Longitudinal view of the right lobe (+ --- + & X --- X) showing a multinodular goiter with both cystic (C) and solid (S) nodules. The nodule (arrow) with punctate bright, white spots is suspicious.

Hypoechoic nodule with microcalcifications



A transverse image of the neck shows a nodule (N) in the anterior-medial part of the left thyroid lobe that is hypoechoic when compared to the right thyroid lobe (RTL). There are bright tiny spots, which are microcalcifications (microC) (arrow) in the nodule and are strongly suggestive of papillary thyroid cancer. The trachea (T) has been displaced to the right by the nodule. The sternocleidomastoid muscles (SCM) are seen lateral to the nodule. A 12.0 MHz transducer was used to achieve high resolution.

Noninvasive and inexpensive.

Overview 

Risk pattern

Ultrasound findings



Sonographic signs of thyroid malignancy 

High risk

- Solid hypoechoic nodule or solid hypoechoic component with at least one of the following:
 - Irregular margins
 - Taller-than-wide shape
 - Microcalcifications
 - Rim calcifications with extruding tissue
 - Extrathyroidal extension

Intermediate risk

- Solid hypoechoic nodule without high-risk features

Sonographic signs of benign thyroid nodules 

Low risk

- Isoechoic or hyperechoic solid nodule
- Cystic nodule with eccentric solid component

Very low risk

- Partially cystic nodule
- Spongiform nodule

Benign

- Cystic nodules (anechoic) without solid component

A test of choice for initial evaluation of a thyroid nodule – often combined with ultrasound guidance for better diagnostic utility.

● **This is the only test that can reliably differentiate between benign and malignant nodule and has a sensitivity of 95% and a specificity of 95%.**

● **Reliability depend on: Operator, Cytopathologist, and the specimen should be enough.**

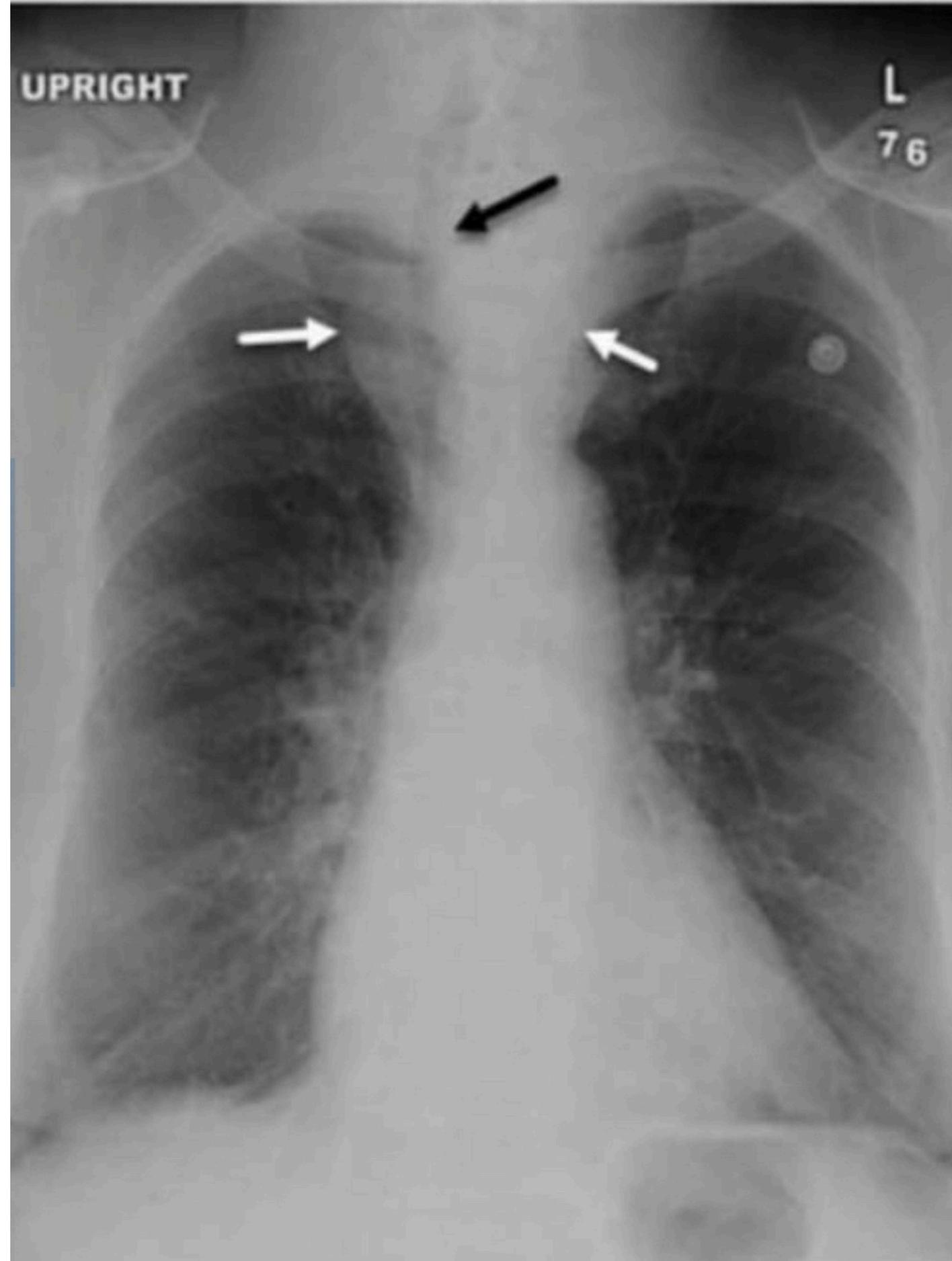
● **Have 5% false negative , and should follow up with periodic FNA if thyroid nodularity persists**

