Ontario Health
Cancer Care Ontario

Explanatory Notes:

Thyroid Ultrasound Structured Reporting Templates

Version 1.0 (February 2020)

Acknowledgements

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Overview of Methods Used to Develop the Thyroid Ultrasound Reporting Templates

Structured clinical radiology templates have been demonstrated to improve radiology quality through clearer communication of results and follow up recommendations, facilitating further clinical decision making. Well-developed clinical templates should include key relevant treatment information and clear recommendations for patient management. Where possible, evidence is derived from existing evidence and vetted standards that have been clinically reviewed. Where evidence is not available, clinical expert consensus can be used as an appropriate source of information.

To decrease the variability and improve the quality of the radiology reports, use of highly structured and synoptic reporting is recommended by Ontario Health (Cancer Care Ontario). The need for creation of a Thyroid Ultrasound Structured Reporting Template was first identified by the Thyroid Cancer Pathway Map Working Group as an important method to optimize pathway concordance and to make clear recommendations regarding follow up and biopsy of thyroid nodules identified at ultrasound. An Expression of Interest was circulated and a multidisciplinary working group was developed which included representation from radiology, radiation oncology, endocrinology, primary care, surgery, surgical oncology, ultrasonography, and picture archiving and communication (PACS) specialists from across the province. The working group met regularly to review the evidence and formulate items for the reporting template. Reviews from internal Cancer Care Ontario expert panels, disease site groups and other committees were obtained and incorporated. The end products of this project are:

1. An evidence-based **Diagnostic Medical Sonographer Worksheet**
2. A structured **Radiologist Reporting Template** for thyroid ultrasounds to guide recommendations for follow up or biopsy criteria
3. A post **Biopsy Addendum Template**, to give recommendations to the clinician based on biopsy results and sonographic features of the biopsied nodule

Comparison of 2017 American College of Radiology Thyroid Imaging – Reporting and Data System (ACR TI-RADS™) and 2015 American Thyroid Association (ATA) Management Guidelines for Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer, as well as the 2017 Ontario Health (Cancer Care Ontario) Thyroid Cancer Diagnosis Pathway Map led the working group to recommend an update of the pathway map to incorporate ACR-TIRADS. The updated Thyroid Cancer Diagnosis Pathway Map was published in 2019 (Ontario Health (Cancer Care Ontario), 2019).

Decisions on the elements of the template were determined by:

- Adherence to the 2019 Ontario Health (Cancer Care Ontario) Thyroid Cancer Diagnosis Pathway Map
- Systematic Reviews of thyroid cancer screening, radiology terminology and reporting schemas
- Expertise and consensus from the Clinical Template Development Working Group

The template should be used during routine assessment to report all ultrasound evaluations of the thyroid gland for nodules.

Providers are encouraged to follow Ontario Health (Cancer Care Ontario)'s Thyroid Cancer Diagnosis Pathway Map for facilitation and management of care of patients with suspected thyroid cancer (Ontario Health (Cancer Care Ontario), 2019). As with the Thyroid Cancer Diagnosis Pathway Map, these templates are intended to be used in adults (18 years or older).

Diagnostic Medical Sonographer Worksheet

Ontario Health
Cancer Care Ontario

ACR TI-RADS™

ACR TI-RADS™ categorizes ultrasound features as benign, mildly suspicious, moderately suspicious or highly suspicious for malignancy. Points are given for each ultrasound feature of a nodule, with more suspicious features being awarded additional points (Tessler et al., 2017). Once a feature is selected from each of the five categories, the points are summed to determine the nodule's ACR TI-RADS™ level.

Diagnostic medical sonographers and radiologists are **strongly encouraged** to review the ACR Atlas for TI-RADS (American College of Radiology, n.d.). It is particularly important to familiarize oneself with the following distinctions:

- Spongiform versus mixed cystic and solid nodules
- Ill-defined versus irregular margins
- Punctate echogenic foci versus comet tail artifacts

