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

**ECHOCOGENICITY**
(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: 2 points
- Irregular: 3 points
- Extra-thyroidal extension: 3 points

**ECHOCOGENIC 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

- **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*

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**COMPOSITION**
- **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.

**ECHOCOGENICITY**
- **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.

**SHAPE**
- **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.

**MARGIN**
- **Lobulated:** Protrusions into adjacent tissue.
- **Irregular:** Jagged, spiculated, or sharp angles.
- **Extra-thyroidal extension:** Obvious invasion = malignancy.
- Assign 0 points if margin cannot be determined.

**ECHOCOGENIC FOCI**
- **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 TI-RADS Categories

- Composition - Choose 1
- Echogencity - Choose 1
- Shape - Choose 1
- Margin - If more than one type, choose the most suspicious
- Echogenic foci - Choose all that apply
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”.
Composition: Cystic or almost completely cystic

Entirely or nearly entirely cystic
Composition: Spongiform

Composed predominately of tiny cystic spaces.
Spongiform is a benign finding. If there is concern for irregular margins or suspicious echogenic foci, reconsider your choice of spongiform.
Composition: Solid or almost completely solid

Composed entirely or nearly entirely of soft tissue, with only a few tiny cystic spaces
Composition: Mixed cystic solid

Composed of soft tissue and cystic spaces. Base all other lexicon nodule characteristics on the solid component.
Echogenicity: Anechoic

Without soft tissue component. Applies to cystic or almost completely cystic nodules.
Echogenicity: Hyperechoic

Increased echogenicity relative to thyroid tissue
Echogenicity: Isoechoic

Similar echogenicity relative to thyroid tissue
Echogenicity: Hypoechogenic

Decreased echogenicity relative to thyroid tissue
Echogenicity: Very Hypoechoic

Decreased echogenicity relative to adjacent neck musculature
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.
A wider-than-tall shape (not taller-than-wide) is defined as a ratio of $\leq 1$ in the anteroposterior diameter to the horizontal diameter when measured in the transverse plane.
Margin: Smooth

Uninterrupted, well-defined, curvilinear edge typically forming a spherical or elliptical shape
Margin: Ill-defined

Border of the nodule is difficult to distinguish from thyroid parenchyma
The outer border of the nodule is spiculated, jagged, or with sharp angles with or without clear soft tissue protrusions into the parenchyma. The protrusions may vary in size and conspicuity and may be present in only one portion of the nodule.
Margin: Lobulated

Border has focal rounded soft tissue protrusions that extend into the adjacent parenchyma. The lobulations may be single or multiple and may vary in conspicuity and size (small lobulations are referred to as microlobulated).
Margin: Extrathyroidal Extension

Nodule extends 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: Macrocalcifications

Calcifications that are large enough to result in posterior acoustic shadowing
Calcifications occupy the periphery of the nodule. May not be continuous but generally involves the majority of the margin. Often dense enough to obscure the central components of the nodule (see Assumptions).
Echogenic Foci: Punctate
Echogenic Foci

“Dot-like” foci less than 1 mm in diameter. Occasionally can have small comet tail artifacts.
REFERENCE

http://www.jacr.org/article/S1546-1440(15)00684-5/abstract

Images from Sharlene A. Teefey

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