**FNA IS RELIABLE for all cancer except : follicular Complications :
Local discomfort, Hematomas, infection**

Radiography

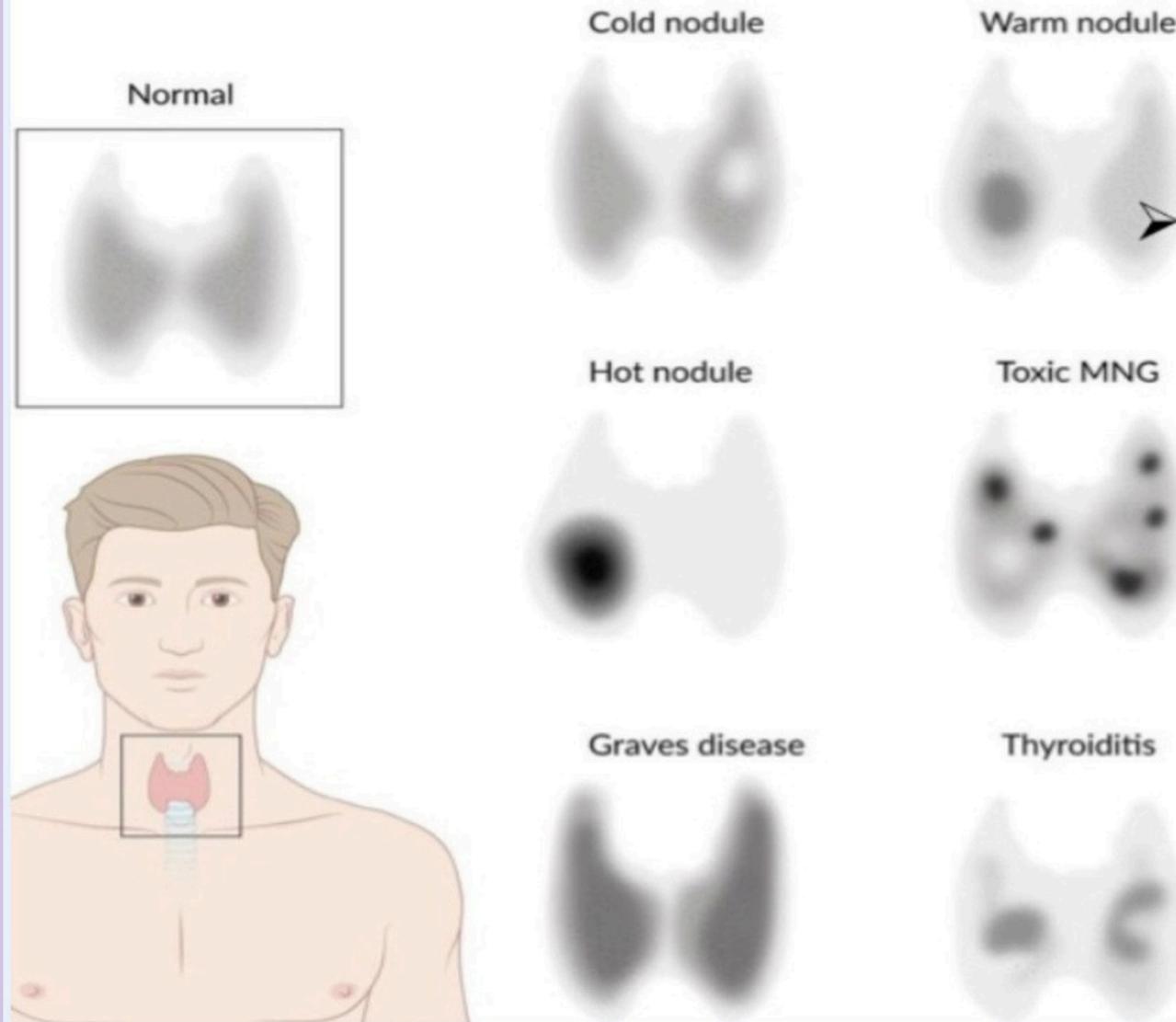
not routinely done, may show:

- tracheal deviation or compression.
- pulmonary metastasis
- calcifications



Thyroid scintigraphy

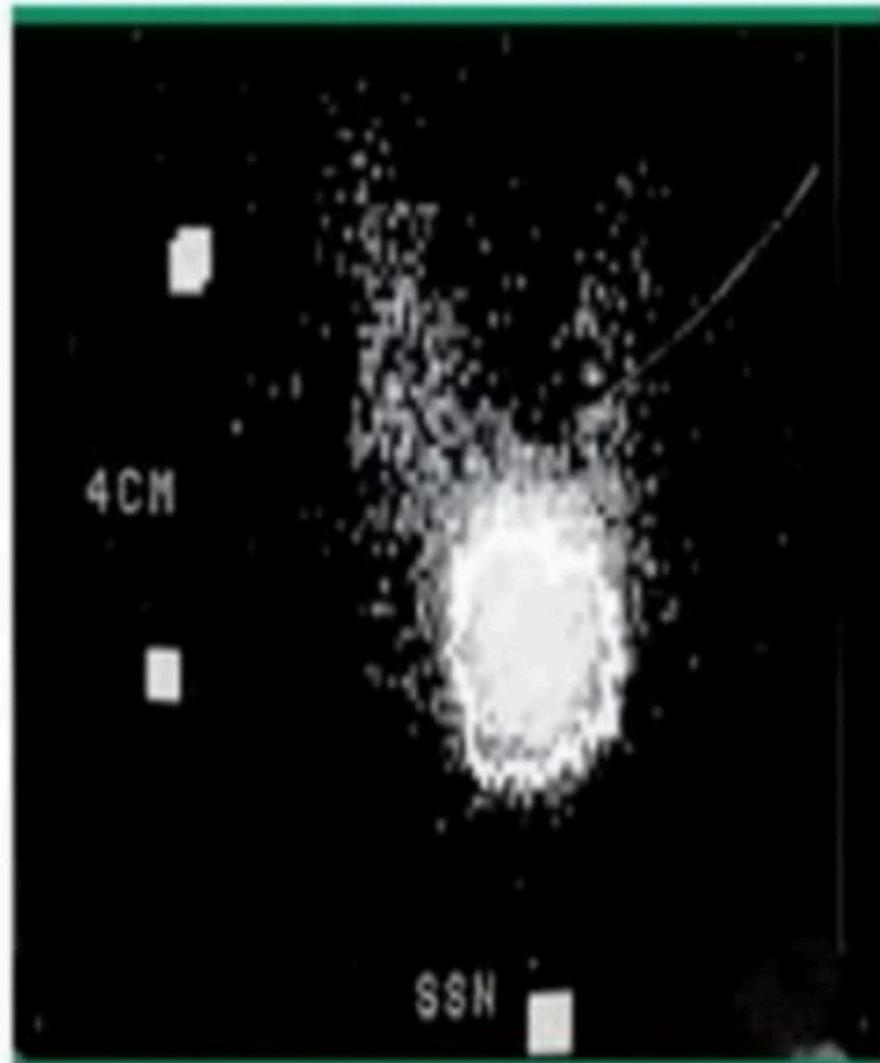
- Indication: **thyroid nodule(s) in a patient with low TSH**
- Contraindications: pregnant and breastfeeding women



Findings and interpretation

- Cold nodule (hypofunctioning nodule): Evaluate for indications for FNAC of thyroid nodules with ultrasound.
- Hot nodule (hyperfunctioning nodule): rarely malignant, FNAC not recommended
- Solitary hot nodule: toxic adenoma
- Multiple hot nodules: toxic multinodular goiter

