Thyroid nodule assessment

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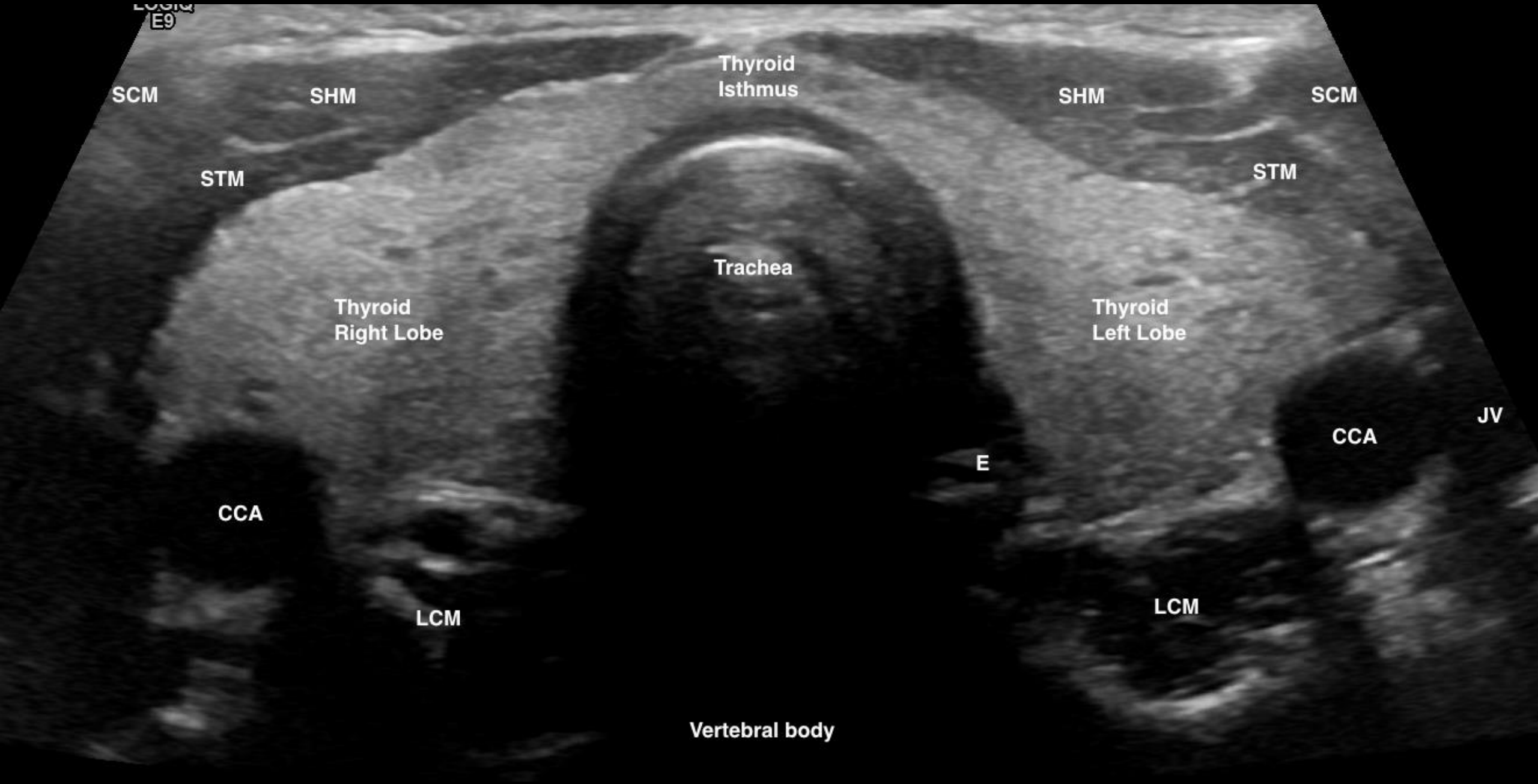
Guideline thyroid nodules assessment

- ACR Thyroid imaging reporting and data system (ACR – TIRADS)
- America thyroid association(ATA)


E9
SCM
SHM
Thyroid
Isthmus
SHM
SCM
STM
STM
Trachea
Thyroid
Right Lobe
Thyroid
Left Lobe
JV
CCA
E
CCA
LCM
LCM
Vertebral body

ACR Thyroid imaging reporting and data system

- Shown great value in predicting thyroid malignancy
- Has a sensitivity ranging 75-97% and specificity ranging 53-67%, which is either the highest sensitivity and lowest specificity amongst compared systems
- Compared with other US systems, ACR-TIRADS criteria offered the lowest rate of unnecessary FNAB
- Malignancy rate among recommended FNABs was highest and the missed malignancy rate among Non-FNABs was lowest with ACR-TIRADS

ACR TI-RADS

COMPOSITION (Choose 1)	
Cystic or almost completely cystic	0 points
Spongiform	0 points
Mixed cystic and solid	1 point
Solid or almost completely solid	2 points

ECHOGENICITY (Choose 1)	
Anechoic	0 points
Hyperechoic or isoechoic	1 point
Hypoechoic	2 points
Very hypoechoic	3 points

SHAPE (Choose 1)	
Wider-than-tall	0 points
Taller-than-wide	3 points

MARGIN (Choose 1)	
Smooth	0 points
Ill-defined	0 points
Lobulated or irregular	2 points
Extra-thyroidal extension	3 points

ECHOGENIC FOCI (Choose All That Apply)	
None or large comet-tail artifacts	0 points
Macrocalcifications	1 point
Peripheral (rim) calcifications	2 points
Punctate echogenic foci	3 points

Add Points From All Categories to Determine TI-RADS Level

0 Points	2 Points	3 Points	4 to 6 Points	7 Points or More
TR1 **Benign** No FNA	**TR2** **Not Suspicious** No FNA	**TR3** **Mildly Suspicious** FNA if ≥ 2.5 cm Follow if ≥ 1.5 cm	**TR4** **Moderately Suspicious** FNA if ≥ 1.5 cm Follow if ≥ 1 cm	**TR5** **Highly Suspicious** FNA if ≥ 1 cm Follow if ≥ 0.5 cm*