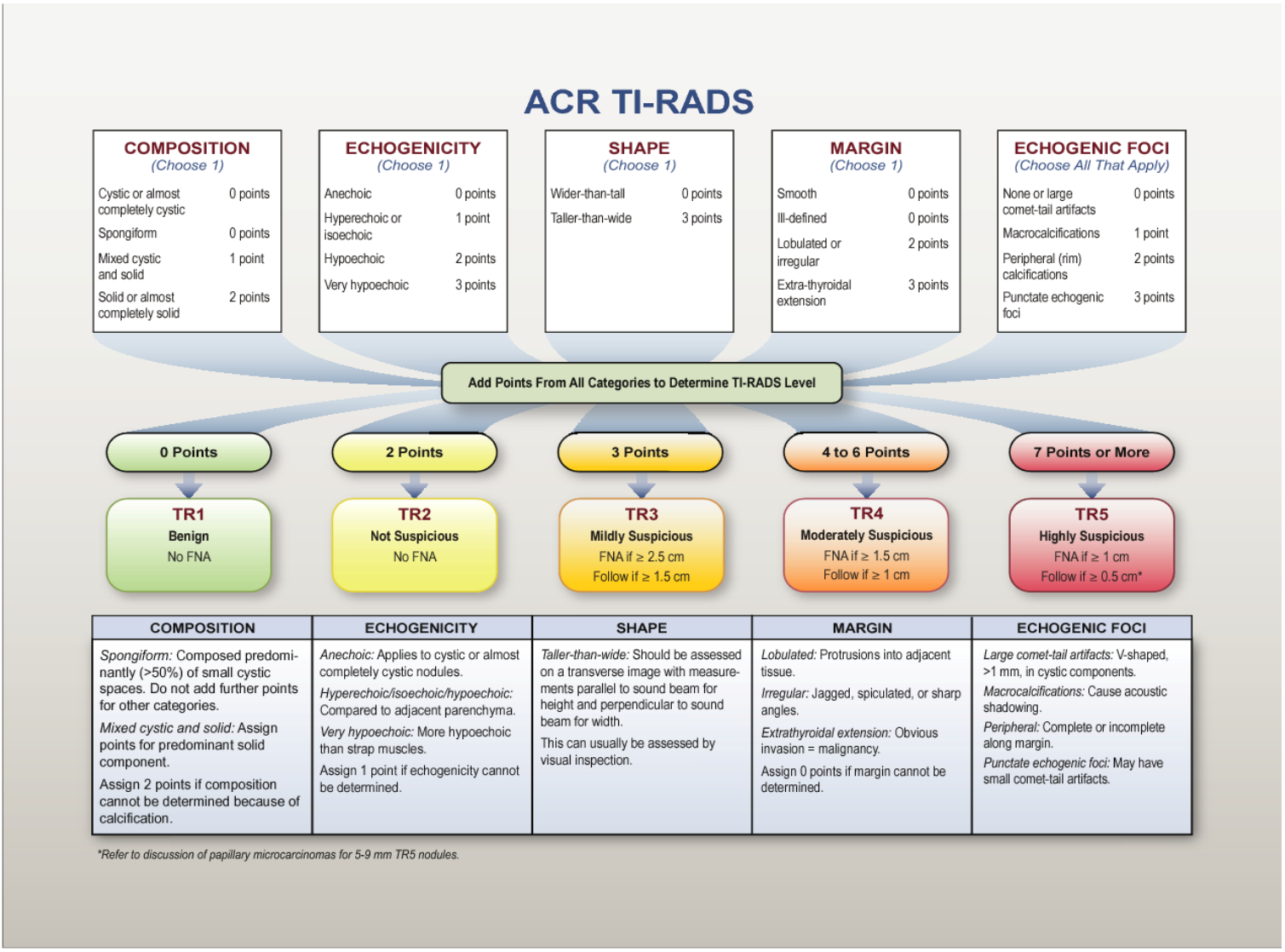


Figure 1 – Chart showing five categories on the basis of the ACR Thyroid Imaging Reporting and Data System (TI-RADS™) lexicon, TR levels, and criteria for fine-needle aspiration or follow-up ultrasound.
ACR TI-RADS chart taken from Tessler et al. (2017) - Reprinted with permission

Thyroid Ultrasound – Diagnostic Medical Sonographer Worksheet (pre-populated table)

Clinical Information

Oldest available prior ultrasound: Date:_____
Other Modality: Date:_____
Prior Biopsy: Date:_____

Patient Name: _____
Date: _____
Patient Unique #: _____

ULTRASOUND FINDINGS

Visualization: ☐Good ☐Moderate ☐Poor

Size right lobe:
_____cm X _____cm X _____cm
(craniocaudal) (transverse) (anterior-posterior)

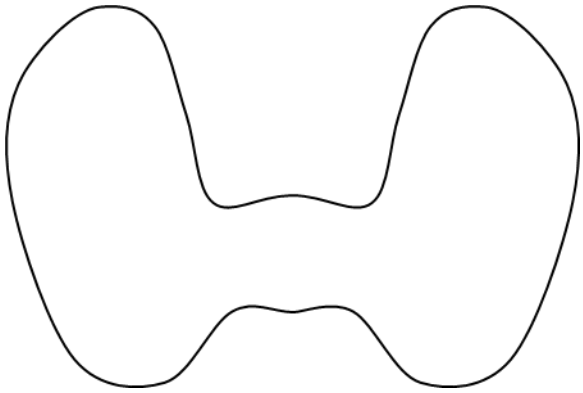
Size left lobe:
_____cm X _____cm X _____cm
(craniocaudal) (transverse) (anterior-posterior)

Overall texture: ☐Homogeneous ☐Heterogeneous

Doppler flow whole gland: ☐Normal ☐Increased ☐Decreased

Estimated total # nodules ≥ 1cm:_____

Suspicious lymph nodes level 2-4, 6: ☐ No ☐ Yes, please draw below



NOD.	SIZE (cm) CC x TX x AP Current (C)/ Oldest Previous (OP)	VOL. (ml)	COMPOSITION	ECHOGENICITY	TALLER-THAN-WIDE	MARGINS	ECHOGENIC FOCI
	C: x x OP: x x		Cy SP MX So ?	A +/= O OO ?	W T	S ID LI Ex ?	N C M R P
	C: x x OP: x x		Cy SP MX So ?	A +/= O OO ?	W T	S ID LI Ex ?	N C M R P
	C: x x OP: x x		Cy SP MX So ?	A +/= O OO ?	W T	S ID LI Ex ?	N C M R P
	C: x x OP: x x		Cy SP MX So ?	A +/= O OO ?	W T	S ID LI Ex ?	N C M R P
Please circle one abbreviation that describes the nodule *under Composition, Echogenicity, Taller-than-wide, and Margins* ***Please circle all that apply*** *under Echogenic Foci.*			**C**ystic or almost completely cystic 0 **Sp**ongiform (SP) 0 **Mi**X**e**d cystic and solid (MX) 1 **So**lid or almost completely solid 2 Cannot be determined (**?**) 2	**A**nechoic 0 Hyperechoic or isoechoic **(+/=)** 1 Hyp**O**echoic 2 Very hypoechoic (**OO**) 3 Cannot be determined (**?**) 1	**W**ider-than-tall or round 0 **T**aller-than-wide 3	**S**mooth 0 **I**ll-**D**efined (ID) 0 **L**obulated or **I**rregular (LI) 2 **Ex**tra-thyroidal extension 3 Cannot be determined (**?**) 0	**N**one or large 0 **C**omet-tail artifacts **M**acrocalcifications 1 Peripheral (**R**im) calcifications 2 **P**unctate echogenic foci 3

Other Comments:

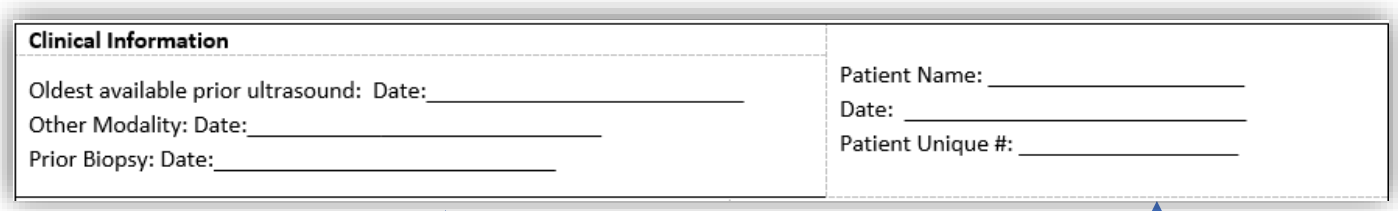
Sonographer: _____

NOT A FINAL REPORT: TECHNICAL IMPRESSION ONLY

Explanatory Notes: Diagnostic Medical Sonographer Worksheet

Disclaimer
We assume a paper environment for the diagnostic medical sonographer. If the diagnostic medical sonographer is in an electronic environment, this paper document can be modified to allow drop down menus and/or pick list for areas with options.