Autonomous thyroid nodule: Appearance on thyroid scintigraphy

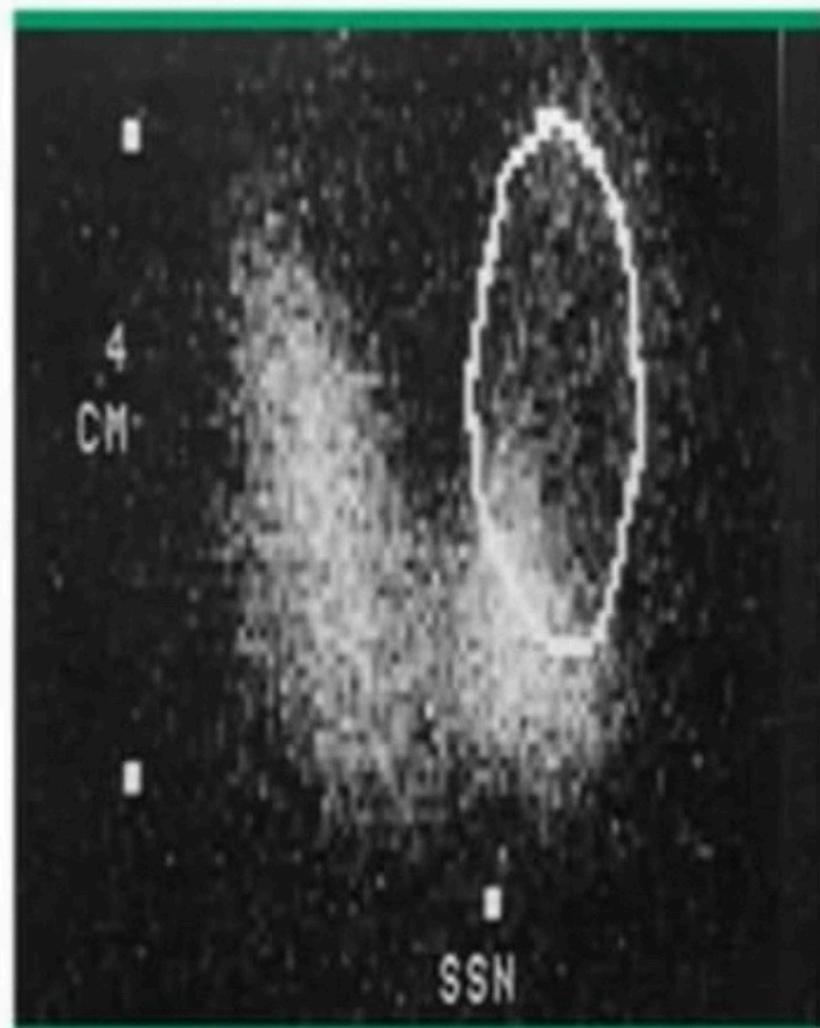


123-I thyroid scan demonstrating an autonomous ("hot") nodule with suppression of isotope uptake elsewhere. The total 24-hour isotope uptake was normal (12 percent).

SSN: suprasternal notch.

Courtesy of Douglas Ross, MD.

Nonfunctioning thyroid nodule: Appearance on thyroid scintigraphy

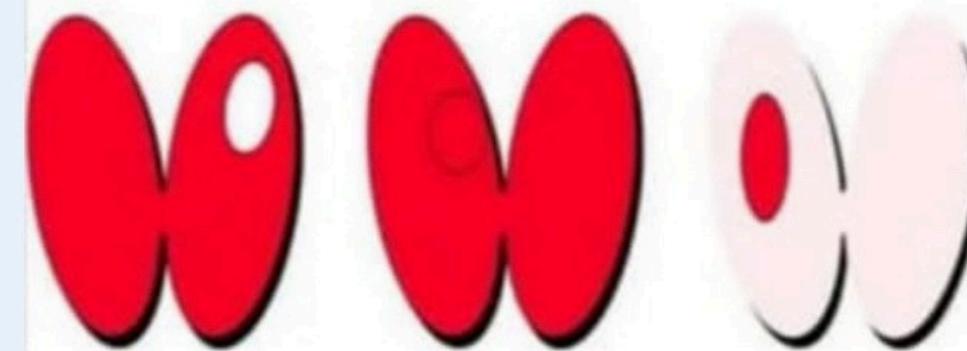
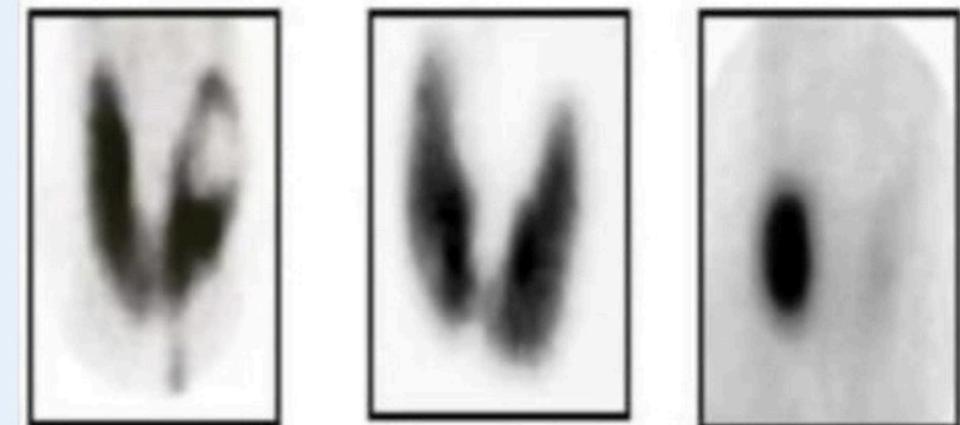


123-I thyroid scan demonstrating typical appearance of a large, 3.5 cm hypofunctioning ("cold") nodule in the left upper lobe of the thyroid. The position of the nodule is outlined in white.

SSN: suprasternal notch.

Courtesy of Douglas Ross, MD.