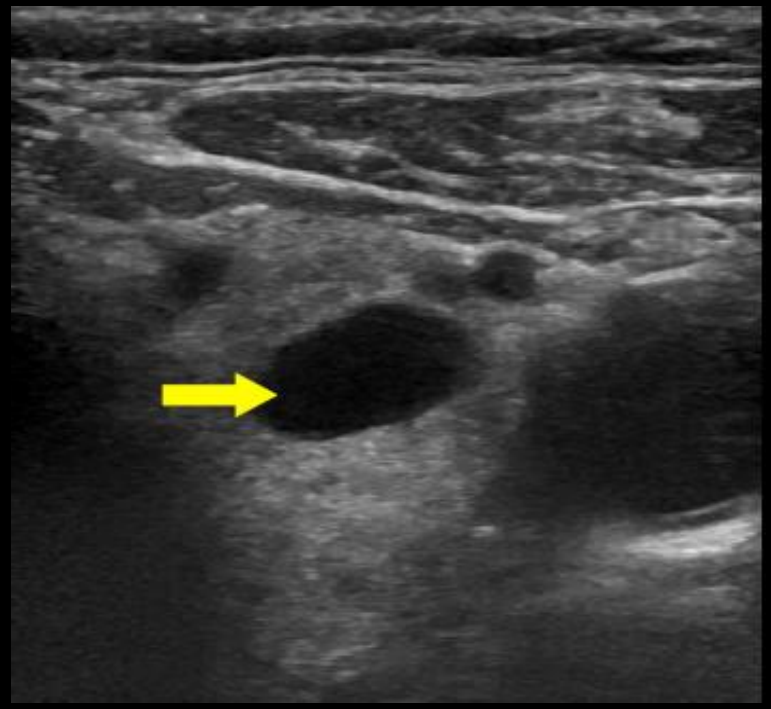
COMPOSITION	ECHOGENICITY	SHAPE	MARGIN	ECHOGENIC FOCI
Spongiform: Composed predominantly (>50%) of small cystic spaces. Do not add further points for other categories. *Mixed cystic and solid:* Assign points for predominant solid component. Assign 2 points if composition cannot be determined because of calcification.	*Anechoic:* Applies to cystic or almost completely cystic nodules. *Hyperechoic/isoechoic/hypoechoic:* Compared to adjacent parenchyma. *Very hypoechoic:* More hypoechoic than strap muscles. Assign 1 point if echogenicity cannot be determined.	*Taller-than-wide:* Should be assessed on a transverse image with measurements parallel to sound beam for height and perpendicular to sound beam for width. This can usually be assessed by visual inspection.	*Lobulated:* Protrusions into adjacent tissue. *Irregular:* Jagged, spiculated, or sharp angles. *Extrathyroidal extension:* Obvious invasion = malignancy. Assign 0 points if margin cannot be determined.	*Large comet-tail artifacts:* V-shaped, >1 mm, in cystic components. *Macrocalcifications:* Cause acoustic shadowing. *Peripheral:* Complete or incomplete along margin. *Punctate echogenic foci:* May have small comet-tail artifacts.

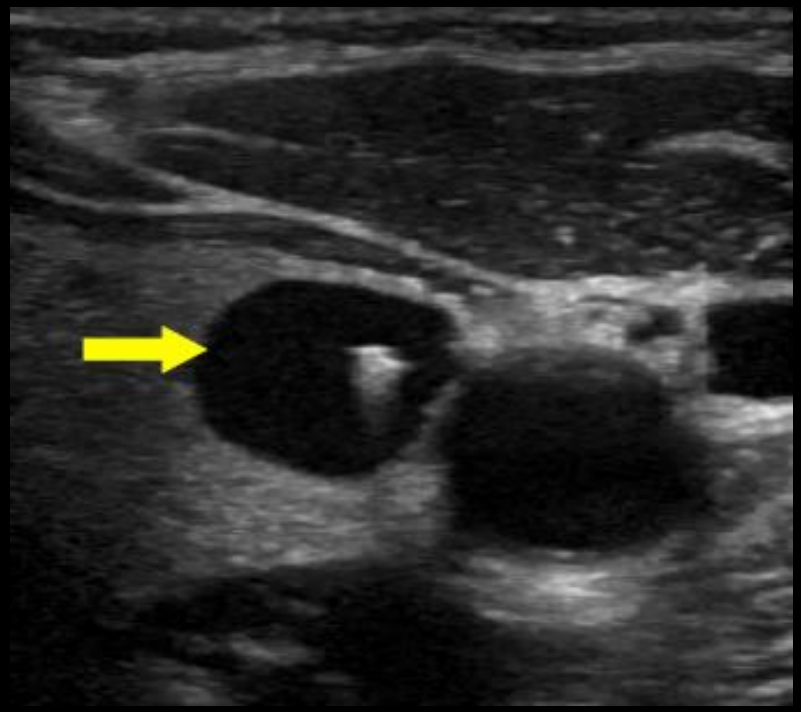
**Refer to discussion of papillary microcarcinomas for 5-9 mm TR5 nodules.*