The following boxes provide explanations and rationales on how best to use this template.



Oldest Available prior ultrasound at your facility that measures all currently measured nodules. Use of prior ultrasounds from other facilities is also acceptable, but we recognize the difficulty in achieving this due to differing protocols and access.
An individual may also refer back to the most recent study, if desired.

Other modality (e.g. CT chest) should be documented with date, if it prompted the thyroid ultrasound study.

We recognize that not all requested clinical information may be available to radiologists or diagnostic medical sonographers.

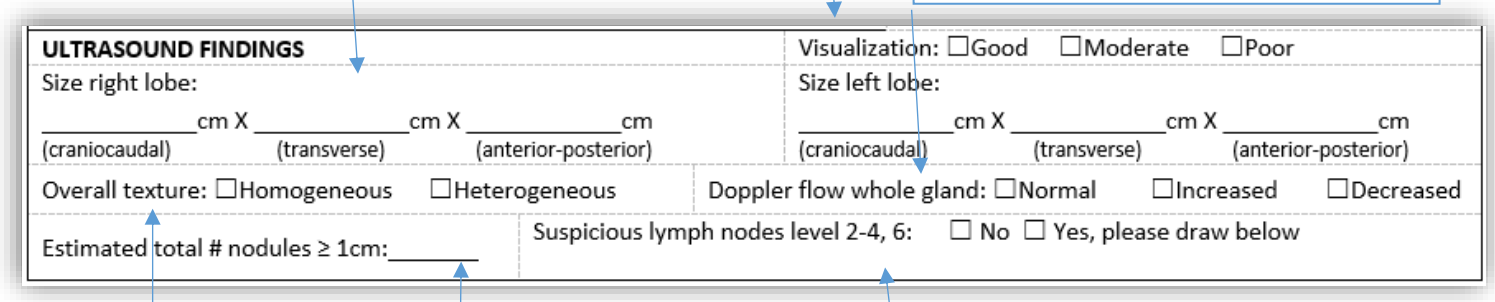
Patient identification should be in accordance of hospital/organization policy. For example, patient sticker or identification tag

Right and left lobe size will be measured. All measurements should be in centimeters. The isthmus does not need to be measured.

Craniocaudal measures from top to bottom.
Anterior-posterior measures from front to back.
Transverse measures from side to side.

Visualization refers to the quality of examination. Typically, ultrasounds are satisfactory in technical quality. However, if the patient cannot cooperate with the scan, the neck is very thick and short, and/or the thyroid extends into the retrosternal region, it may be less than satisfactory.

Doppler flow whole gland: The committee recognizes that this is a subjective assessment but may be helpful in identifying active thyroiditis or atrophic gland.



ULTRASOUND FINDINGS	Visualization: ☐Good ☐Moderate ☐Poor
Size right lobe: _____cm X _____cm X _____cm (craniocaudal) (transverse) (anterior-posterior)	Size left lobe: _____cm X _____cm X _____cm (craniocaudal) (transverse) (anterior-posterior)
Overall texture: ☐Homogeneous ☐Heterogeneous	Doppler flow whole gland: ☐Normal ☐Increased ☐Decreased
Estimated total # nodules ≥ 1cm:_____	Suspicious lymph nodes level 2-4, 6: ☐ No ☐ Yes, please draw below

Overall texture is a qualitative assessment of the gland.

Estimated total # of nodules > 1.0 cm in longest dimension should be documented.

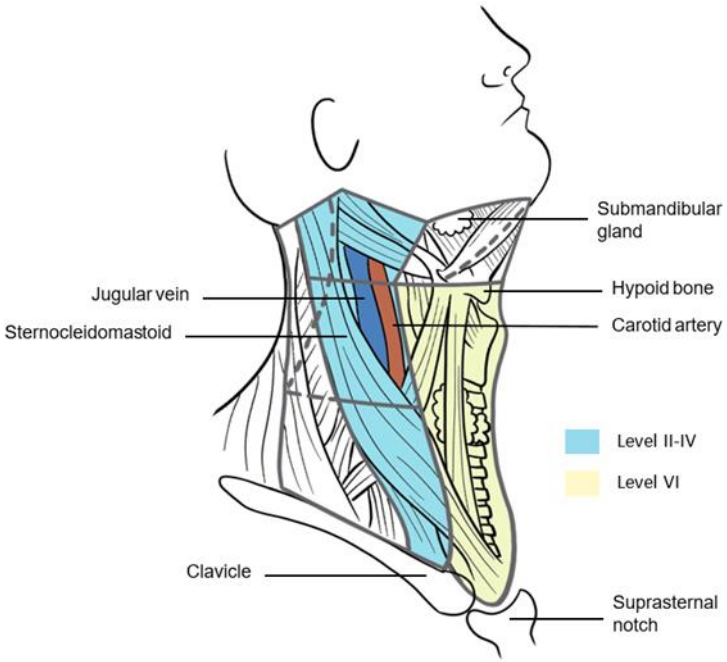
Suspicious lymph nodes should contain microcalcifications or be at least 0.8cm short axis and have other suspicious features.

See additional information on lymph nodes below.

Lymph nodes at levels 2-4 (lateral compartment) and 6 (central compartment) should be assessed on every patient. If a more limited scan is performed, a reason should be provided.

