Thyroid Nodule

TSH first · sonographic pattern plus size decides the needle · and overdiagnosis of indolent cancer is a real harm

Hot nodules *are not biopsied*

⚠ TSH FIRST, BECAUSE IT CHANGES THE PATHWAY *this is the branch point, not a formality*

LOW TSH → RADIONUCLIDE SCAN

A **hyperfunctioning ("hot") nodule is almost never malignant and should NOT be biopsied** -it is managed as hyperthyroidism (radioiodine, antithyroid drugs, or surgery). **Sending a hot nodule for FNA is a classic wasted step** that can also generate a confusing indeterminate cytology result.

NORMAL OR HIGH TSH → ULTRASOUND PATHWAY

Dedicated thyroid AND cervical node ultrasound in every patient -not just the report from the incidental CT. **Thyroglobulin is a post-thyroidectomy surveillance marker, not a diagnostic test for nodules.** Routine calcitonin is not universally recommended, but check it when medullary carcinoma is suspected by family history or syndrome.

THE OVERDIAGNOSIS PROBLEM

Nodules are detectable by ultrasound in a large share of adults; **only a small minority are malignant**, and most of those are indolent papillary cancers. **Widespread scanning raised detected thyroid cancer without a matching change in mortality** -many found cancers would never have caused harm. That is precisely why size thresholds exist and why **sub-centimeter nodules are usually followed rather than sampled**.

PATTERN PLUS SIZE DECIDES THE NEEDLE *the threshold rises as sonographic risk falls*

Feature set	Meaning and action
Suspicious features	**Solid and hypoechoic, microcalcifications, irregular or infiltrative margins, taller-than-wide shape** (transverse view), extrathyroidal extension. **High-suspicion patterns are biopsied at about 1 cm**
Reassuring features	**Purely cystic or spongiform**, isoechoic or hyperechoic, smooth margins, peripheral rather than internal vascularity. **Very low suspicion and purely cystic nodules are generally observed rather than sampled** regardless of size (aspiration only for symptomatic relief)
The principle	Risk-stratification systems (ACR TI-RADS, ATA patterns) combine these features, and **the biopsy threshold size RISES as sonographic risk FALLS**: a suspicious small nodule is sampled while a larger spongiform one is watched. Ultrasound guidance is standard for the FNA itself
⚠ Findings that OVERRIDE size	**Abnormal cervical lymph nodes** (rounded, loss of fatty hilum, microcalcifications, cystic change) -the single most important finding, warranting FNA of node and nodule because nodal disease changes staging and surgical extent. Also **extrathyroidal extension** and **childhood head-and-neck radiation**
Higher-risk history	Childhood radiation, total body irradiation, **family history of thyroid cancer or syndrome** (MEN2, familial medullary, FAP, Cowden), rapid growth. **Worrying exam:** hard fixed nodule, cervical lymphadenopathy, **hoarseness or vocal cord palsy** suggesting recurrent laryngeal nerve involvement
Compressive symptoms	Dysphagia, positional dyspnea, choking sensation. **These reflect size and location rather than malignancy**, but they push toward treatment regardless of what the cytology shows
Cross-sectional imaging	**CT and MRI are not first-line**: reserve for large substernal goiters or assessing invasive extent. **Avoid iodinated contrast if radioiodine therapy is anticipated**, since it delays treatment for weeks to months

BETHESDA CYTOLOGY *and why follicular lesions cannot be resolved by a needle*

Category	Meaning	Action
⚠ I	Nondiagnostic / unsatisfactory	**Repeat FNA under ultrasound guidance. A nondiagnostic result is NOT a negative result**, and treating it as reassuring is a recognized error
II	Benign (the commonest result by far)	Ultrasound surveillance, no surgery
III	Atypia of undetermined significance	Repeat FNA, **molecular testing**, or surveillance
IV	Follicular neoplasm / suspicious for follicular neoplasm	**Cytology CANNOT distinguish follicular adenoma from carcinoma** -that needs capsular or vascular invasion on histology, an architectural finding requiring the intact capsule. Molecular testing or diagnostic lobectomy
V / VI	Suspicious for malignancy / malignant	Surgery, extent set by size, nodes and risk features
Molecular testing	**Its job is to reduce unnecessary diagnostic surgery in the indeterminate categories (III and IV)**, where patients historically had a lobectomy purely to find out whether a nodule was cancer. **A benign molecular result has high negative predictive value** and supports surveillance; a positive result supports surgery but with more modest positive predictive value	

MANAGEMENT *treat symptoms, not images*

BENIGN NODULES

Surveillance ultrasound at risk-based intervals, not repeat biopsy. **Growth alone is not malignancy**, but meaningful growth prompts repeat FNA. **Levothyroxine suppression is NOT recommended** -minimal shrinkage in exchange for iatrogenic thyrotoxicosis, bone loss and atrial fibrillation risk. Compressive or cosmetically significant nodules go to surgery, or ethanol/radiofrequency ablation in selected centers.

MALIGNANT DISEASE

Lobectomy suffices for many low-risk, small, node-negative papillary cancers; total thyroidectomy for larger, multifocal, node-positive, extrathyroidal or post-radiation disease. **Active surveillance is a legitimate option for selected papillary microcarcinomas** (small, intrathyroidal, node-negative, away from critical structures, in a patient who can adhere to follow-up) -a direct response to overdiagnosis. **Radioactive iodine is risk-adapted, not automatic**: used selectively in intermediate and high-risk disease rather than routinely for low-risk papillary cancer. After surgery: levothyroxine with a recurrence-risk-based TSH target, plus **thyroglobulin measured with anti-thyroglobulin antibodies** and neck ultrasound.

TWO DIAGNOSES NOT TO MISS

- ⚠ **Anaplastic carcinoma: a rapidly enlarging, hard neck mass in an older patient with hoarseness, dysphagia or stridor is an AIRWAY EMERGENCY**, not a clinic nodule pathway. Assess the airway and refer urgently; prognosis is poor and delay is costly.
- **Medullary carcinoma arises from parafollicular C cells, so the markers are calcitonin and CEA, not thyroglobulin.** It is associated with **MEN2**.
- ⚠ **Before operating on medullary carcinoma, exclude pheochromocytoma and send RET germline testing.** Anesthetizing an unrecognized pheochromocytoma can precipitate a catastrophic hypertensive crisis, so it is screened for and resected first.
- **Avoid iodinated contrast if radioiodine therapy is anticipated** -it delays treatment for weeks to months.

References: ATA management guidelines for adult patients with thyroid nodules and differentiated thyroid cancer · ACR TI-RADS white paper on thyroid nodule risk stratification · The Bethesda System for Reporting Thyroid Cytopathology · ATA guidelines on medullary thyroid carcinoma.