ACR –TIRADS CATEGORIES

- COMPOSITION
- ECHOGENICITY
- SHAPE
- MARGIN
- ECHOGENIC FOCI

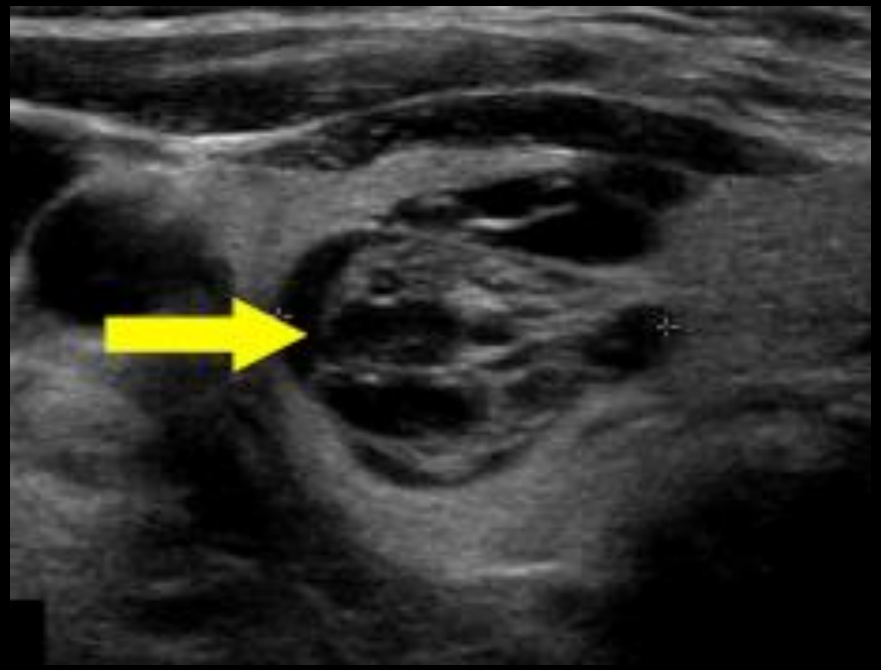
Composition

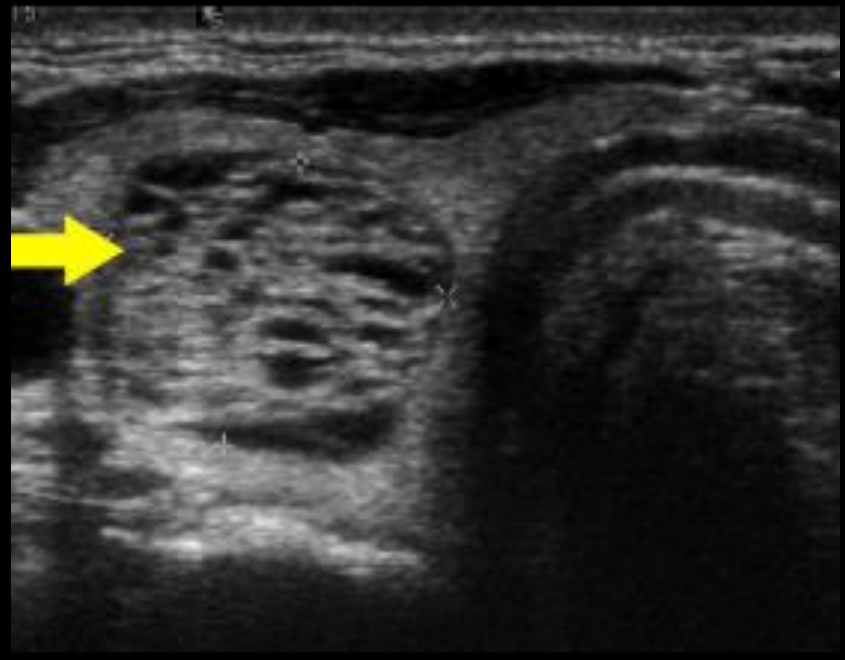




Cystic and nearly entirely cystic

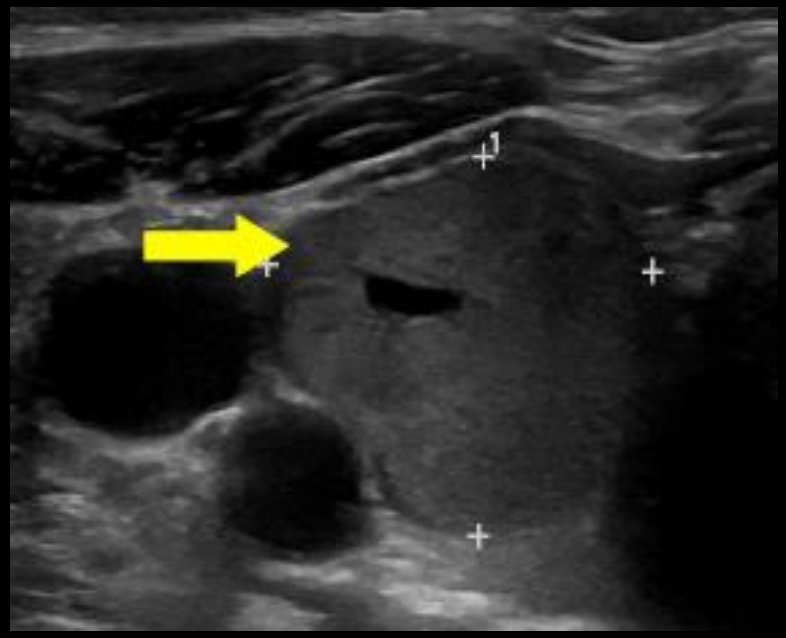
Composition





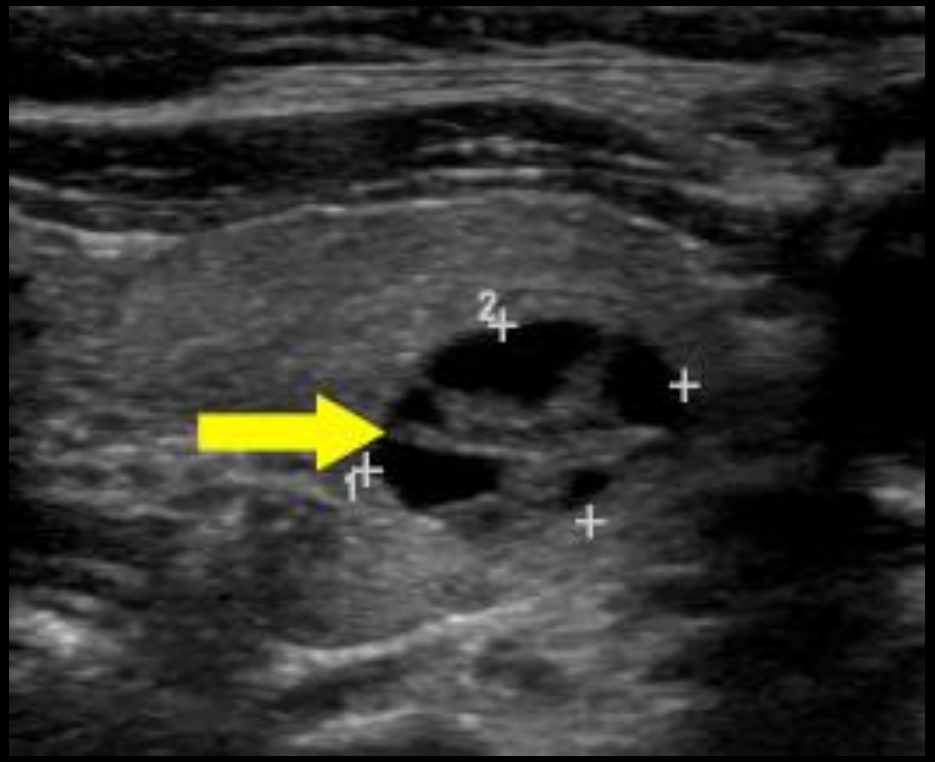
Composed predominately of tiny cystic spaces(>50%).
Benign findings.