Levels 2-4 (lateral compartment) are bounded by: (Haugen, et al., 2016)

1. Carotid arteries medially
2. Posterior border sternomastoid muscle laterally
3. Skull base and posterior edge of submandibular gland superiorly
4. Clavicle inferiorly
   Submandibular nodes (level 1) are NOT included in this compartment

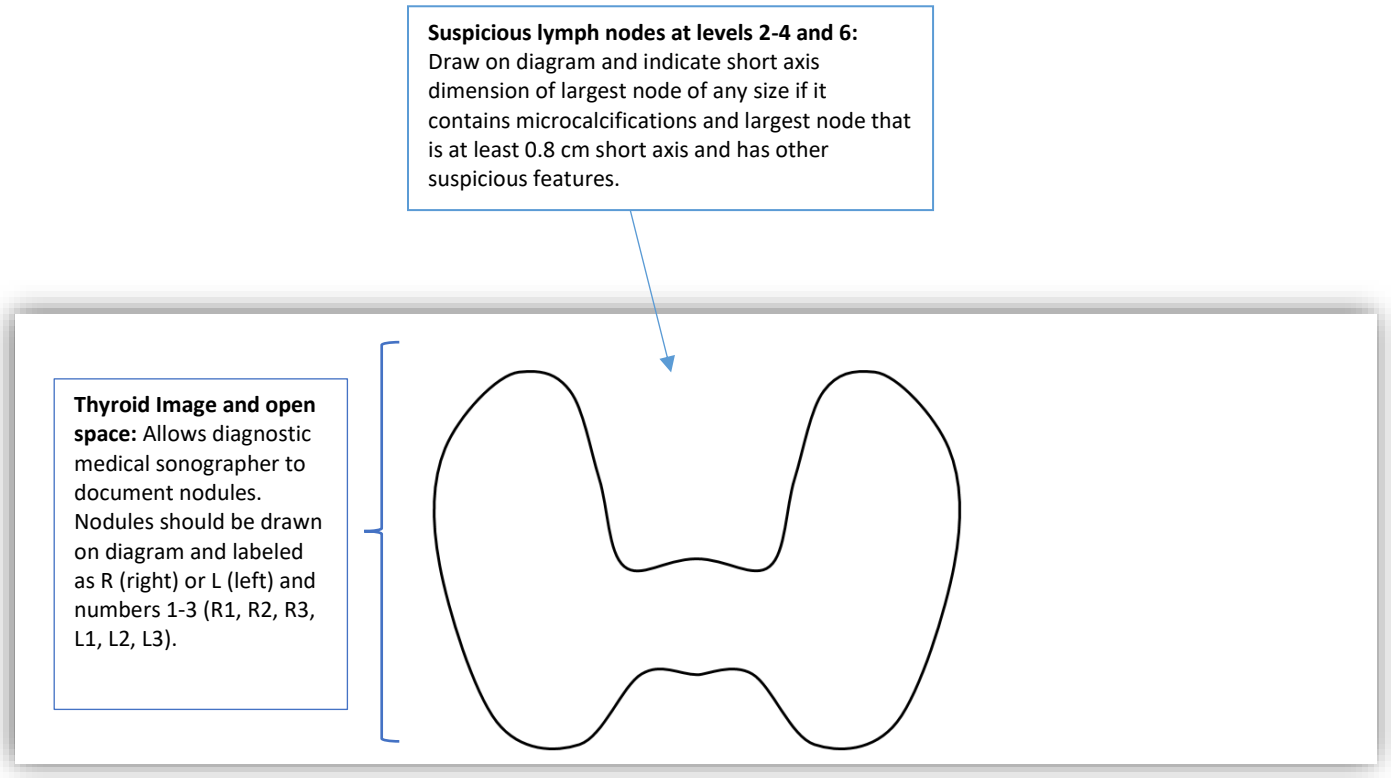


Level 6 (central compartment) is bounded by: (Haugen, et al., 2016)

1. Carotid arteries laterally
2. Hyoid bone superiorly
3. Suprasternal notch inferiorly

Sonographic features suggestive of abnormal lymph nodes include (Haugen et al., 2016; Leenhardt et al., 2013; Ontario Health (Cancer Care Ontario), 2019):

- Hilar compression/displacement/replacement
- A rounded rather than oval shape
- Microcalcifications
- Cystic or necrotic
- Peripheral vascularity
- Hyperechoic tissue looking like thyroid



The nodules chosen for detailed assessment should be the ones with the most worrisome features (see table in next section and ACR TI-RADS™ chart on page 6) and any accounting for a palpable finding. Cysts do not require measurement unless they account for a palpable finding. If no nodules have worrisome features and all are similar, choose the largest one in each lobe.

A maximum of 3 nodules on one side and a maximum of 4 nodules total should be drawn on the diagram. Isthmic nodules should be given R or L designation based on which side they extend toward. A midline nodule can be assigned to either side. Labelling should be consistent from one study to the next.

Diagnostic medical sonographers are asked to use the ACR TI-RADS™ lexicon to describe nodules. The reporting radiologist may choose different lexicon descriptors for the final report if he/she disagrees with your choices.

Nodule Location
Use one line for each nodule.
Indicate R1, R2 , R3, L1, L2, L3.

Current and Oldest Previous is a comparison of size of nodules. Oldest previous is the oldest available prior ultrasound referenced in the clinical information at the top of the worksheet.