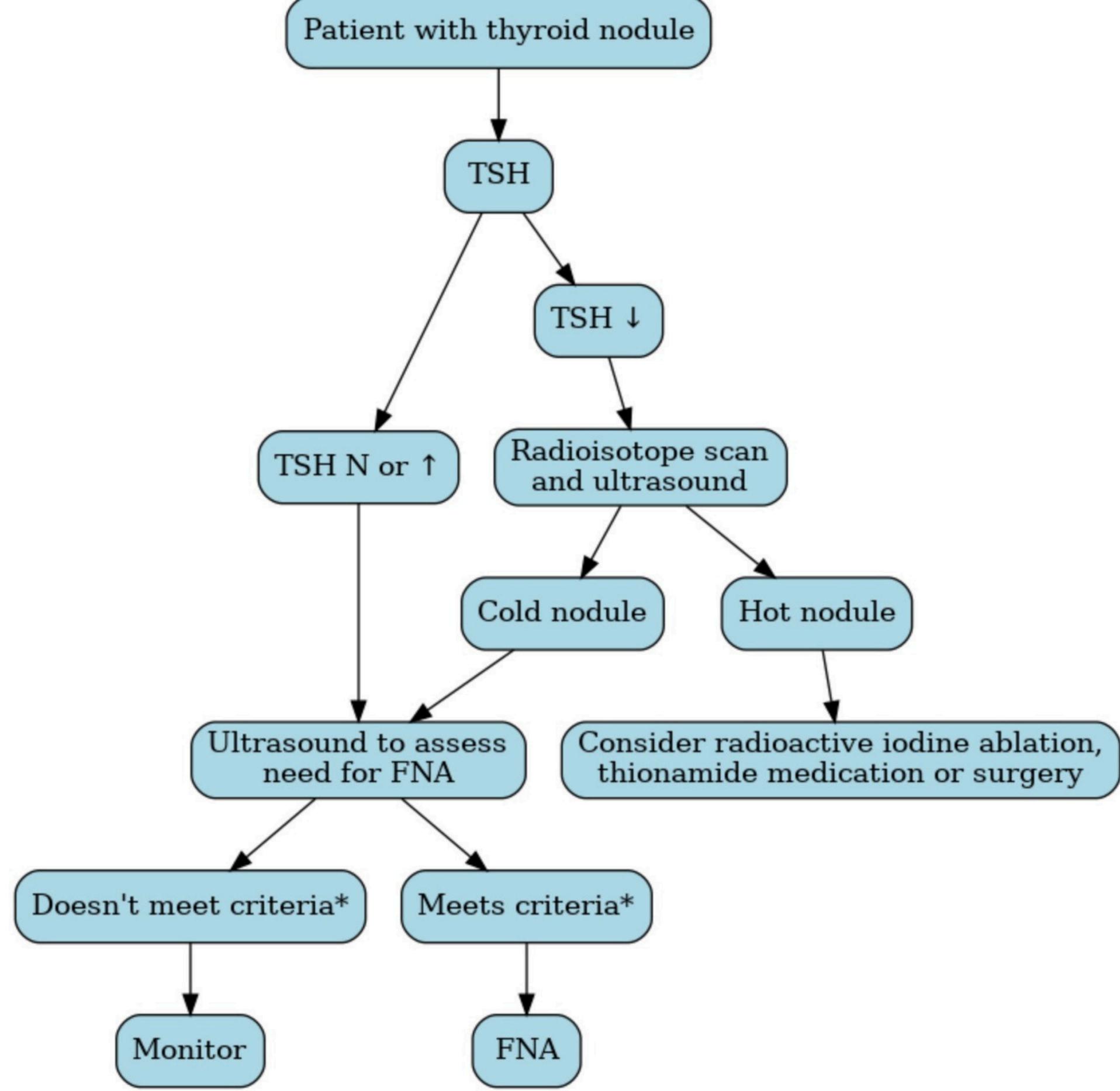
Figure 7. Potential Radionuclide Scan Findings in Individuals with a Thyroid Nodule