Composition



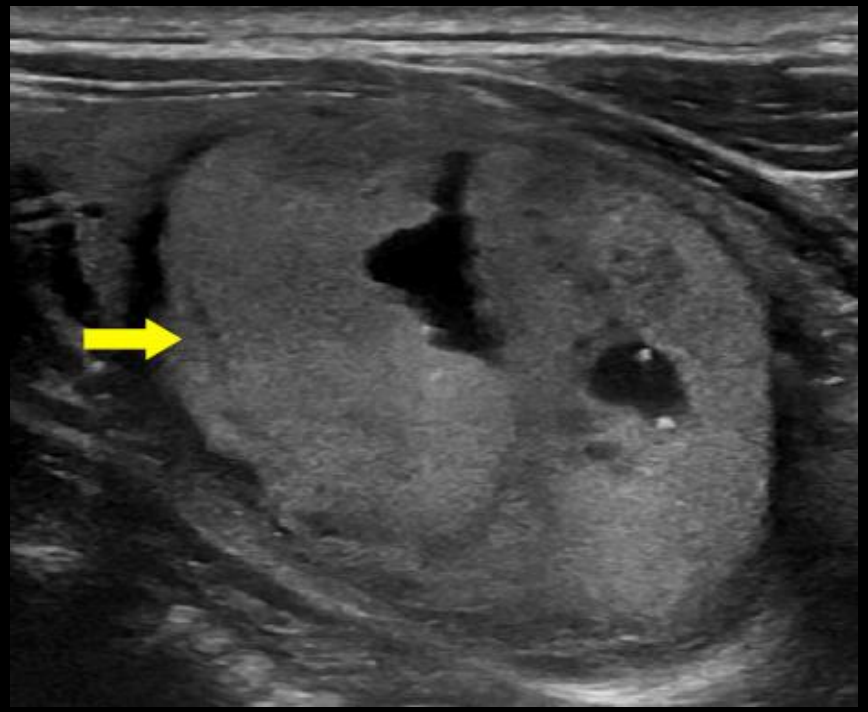
Solid or almost completely solid

Composition

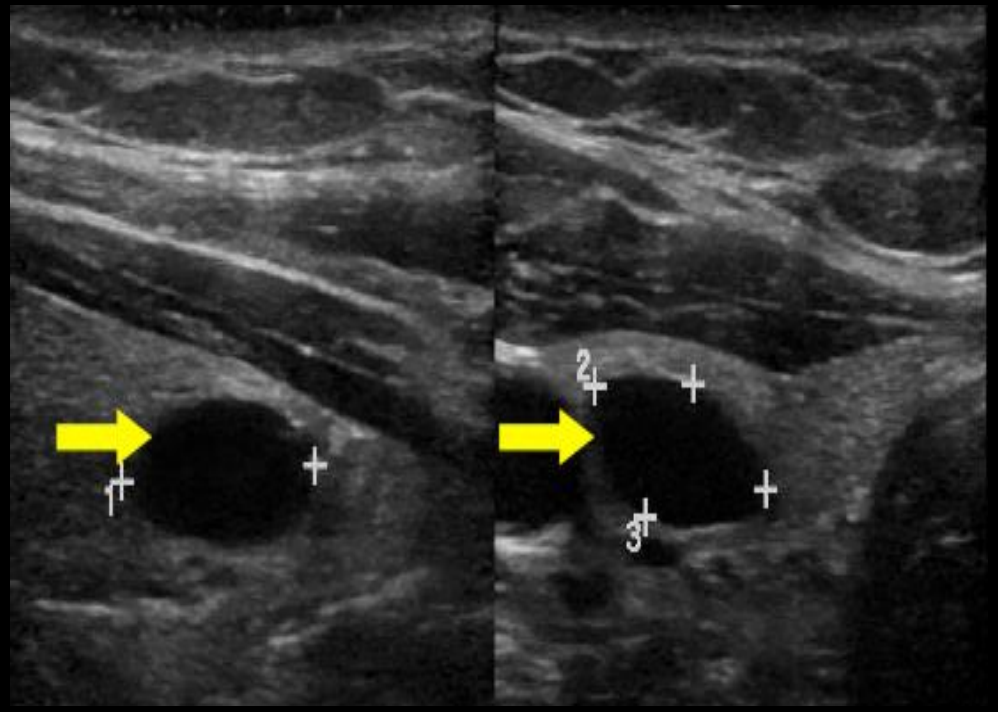


Mixed cystic solid

ECHOGENICTY



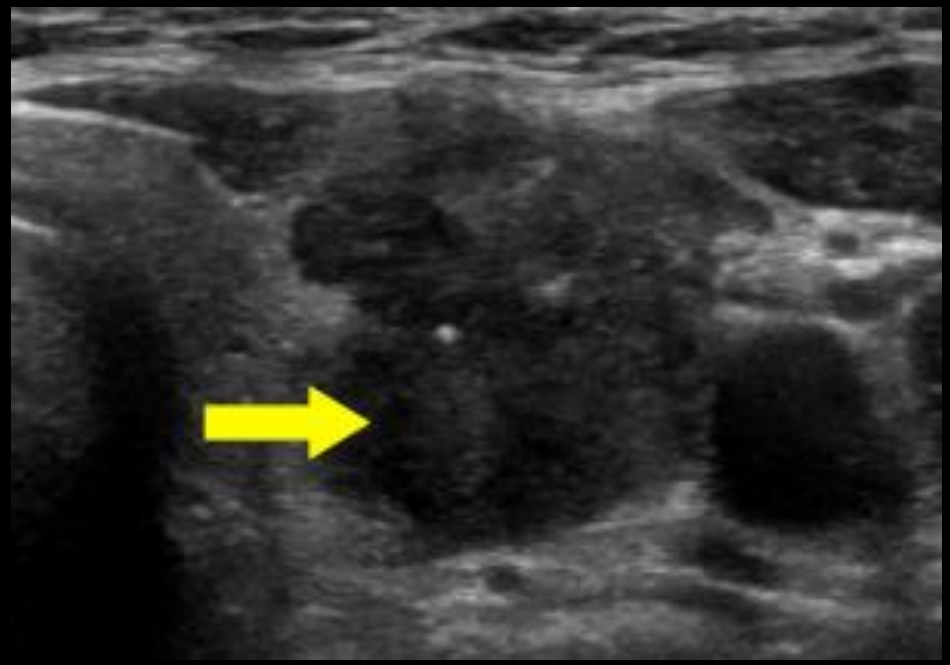
Hyperechoic to thyroid tissue.