Volume calculation can be obtained automatically from the ultrasound machine, as long as your settings are adjusted to do this and you obtain all three dimensions consecutively. Previous studies may not indicate volume so this can be left blank for the previous. Current and all future studies should include volume for comparison going forward. *Growth is defined as 50% increase in volume or 20% increase in each of two linear dimensions.*

NOD.	SIZE (cm) CC x TX x AP Current (C)/ Oldest Previous (OP)	VOL. (ml)	COMPOSITION	ECHOGENICITY	TALLER-THAN-WIDE	MARGINS	ECHOGENIC FOCI
	C: x x OP: x x		Cy SP MX So ?	A +/= O OO ?	W T	S ID LI Ex ?	N C M R P
	C: x x OP: x x		Cy SP MX So ?	A +/= O OO ?	W T	S ID LI Ex ?	N C M R P
	C: x x OP: x x		Cy SP MX So ?	A +/= O OO ?	W T	S ID LI Ex ?	N C M R P
	C: x x OP: x x		Cy SP MX So ?	A +/= O OO ?	W T	S ID LI Ex ?	N C M R P
Please circle one abbreviation that describes the nodule *under Composition, Echogenicity, Taller-than-wide and Margins.* ***Please circle all that apply*** *under Echogenic Foci.*			Cystic or almost completely cystic 0 Spongiform (SP) 0 MiXed cystic and solid (MX) 1 Solid or almost completely solid 2 Cannot be determined (?) 2	Anechoic 0 Hyperechoic or isoechoic (+/=) 1 HypOechoic 2 Very hypoechoic (OO) 3 Cannot be determined (?) 1	Wider-than-tall or round 0 Taller-than-wide 3	Smooth 0 Ill-Defined (ID) 0 Lobulated or Irregular (LI) 2 Extra-thyroidal extension 3 Cannot be determined (?) 0	None or large 0 Comet-tail artifacts 0 Macrocalcifications 1 Peripheral (Rim) calcifications 2 Punctate echogenic foci 3

Other comments:

Sonographer: _____ **NOT A FINAL REPORT: TECHNICAL IMPRESSION ONLY**

Other comments section may be used to enter any additional comments regarding the thyroid or other visualized structures. For example, parathyroid enlargement and carotid stenosis can be noted here.

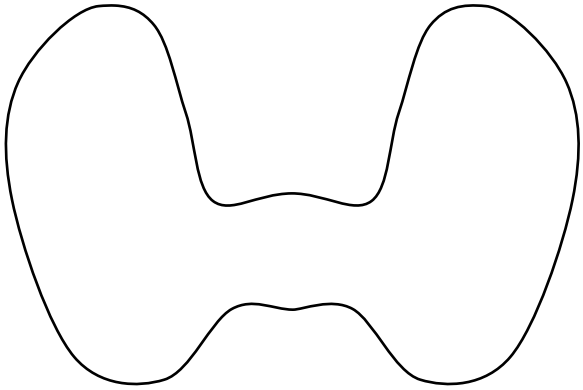
Abbreviations in the boxes come from the bottom row of the table (in gray, for reference) and are intended to allow the diagnostic medical sonographer to circle the correct descriptor. Page 13 provides a blank table. Either style is acceptable, depending on department preference. In an electronic format, these descriptors would be in a drop down pick list.

Sonographer signature:
Identification of diagnostic medical sonographer should be in accordance of hospital/organization policy. This may include a signature, initials, and/or name for identification.

Nodule descriptors: The nodule descriptors are taken from the ACR TI-RADS Chart shown on page 6 and comprise the accepted lexicon for describing thyroid nodules. Only these descriptors should be used. The descriptors with the highest numbers assigned to them are the ones most worrisome for thyroid cancer.

Thyroid Ultrasound – Diagnostic Medical Sonographer Worksheet (free text table)

Clinical Information	
Oldest available prior ultrasound: Date:_____ Other Modality: Date:_____ Prior Biopsy: Date:_____	Patient Name: _____ Date: _____ Patient Unique #: _____
ULTRASOUND FINDINGS	Visualization: ☐Good ☐Moderate ☐Poor
Size right lobe: _____cm X _____cm X _____cm (craniocaudal) (transverse) (anterior-posterior)	Size left lobe: _____cm X _____cm X _____cm (craniocaudal) (transverse) (anterior-posterior)
Overall texture: ☐Homogeneous ☐Heterogeneous	Doppler flow whole gland: ☐Normal ☐Increased ☐Decreased
Estimated total # nodules ≥ 1cm:_____	Suspicious lymph nodes level 2-4, 6: ☐ No ☐ Yes, please draw below



NOD.	SIZE (cm) CC x TX x AP Current (C)/ Oldest Previous (OP)	VOL. (ml)	COMPOSITION	ECHOGENICITY	TALLER-THAN-WIDE	MARGINS	ECHOGENIC FOCI
	C: x x						
	OP: x x						
	C: x x						
	OP: x x						
	C: x x						
	OP: x x						
	C: x x						
	OP: x x						
Please circle one abbreviation that describes the nodule *under Composition, Echogenicity, Taller-than-wide and Margins.* ***Please circle all that apply*** *under Echogenic Foci.*			**C**ystic or almost completely cystic 0 **Sp**ngiform (SP) 0 **Mi**xed cystic and solid (MX) 1 **So**lid or almost completely solid 2 Cannot be determined (**?**) 2	**A**nechoic 0 Hyperechoic or isoechoic **(+/=)** 1 Hyp**O**echoic 2 Very hypoechoic (**OO**) 3 Cannot be determined (**?**) 1	**W**ider-than-tall or round 0 **T**aller-than-wide 3	**S**mooth 0 **Ill-D**efined (ID) 0 **L**obulated or **I**rregular (LI) 2 **Ex**tra-thyroidal extension 3 Cannot be determined (**?**) 0	**N**one or large 0 **C**omet-tail artifacts 0 **M**acrocalcifications 1 Peripheral (**R**im) calcifications 2 **P**unctate echogenic foci 3

Other Comments:

Sonographer: _____ **NOT A FINAL REPORT: TECHNICAL IMPRESSION ONLY**

Radiologist Reporting Template

Thyroid Ultrasound - Radiologist Reporting Template

Note: this template format is for content only. Format will be altered to fit with a voice recognition system.

