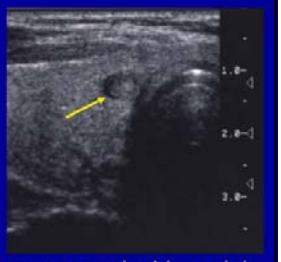
Evaluation of Thyroid Nodules

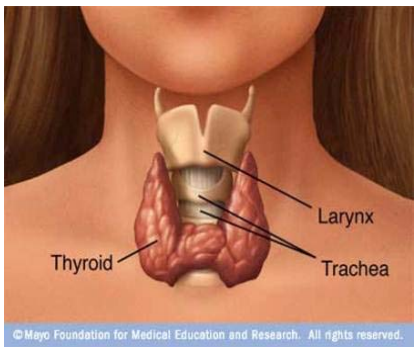
Stephan Kowalyk, MD

Sonographic Thyroid Nodule

- "Nodule"- one or more areas of the thyroid with a different echotexture than surrounding parenchyma
- Most nodules are not true tumors but hyperplastic regions of the thyroid
- Most thyroid nodules are detected "incidentally"



5 mm non palpable nodule



Causes of thyroid nodules

Benign	Malignant
Multinodular (sporadic) goiter ("colloid adenoma")	Papillary carcinoma
Hashimoto's (chronic lymphocytic) thyroiditis	Follicular carcinoma
Cysts (colloid, simple, or hemorrhagic)	Minimally or widely invasive
Follicular adenomas	Oxyphilic (Hürthle cell) type
Macrofollicular adenomas	Noninvasive follicular thyroid neoplasm with papillary-like nuclear features
Microfollicular or cellular adenomas	Medullary carcinoma
Hürthle cell (oxyphil cell) adenomas	Anaplastic carcinoma
Macro- or microfollicular patterns	Primary thyroid lymphoma
	Metastatic carcinoma (breast, renal cell, others)

UpToDate®

Primary goal

Exclude malignancy

Incidental thyroid nodules

- If found on CT, MRI, PET scan, carotid Doppler
- ULTRASOUND!!

Sonographic monitoring without biopsy may be an acceptable alternative, but stability without biopsy does not entirely exclude malignancy

Risk Factors

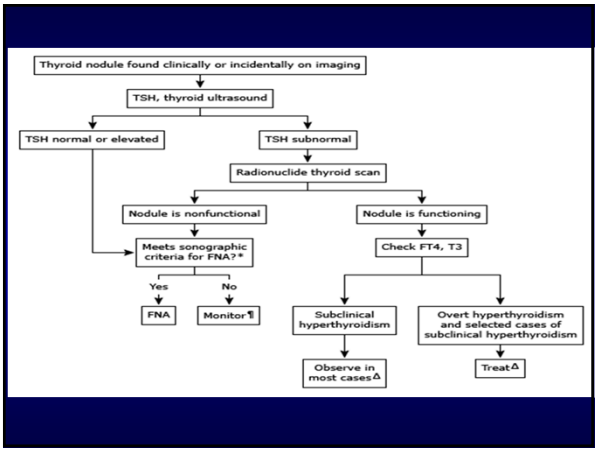
– young patients (<20 years of age)
– older (>60 years of age) -higher risk, especially for more aggressive thyroid tumors
– history of head or neck radiation
-first degree relatives with thyroid cancer
-uptake on PET scanning
-calcitonin >100
-MEN II, Gardner's Syndrome, Cowden's disease.

Gender and Thyroid Nodules

- Gender
  – male -higher risk if nodule present
  – females
    - have many more nodules
    - less likely to be malignant.
    - still have majority of thyroid cancers

Concerning Personal History

- Recent growth
- Soft tissue swelling
- Vocal changes(recurrent nerve involvement)
- Dysphagia



Thyroid Scans

- Purpose
  - Determine function of the gland and/or a nodule within the gland
- Hot nodules - usually independently functioning nodules
  - Rarely malignant
- Cold nodules - either adenoma or maligancy
  - 15% chance of malignancy in adults.