Anechoic

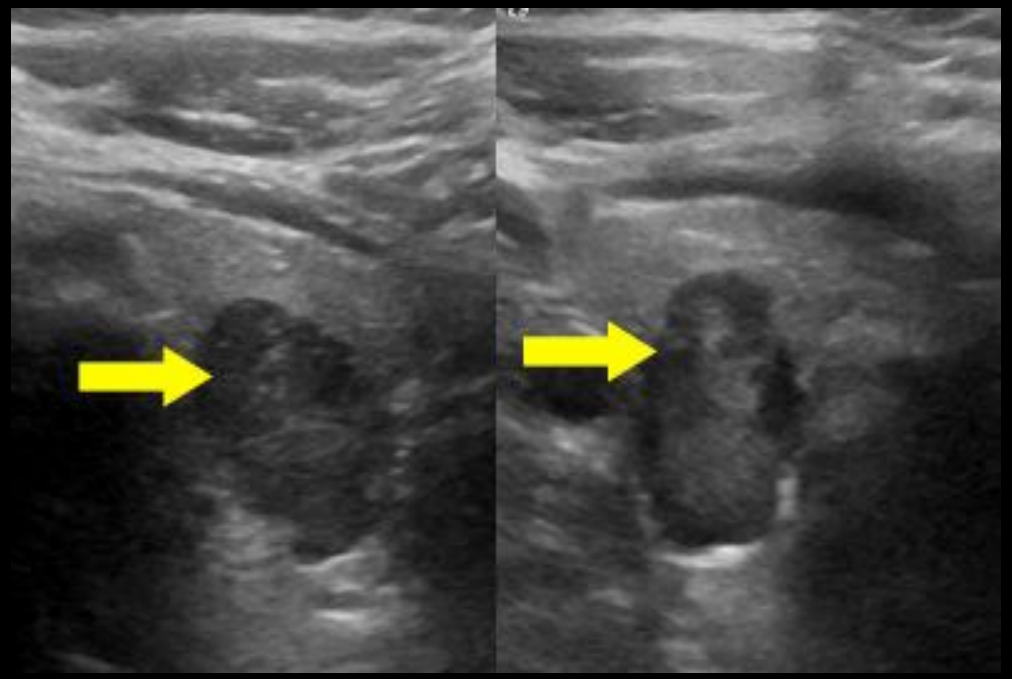
ECHOGENICTY

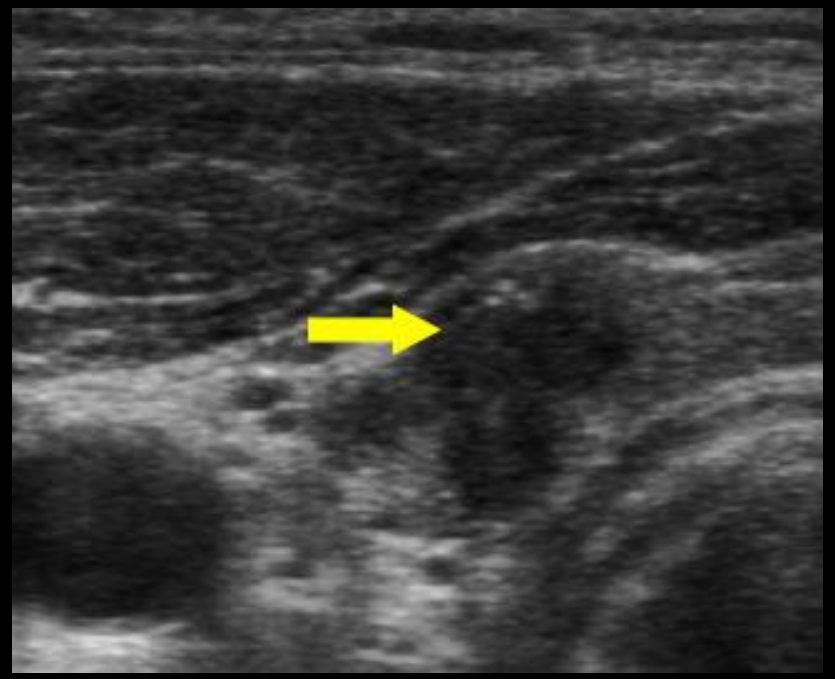
Isoechoic



Hypoechoic

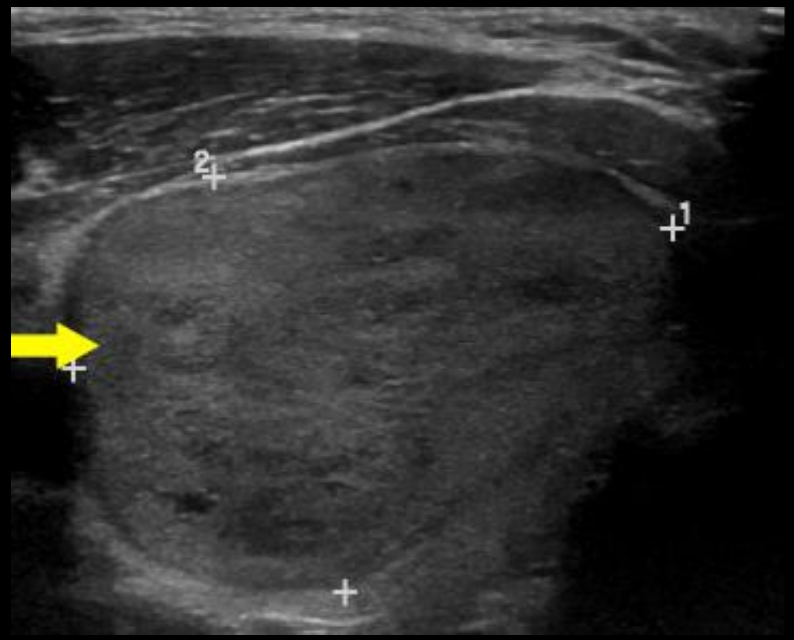
SHAPE – TALLER THAN WIDE





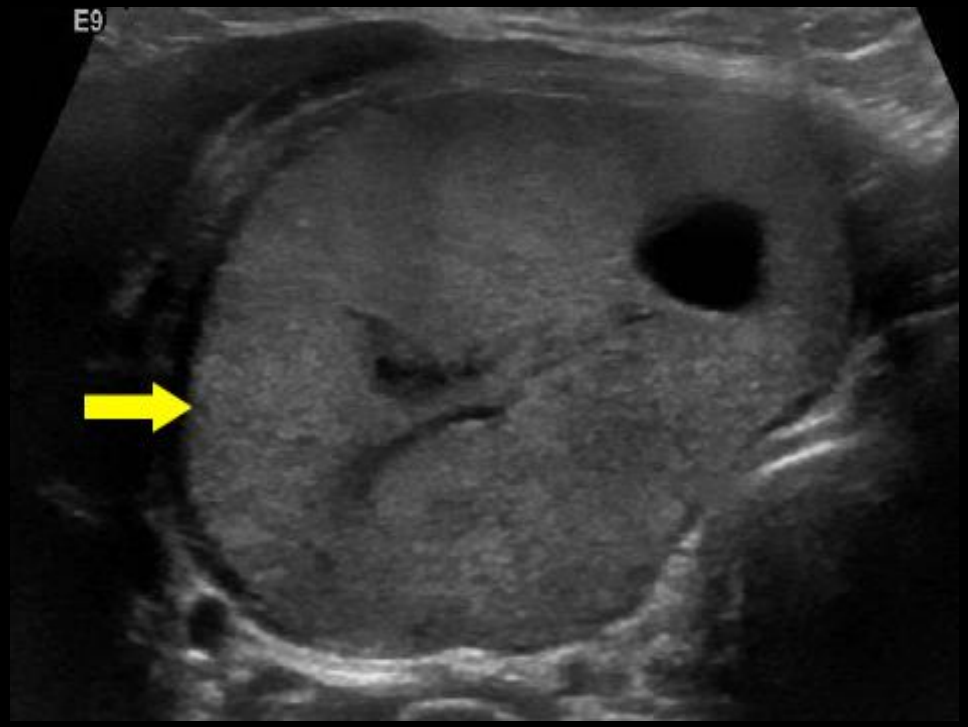
A taller-than-wide shape is defined as a ratio of **>1** in the anteroposterior diameter to the horizontal diameter when measured in the **transverse** plane

SHAPE – WIDER THAN TALL



A wider-than-tall shape is defined as a ratio of **≤1** in the anteroposterior diameter to the horizontal diameter when measured in the **transverse** plane