CLINICAL INFORMATION

1. Clinical History: [Default: follow up nodule(s)]

2. Personal history of thyroid malignancy: ○ Yes ○ No

3. Prior Biopsy: ○ Yes: _____ *(date)*
○ No

COMPARISON STUDY

1. Comparison Study: ○ Oldest available prior US exam: _____ *(date)*
○ Other modality:_____(modality and date)
○ No prior imaging

TECHNICAL NOTE

1. Technical Quality: ○ Satisfactory ○ Limited due to: [enter text]

FINDINGS

1. <u>Thyroid Gland:</u>

A. Right lobe _____cm (CC x TX x AP) Previous _____cm (CC x TX x AP)

B. Left lobe _____cm (CC x TX x AP) Previous _____cm (CC x TX x AP)

C. Doppler Flow Whole Gland: ○ normal ○ increased ○ decreased

D. Thyroid Echotexture:
- ○ Parenchymal echogenicity is uniform
- ○ Subtle lobulation of outline and parenchymal heterogeneity
- ○ Parenchymal heterogeneity with numerous small hypoechoic nodules, consistent with Hashimoto's (lymphocytic) thyroiditis

2. <u>Nodules (Erase this section if no nodules to assess):</u>

A. Estimated total number of nodules ≥1cm: [0, 1, 2, 3, 4, 5, 6-10, >10]

B. <u>Nodule: [R1, R2, R3, L1, L2, L3]</u>

Duplicate section B for each nodule warranting description and follow up or biopsy, up to 3 nodules per lobe and 4 nodules total. Nodule identification should be as per technologist worksheet, identified as R1, R2, R3 or L1, L2, L3.

I. Location: ○ Right upper ○ Right mid ○ Right lower ○ Left upper ○ Left mid ○ Left lower

II. Size: [ ] cm (CC x TX x AP), [ ] ml Previous (if applicable): Size: [ ] cm (CC x TX x AP), [ ] ml

III. Composition:
- ○ (0 points) cystic/almost completely cystic
- ○ (0 points) spongiform: >50% small cystic spaces. DO NOT add points in other categories; skip to section VIII
- ○ (1 point) mixed cystic and solid
- ○ (2 points) solid/almost completely solid
- ○ (2 points) composition cannot be determined

IV. Echogenicity (assess solid component of mixed cystic and solid nodule):
- ○ (0 points) anechoic
- ○ (1 point) iso/hyperechoic
- ○ (2 points) hypoechoic
- ○ (3 points) very hypoechoic
- ○ (1 points) echogenicity cannot be determined

V. Shape:
- ○ (0 points) wider than tall or round
- ○ (3 points) taller than wide

VI. Margins:
- ○ (0 points) smooth
- ○ (0 points) ill-defined
- ○ (2 points) lobulated/irregular
- ○ (3 points) extrathyroidal extension
- ○ (0 points) margin cannot be determined

VII. Echogenic foci (choose all that apply):
- ○ (0 points) none
- ○ (0 points) large comet-tail artifacts
- ○ (1 points) macrocalcifications
- ○ (2 points) peripheral calcifications
- ○ (3 points) punctate echogenic foci

VIII. ACR TI-RADS total points: [tallied points from III-VII]

IX. ACR TI-RADS risk category:

- ○ TR1 (0 points) Benign - Risk of malignancy <2%
  No FNA or follow-up

- ○ TR2 (2 points) Not suspicious - Risk of malignancy <2%
  No FNA or follow-up

- ○ TR3 (3 points) Mildly suspicious - Risk of malignancy <5%
  - ○ <1.5cm, no FNA or follow up
  - ○ 1.5cm - 2.4cm, Follow up US at 1, 3, 5 years. Stop if stable; continue following if there is growth until no growth over 5 years.
  - ○ ≥ 2.5cm, FNA

- ○ TR4 (4-6 points) Moderately suspicious - Risk of malignancy 5-20%
  - ○ <1cm, no FNA or follow up
  - ○ 1.0cm - 1.4cm, Follow up US at 1, 2, 3, and 5 years. Stop if stable; continue following there is growth until no growth over 5 years.
  - ○ FNA if ≥ 1.5cm

- ○ TR5 (≥7 points) Highly suspicious - Risk of malignancy >20%
  - ○ <0.5cm, no FNA or follow up
  - ○ 0.5cm - 0.9 cm, annual US for 5 years. Stop if stable; continue following if there is growth until no growth over 5 years.
  - ○ FNA if ≥ 1cm

3. Lymph Nodes

A. Levels evaluated: ○ Levels 2-4 (lateral) and 6 (central) ○ Other [enter text]

B. Suspicious lymph nodes: ○ yes: location/short axis size (cm): [enter text] ○ no

4. Additional Findings

[enter text]

IMPRESSION

1. Thyroid:

A. Pick all that are appropriate:

- ○ Normal thyroid sonogram.
- ○ Small thyroid nodules.
- ○ Consistent with Hashimoto's (lymphocytic) thyroiditis.
- ○ Nodules show stability over at least 5 years.
- ○ No imaging follow up is recommended unless clinically indicated.

B. US guided FNA should be considered for the following nodule(s):
[Default None. If applicable, list which nodules should be considered for FNA]

C. Follow up US is recommended until stability over 5 years has been demonstrated for the following nodules:
[Default None or list nodules that are recommended for follow up]

The follow up intervals are chosen based on the most worrisome nodules. Choose follow up schedule:

- ○ TR5 0.5-1cm: US annually for 5 years
- ○ TR4 1-1.5cm: US at 1,2,3 and 5 years
- ○ TR3 1.5-2.5cm: US at 1,3 and 5 years

2. Adenopathy:

- ○ None
- ○ [enter text if abnormal nodes are present]

3. Additional Findings:

[Default: no other abnormality demonstrated OR enter other pathology demonstrated here]

Note that nodules less than 1.5cm on the US may not be individually reported unless judged to warrant surveillance.

Surveillance imaging is greatly facilitated by having the prior imaging file available.

For these recommendations, growth is defined as 50% increase in volume or 20% increase in each of two linear dimensions and a minimum increase of 2mm.

TR5	≥7 points	<0.5cm, no FNA or follow up 0.5cm - 0.9 cm, annual US for 5 years. Stop if stable; continue following if there is growth until no growth over 5 years. FNA if ≥ 1cm
TR4	4-6 points	<1cm, no FNA or follow up 1.0cm - 1.4cm, Follow up US at 1, 2, 3, and 5 years. Stop if stable; continue following there is growth until no growth over 5 years. FNA if ≥ 1.5cm
TR3	3 points	<1.5cm, no FNA or follow up 1.5cm - 2.4cm, Follow up US at 1, 3, 5 years. Stop if stable; continue following if there is growth until no growth over 5 years. ≥ 2.5cm, FNA
TR2	2 points	No FNA or follow-up
TR1	0 points	No FNA or follow-up

Tessler et al. (2017)

Explanatory Notes: Radiologist Reporting Template

ACR TI-RADS™

ACR TI-RADS™ categorizes ultrasound features as benign, mildly suspicious, moderately suspicious or highly suspicious for malignancy. Points are given for each ultrasound feature of a nodule, with more suspicious features being awarded additional points (Tessler, Middleton, & Grant, 2018; Tessler F. N., et al., 2017). Once a feature is selected from each of the five categories, the points are summed to determine the nodule's ACR TI-RADS™ level.