Fine-Needle Aspiration

- Best tool for determining pathology other than surgical excision
- Can be as high as 80 % sensitive and 95% specific

Nodule sonographic or clinical features	Recommended nodule threshold size for FNA
High-risk radiographic features or history	>1 cm
Abnormal cervical lymph nodes	All
Solid nodule and iso- or hyperechoic	≥1 cm
Mixed cystic-solid nodule without suspicious ultrasound features	≥2 cm
Spongiform nodule	≥2 cm
Purely cystic nodule	FNA not indicated

HIGH RISK FEATURES

- microcalcifications
- hypoechoic
- increased vascularity
- infiltrative margins('irregular")
- taller than wide on transverse view

Interpreting the Biopsy Report

- What you get:
  - benign (low probability)
  - follicular lesion unknown significance
  - suspicious (high probability)
  - inadequate specimen
- What it means:
  - benign - 90-95% likelihood it is benign
  - FLUS-need molecular markers
  - suspicious- it's malignant.
  - inadequate specimen - do it again (and again)

Molecular markers

- Typically give % risk malignancy
- Useful to guide need for resection

What about those benign nodules?

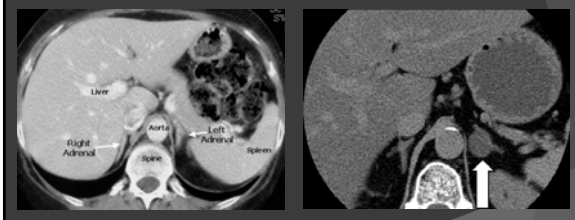
- No specific treatment is needed.
- Thyroid suppression may shrink size of adenomasnot recommeded
- Not proven to be effective or necessary
- May hide malignancies - ? Periodic biopsies

Never assume a thyroid nodule is benign. Prove it.

Adrenal Incidentaloma

- Lesion > 1 cm in diameter
- Found in 4-6% on CT scans

Adrenal Masses



Differential diagnosis

- Functioning
- Nonfunctioning
- Malignancy

Benign features

- **Imaging –fat results in low attenuation on CT=benign**
- **<10 Housefield units and rapid washout >50% in 10 minutes**
- **Homogenous**
- **Smooth borders**
- **<4 cm**

Malignancy

- Adrenocortical carcinoma
- Pheochromocytoma
- Metastasis

Malignancy features

- >4cm
- Irregular shape
- **Inhomogeneous**
- High attenuation > 20 Housefield units
- **Delayed washout <50% in 10 minutes**

Functioning tumors

- Cortisol secreting adenoma
- Aldosterone secreting adenoma
- Adrenocortical carcinoma
- Pheochromocytoma

Cushing's syndrome

- Overnight dexamethasone suppression test
- 11pm 1mg dexamethasone 8am blood cortisol normal <5

Pheochromocytoma

- 24 hour urine catecholamines and metanephrines
- Plasma catecholamines/free metanephrines

Hyperaldosteronism

- If patient hypertensive/hypokalemic
- Plasma renin aldosterone ratio

Adrenocortical carcinoma

- DHEAS not DHEA

Evaluation based on imaging

- Adrenal Mass on CT Scan <1 cm in greatest diameter (especially if fatty or cystic consistency)
  - Functional(laboratory evaluation)

Adrenal mass >4 cm

- Laboratory evaluation
- Biopsy unless clearly benign(cyst, myelolipoma)
- Surgical consultation

Lipid rich adrenal mass 1-4cm

- Laboratory evaluation
- Repeat CT 12 months

Lipid poor adrenal mass 1-4cm

- Laboratory evaluation
- Consider MRI
- PET scan
- Surgical consultation

Follow-Up

- If functional studies are normal and no high risk imaging characteristics
  - Repeat imaging at 6-12 months
  - Surgery if grows >1cm
  - Repeat adrenal screening annually for 4 years
  - If concern for malignant potential based on imaging the biopsy or excision