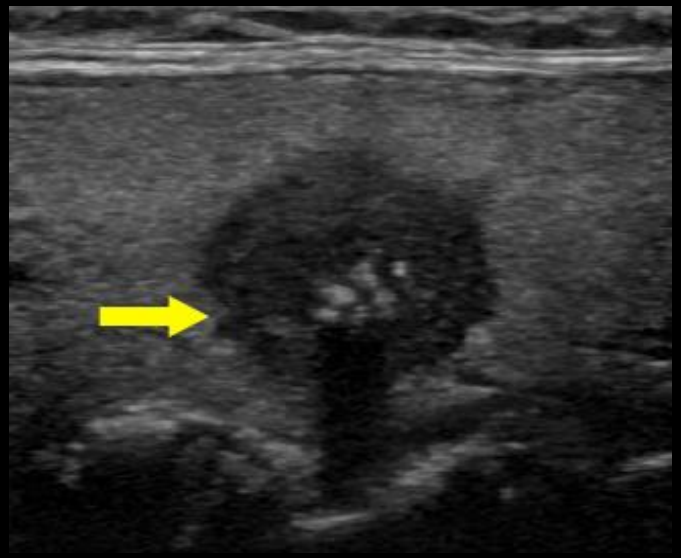
MARGIN



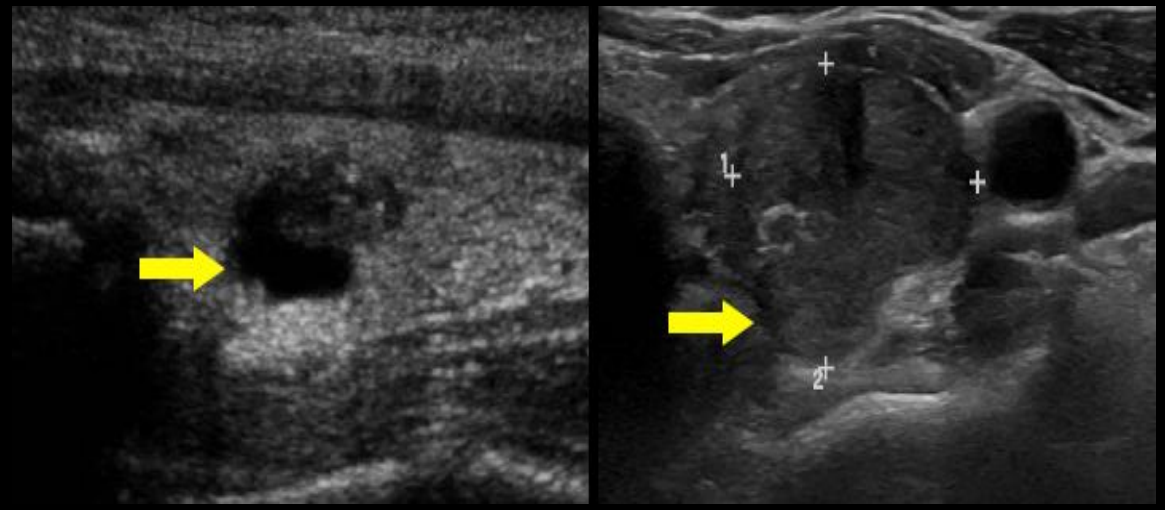
Well defined - uninterrupted

Ill defined – difficult to differentiate with thyroid parenchyma

MARGIN

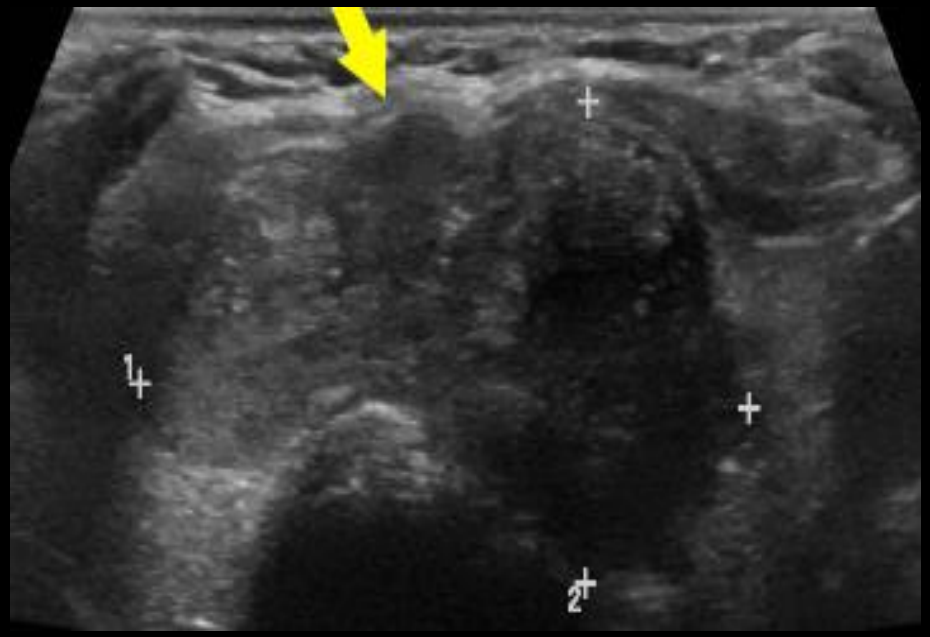


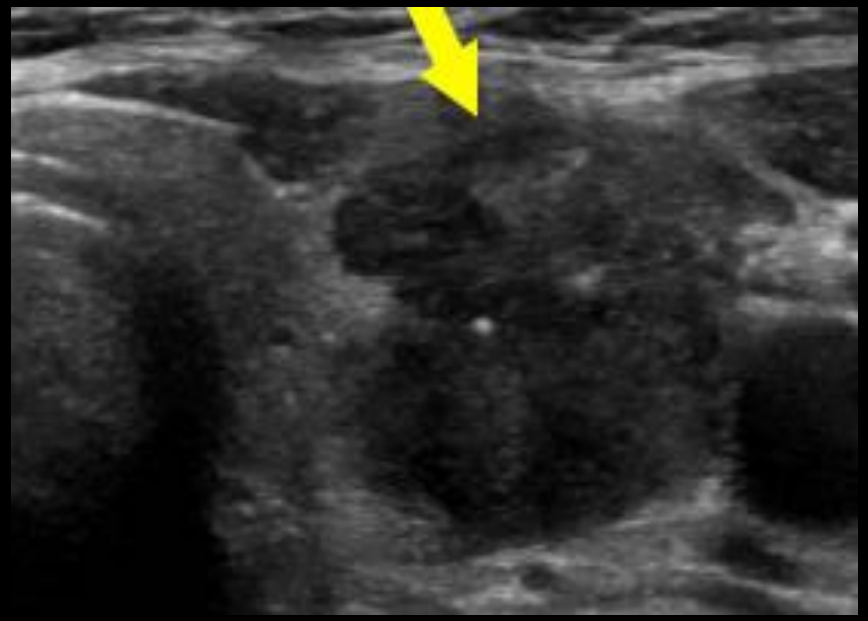
Irregular - spiculated, jagged or sharp angles



Lobulated – Border of focal rounded soft tissue protrusions that extend into the adjacent parenchyma.