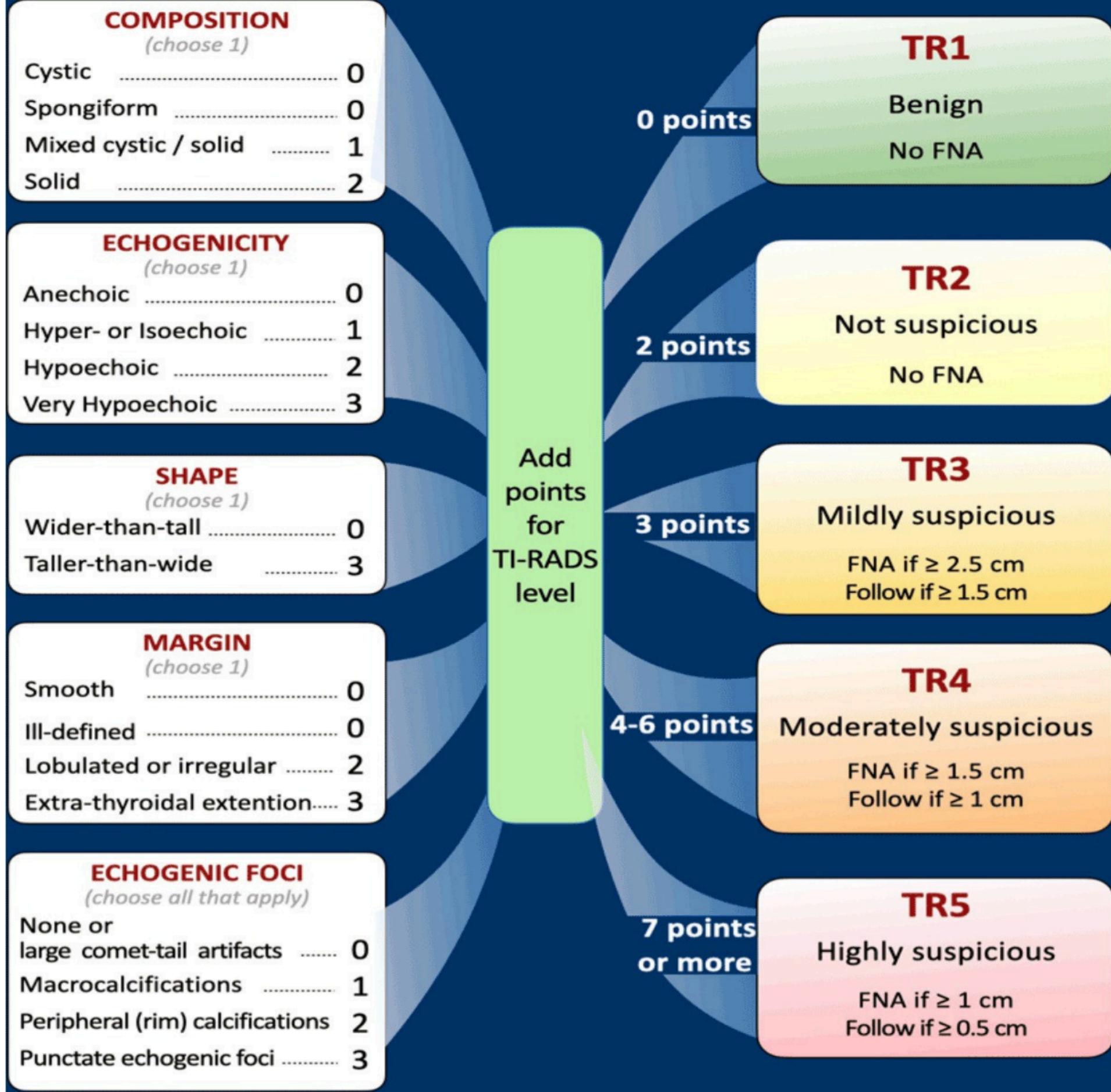
Cold

Warm

Hot



(TIRADS) is a 5 point classification to determine the risk of cancer in thyroid nodules based on ultrasound characteristics.



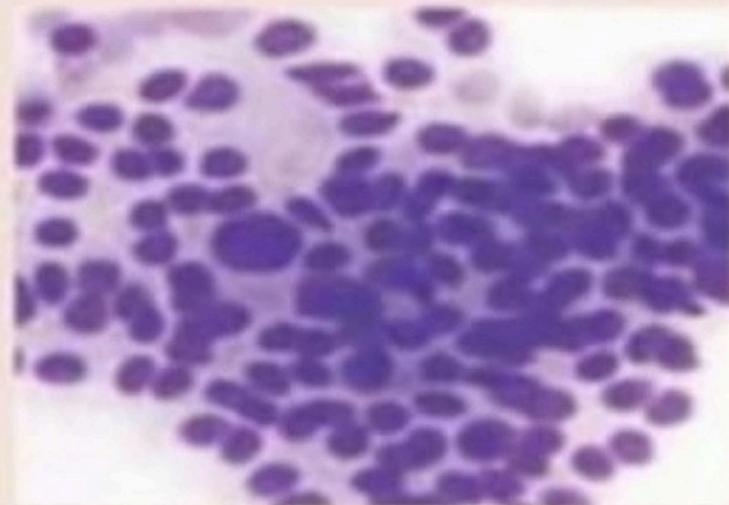
The Bethesda System is a “Risk of Malignancy” scale (probability of cancer) based on the analysis of cells collected during the FNA procedure

SCORE	CATEGORY	MANAGEMENT	MALIGNANCY
I	Non diagnostic	Repeat FNAC	-
II	Benign	Follow-up by ultrasound	0 - 3%
III	<u>Atypia</u> of undetermined significance or follicular lesion of undetermined significance	Repeat FNAC	5 - 15%
IV	Suspicious for follicular neoplasm	Surgery	15 - 30%
V	Suspicious for malignancy	Surgery	60 - 75%
VI	Malignant	Surgery	97 - 99%

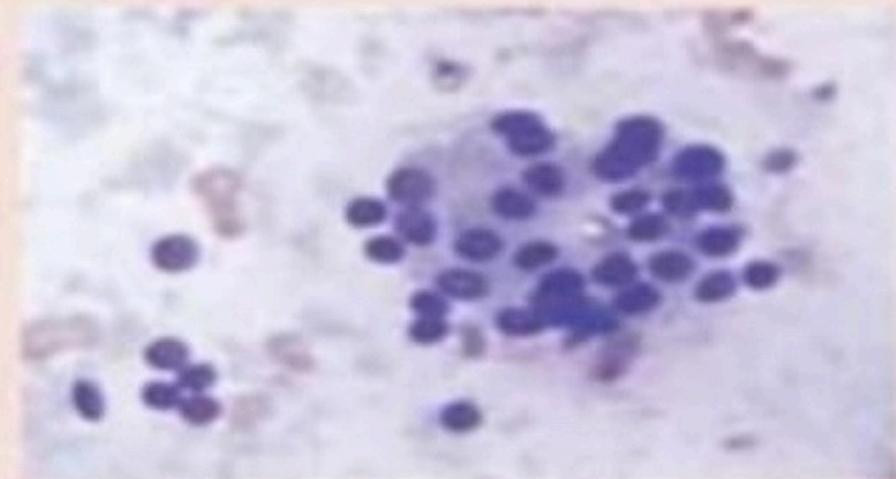
Bethesda System for Reporting Thyroid Cytopathology