Diagnostic medical sonographers and radiologists are **strongly encouraged** to review the ACR Atlas for TIRADS (American College of Radiology, n.d.). It is particularly important to familiarize oneself with the following distinctions:

- Spongiform versus mixed cystic and solid nodules
- Ill-defined versus irregular margins
- Punctate echogenic foci versus comet tail artifacts

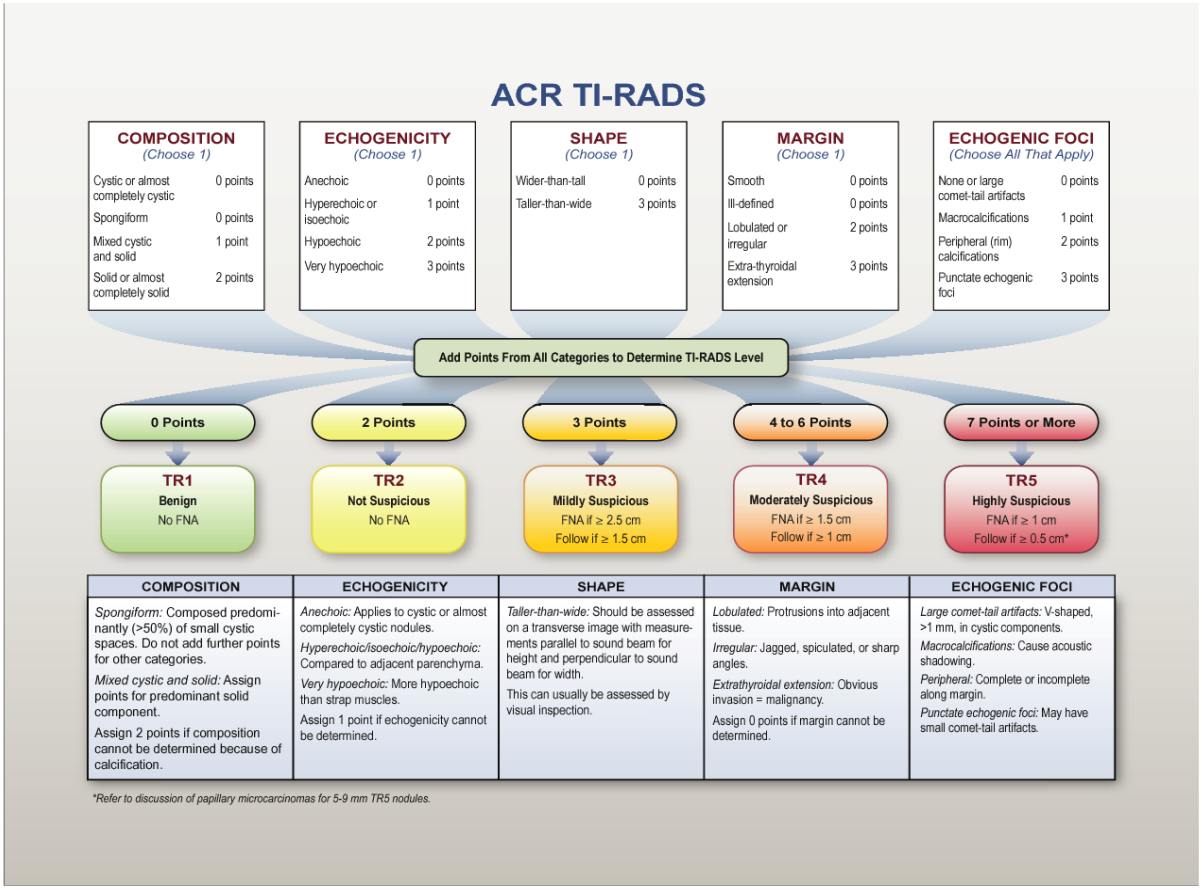


Figure 2 – Chart showing five categories on the basis of the ACR Thyroid Imaging, Reporting and Data System (TI-RADS™) lexicon, TR levels, and criteria for fine-needle aspiration or follow-up ultrasound.
ACR TI-RADS chart taken from Tessler et al. (2017) - Reprinted with permission

A preliminary version of most of the information required to complete the structured reporting template should be available to the reporting radiologist on the Diagnostic Medical Sonographer Worksheet. Depending on the set up of your PACS and EMR systems, you may prefer to have the diagnostic medical sonographer enter information directly into the structured reporting template rather than using the worksheet as an intermediate step. This optimizes efficiency, reduces transcription errors and frees the radiologist to focus on ensuring correct nodule descriptor choices and on the final impression.

Clinical Information

CLINICAL INFORMATION

1. Clinical History: [Default: follow up nodule(s)]
2. Personal history of thyroid malignancy: O Yes O No
3. Prior Biopsy: O Yes: _____ *(date)*
   O No

Clinical information should include relevant clinical history, including baseline or follow-up study. This may be imported from the health information system (HIS) and the default has been set to 'follow up nodule(s)'.

Any personal history of thyroid malignancy and prior biopsy should be noted. When listing prior biopsy, Biopsied nodule and pathology result should be documented, if known. Nodules in the patients with clinical risk factors for thyroid cancer (e.g. MEN2, radiation therapy in childhood, positive family history) should be noted, if known.[1]

Comparison study

COMPARISON STUDY

1. Comparison Study: O Oldest available prior US exam: _____ *(date)*
   O Other modality:_____(modality and date)
   O No prior imaging

Oldest available prior US exam

Since the time frame for change in size is not as relevant as the change in size itself, a comparison should be made to the oldest available prior ultrasound at your facility that measures all currently measured nodules. Use of prior ultrasounds from other facilities is also acceptable, but we recognize the difficulty in achieving this due to differing protocols, access and lack of familiarity with diagnostic medical sonographers at other facilities.