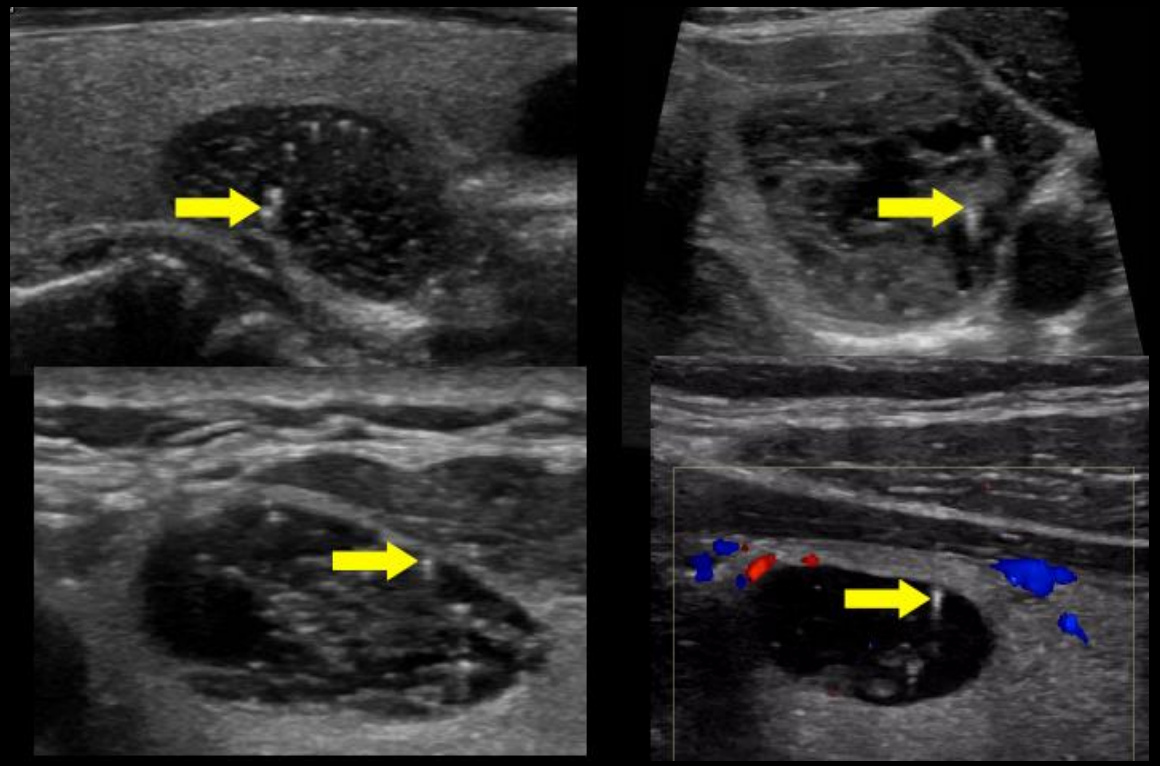
MARGIN





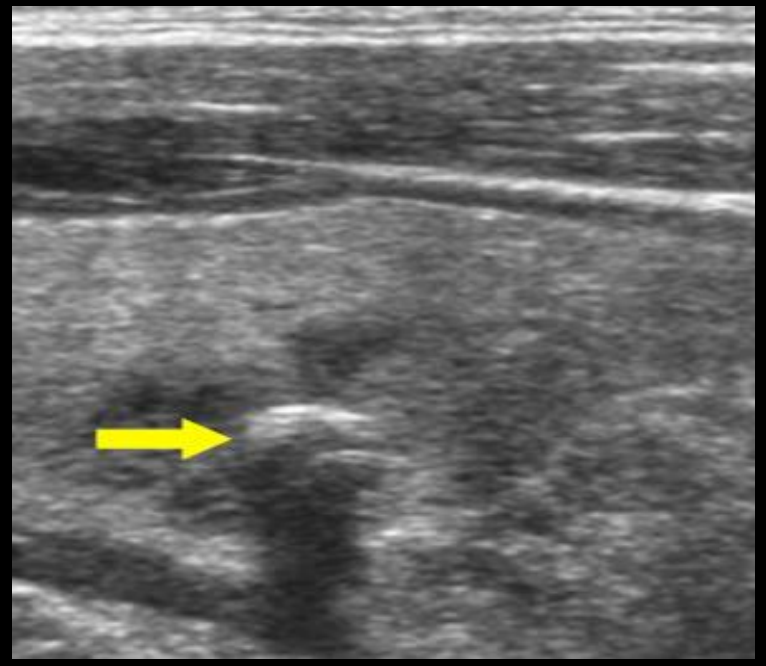
Extrathyroidal extension – extend through the thyroid margin

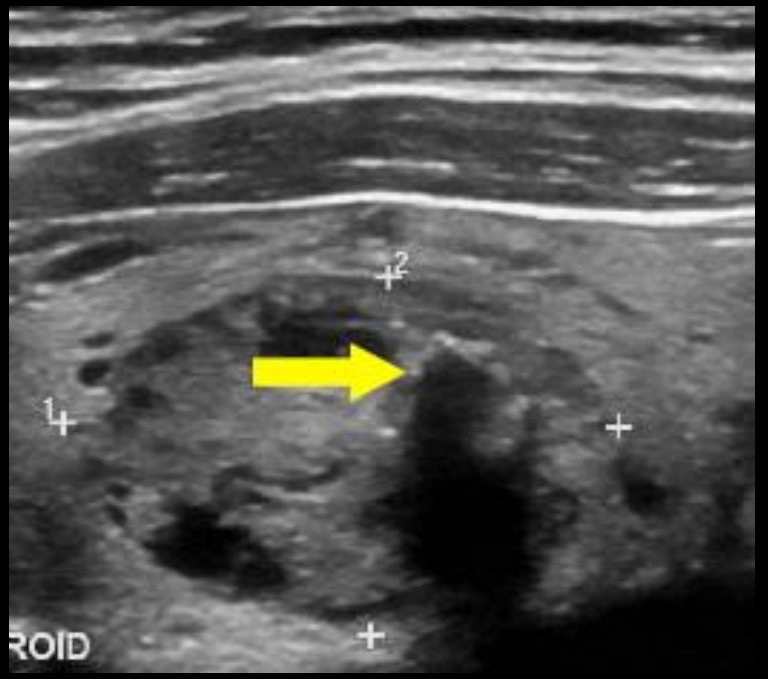
ECHOGENIC FOCI – LARGE COMET TAIL



A comet-tail artifact is a type of reverberation artifact. The deeper echoes become attenuated and are displayed as decreased width, resulting in a triangular shape

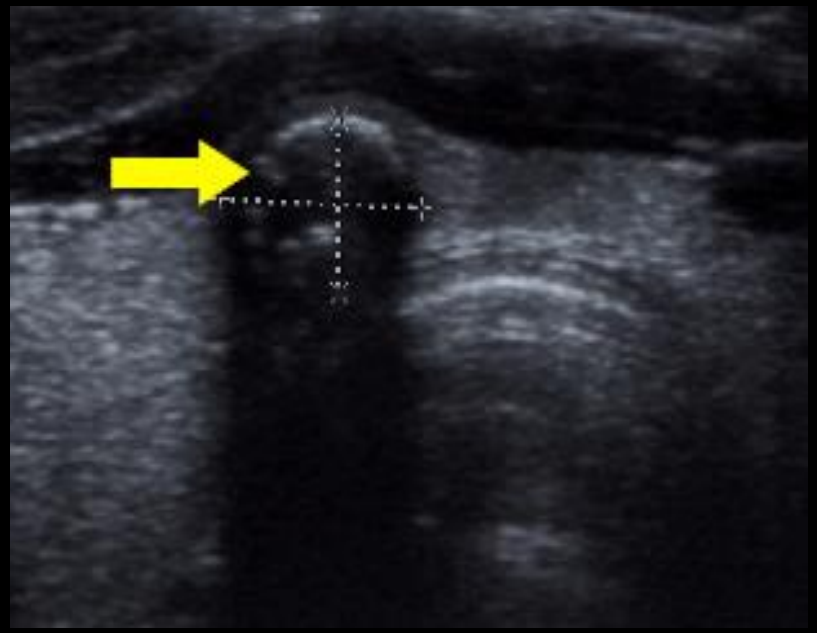
ECHOGENIC FOCI





Macrocalcification – large enough to cause posterior acoustic shadowing

ECHOGENIC FOCI



Peripheral calcification

ECHOGENIC FOCI

Punctate echogenic foci – No posterior shadow

ASSUMPTIONS

- If rim calcifications obscure the nodule completely, choose composition to be “solid” and echogenicity to be “isoechoic”.
- If the margin cannot be determined, choose “ill-defined margin”.
- If echogenicity cannot be determined, choose “isoechoic”.
- If composition cannot be determined, choose “solid”.