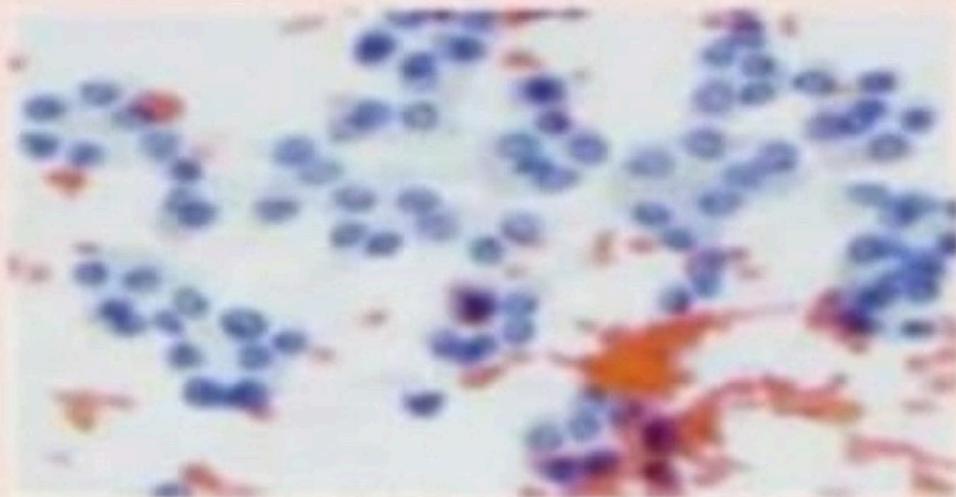
Bethesda II:
benign



Bethesda III:
follicular lesion of
indeterminate significance



Bethesda IV: suspicious for
Hurthle cell neoplasm

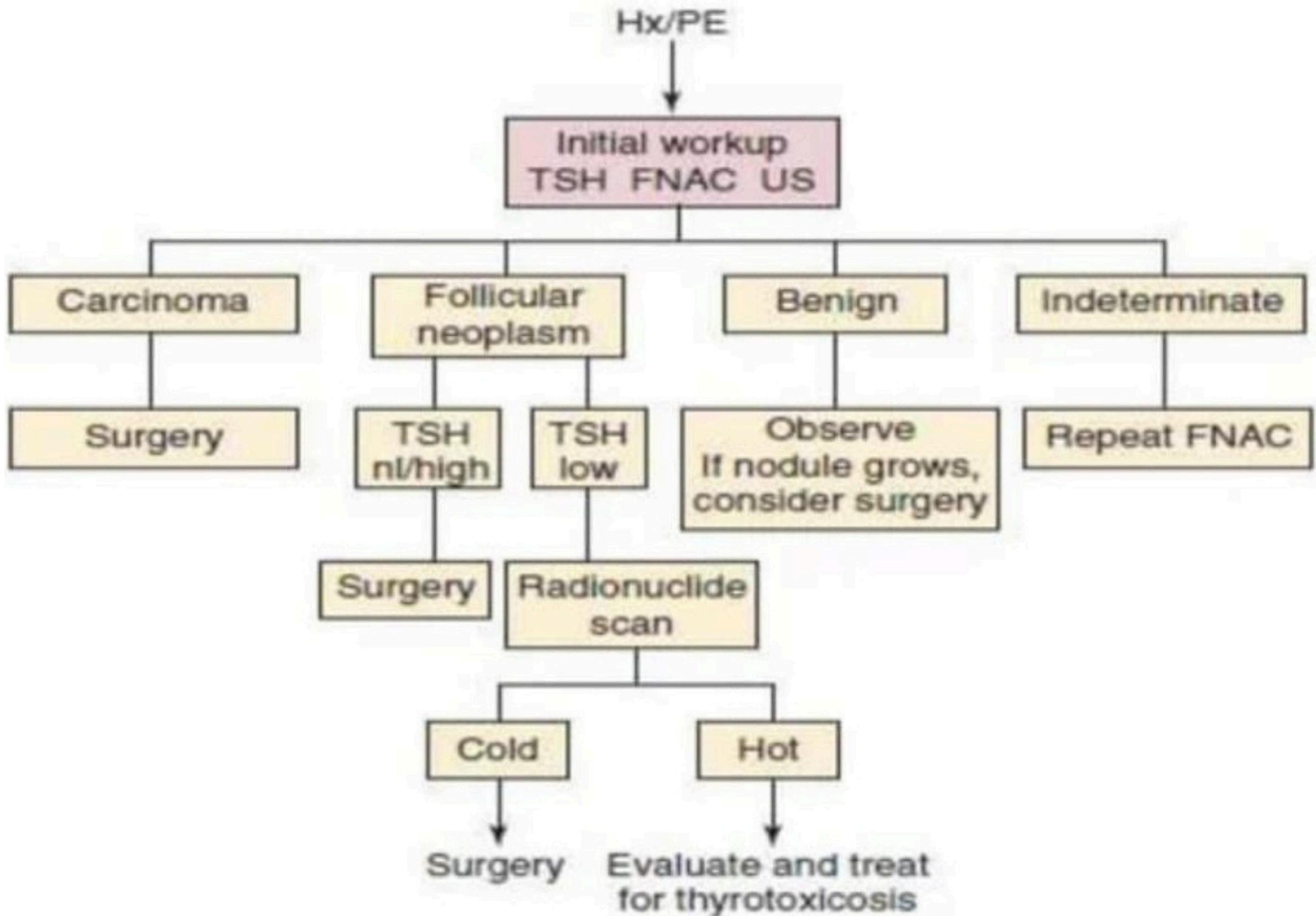


Bethesda IV: suspicious for
papillary thyroid cancer



Bethesda VI: papillary
thyroid cancer

APPROACH TO MANAGEMENT OF A THYROID NODULE:



Preoperative preparation

Patients scheduled for nodulectomy underwent thyroid function tests and a neck U/S .Further investigations included ATPO, thyroglobulin, complete blood count and viral screening.

The decision on nodulectomy was based on a careful assessment of patients' thyroid status, risk factors, nodule characteristics, age, preoperative levels of calcitonin and thyroglobulin, and the chance to preserve thyroid function and achieve complete nodule removal.

Surgical intervention

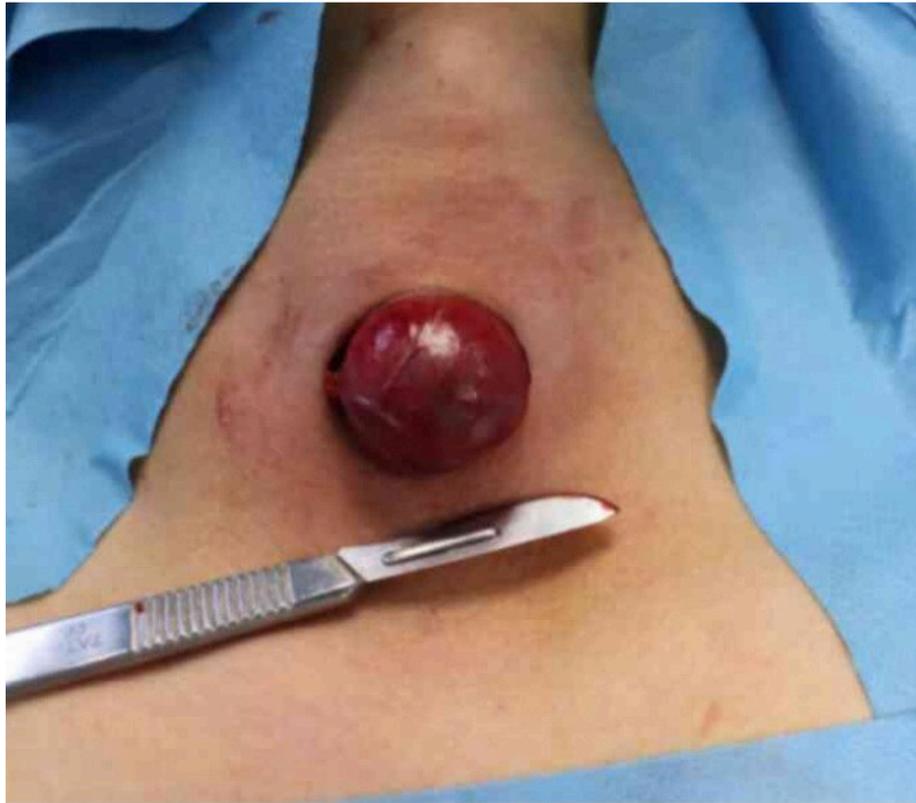
Bilateral subtotal thyroidectomy is standard therapy for patients with nontoxic multinodular goiter. If only one lobe is enlarged, unilateral lobectomy and isthmectomy may suffice.

The surgical mortality rate associated with bilateral thyroid operations in patients with non-toxic multinodular goiter is less than 1%

Causes of surgical morbidity are:

- Postoperative tracheal obstruction due to hemorrhage or tracheomalacia**
- Injury to recurrent laryngeal nerve (1–2% of cases when surgeon is experienced)**
- Hypoparathyroidism (0.5–5% of cases)**
- Voice changes due to superior-laryngeal-nerve damage**
- Hypothyroidism**

Collar incision along a natural skin crease in the midline, which extended more to the site of the nodule.



Ligasure employed to both incise and cauterize the blood vessels and tissues while the surgeon removes the nodule.



The site and length of the incision along the neck's natural crease.

Thank you