America thyroid association(ATA)

- Initial evaluation
  - Serum TSH evaluation
    - TSH< further radionuclide scan needed.
    - TSH normal or >, no need for radionuclide scan

  - An incidental finding of focal FDG uptake in a >1 cm thyroid nodule is concerning and FNA is warranted

TABLE 6. SONOGRAPHIC PATTERNS, ESTIMATED RISK OF MALIGNANCY, AND FINE-NEEDLE ASPIRATION GUIDANCE FOR THYROID NODULES

Sonographic pattern	*US features*	*Estimated risk of malignancy, %*	*FNA size cutoff (largest dimension)*
High suspicion	Solid hypoechoic nodule or solid hypoechoic component of a partially cystic nodule ***with*** one or more of the following features: irregular margins (infiltrative, microlobulated), microcalcifications, taller than wide shape, rim calcifications with small extrusive soft tissue component, evidence of ETE	>70–90[a]	Recommend FNA at ≥1 cm
Intermediate suspicion	Hypoechoic solid nodule with smooth margins ***without*** microcalcifications, ETE, or taller than wide shape	10–20	Recommend FNA at ≥1 cm
Low suspicion	Isoechoic or hyperechoic solid nodule, or partially cystic nodule with eccentric solid areas, ***without*** microcalcification, irregular margin or ETE, or taller than wide shape.	5–10	Recommend FNA at ≥1.5 cm
Very low suspicion	Spongiform or partially cystic nodules ***without*** any of the sonographic features described in low, intermediate, or high suspicion patterns	<3	Consider FNA at ≥2 cm Observation without FNA is also a reasonable option
Benign	Purely cystic nodules (no solid component)	<1	No biopsy[b]

US-guided FNA is recommended for cervical lymph nodes that are sonographically suspicious for thyroid cancer (see Table 7).

[a]The estimate is derived from high volume centers, the overall risk of malignancy may be lower given the interobserver variability in sonography.

[b]Aspiration of the cyst may be considered for symptomatic or cosmetic drainage.

ETE, extrathyroidal extension.

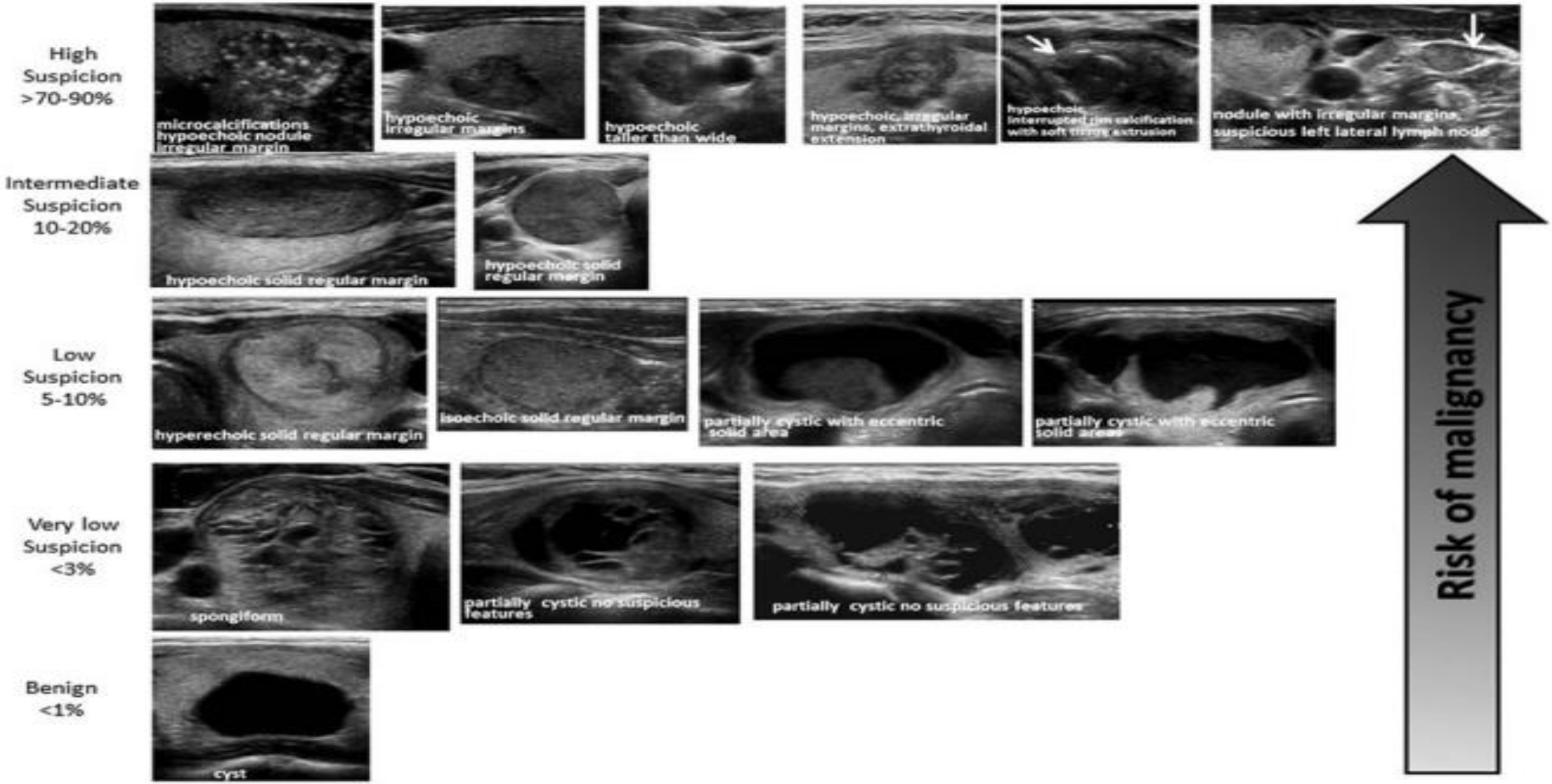


FIG. 2. ATA nodule sonographic patterns and risk of malignancy.

References

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- 1. Haugen BR, Alexander EK, Bible KC et-al. 2015 American Thyroid Association Management Guidelines for Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer: The American Thyroid Association Guidelines Task Force on Thyroid Nodules and Differentiated Thyroid Cancer. Thyroid. 2016;26 (1): 1-133. doi:10.1089/thy.2015.0020 - Free text at pubmed - Pubmed citation
- Ting Xu, Ya Wu, Run-Xin Wu, Yu-Zhi Zhang, Jing-Yu Gu, Xin-Hua Ye, Wei Tang, Shu-Hang Xu, Chao Liu, Xiao-Hong Wu. Validation and comparison of three newly-released Thyroid Imaging Reporting and Data Systems for cancer risk determination. (2019) Endocrine. 64 (2): 299. doi:10.1007/s12020-018-1817-8 - Pubmed