[1] consider biopsy of nodules below threshold size in these circumstances:

- Any nodule that is FDG avid on PET
- Most suspicious one or two nodules in the setting of adenopathy
- Any nodule in patients scheduled for parathyroid surgery is the discretion of ENT Surgeon
- Nodules adjacent to the recurrent laryngeal nerve or trachea (postero-medial)
- Nodules in patients with clinical risk factors for thyroid cancer (e.g. MEN2, radiation therapy in childhood, positive family history)

For more information please refer to the ACR TI-RADS 2nd Webinar:
https://www.youtube.com/watch?time_continue=2&v=Y9JU2i4IF-M

The oldest available ultrasound captures growth over the longest available assessment time frame, thereby allowing assessment for slow growth or slow change in characteristics to be identified. An individual may refer back to the most recent study, if desired.

Other Modality
At times, thyroid nodule(s) may be identified on another imaging modality, which leads to the ultrasound being performed. Therefore, another modality should be listed if it prompted the ultrasound. This is particularly important if a nodule was FDG avid on PET scan. All such nodules should have FNA, regardless of sonographic features or size. See footnote 1 on page 20.

Technical note

TECHNICAL NOTE

1. Technical Quality: ○ Satisfactory ○ Limited due to: [enter text]

Overall image quality is determined by the radiologist's review of images, along with any comments from the diagnostic medical sonographer regarding difficulty of the examination. Typically, ultrasounds are satisfactory in technical quality, however, if the patient cannot cooperate with the scan, the neck is very thick and short, and/or the thyroid extends into the retrosternal region, it may be less than satisfactory.

Findings

Thyroid Gland

FINDINGS

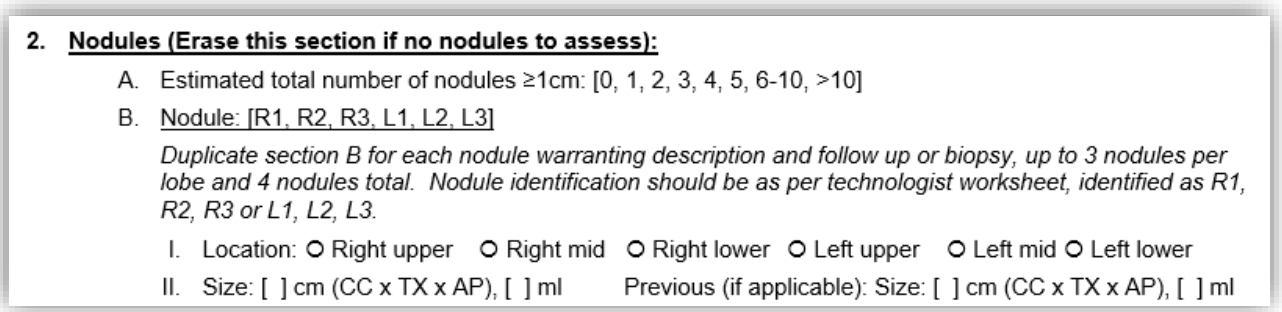
1. **Thyroid Gland:**
   - A. Right lobe _____cm (CC x TX x AP) Previous _____cm (CC x TX x AP)
   - B. Left lobe _____cm (CC x TX x AP) Previous _____cm (CC x TX x AP)
   - C. Doppler Flow Whole Gland: ○ normal ○ increased ○ decreased
   - D. Thyroid Echotexture:
     - ○ Parenchymal echogenicity is uniform
     - ○ Subtle lobulation of outline and parenchymal heterogeneity
     - ○ Parenchymal heterogeneity with numerous small hypoechoic nodules, consistent with Hashimoto's (lymphocytic) thyroiditis

Right and left lobe size will be measured by the diagnostic medical sonographer. The orientations of dimensions are listed as craniocaudal x transverse x anterior-posterior. All measurements should be in centimeters. The isthmus does not need to be measured separately.

Doppler Flow Whole Gland
The committee recognizes that this is a subjective assessment but may be helpful in identifying active thyroiditis or atrophic gland.

Thyroid Echotexture
The pick list allows for description of overall gland appearance.

Nodules



2. **Nodules (Erase this section if no nodules to assess):**
   - A. Estimated total number of nodules ≥1cm: [0, 1, 2, 3, 4, 5, 6-10, >10]
   - B. Nodule: [R1, R2, R3, L1, L2, L3]

     Duplicate section B for each nodule warranting description and follow up or biopsy, up to 3 nodules per lobe and 4 nodules total. Nodule identification should be as per technologist worksheet, identified as R1, R2, R3 or L1, L2, L3.

     I. Location: ○ Right upper ○ Right mid ○ Right lower ○ Left upper ○ Left mid ○ Left lower

     II. Size: [ ] cm (CC x TX x AP), [ ] ml Previous (if applicable): Size: [ ] cm (CC x TX x AP), [ ] ml

Location and Size
A nodule warrants description if it requires follow up or biopsy, as per ACR TI-RADS™ criteria (see also footnote 1 on page 20) OR if it was identified clinically or on another imaging modality and prompted the ultrasound examination. Reporting of the nodule location and size is critical for efficient identification and reporting of nodules for biopsies or follow-up examinations. Each nodule warranting description should be reported separately with a section B for each nodule. Consider creating a sub macro of the Section B content in your local voice recognition system. Nodules should be labelled by R for Right and L for Left and #1-3 for numbering, for example, R1, R2, R3, L1, L2, and L3. Up to three nodules can be assessed on each side but only a total of four nodules should be assessed and measured. A nodule that was identified clinically or by another imaging modality and that prompted the ultrasound examination should always be measured. If there are more than 4 nodules that meet ACR TI-RADS™ criteria for reporting then report the most worrisome 4 nodules.

Isthmic nodules can be designated as right-sided or left-sided nodules depending in which side of the isthmus they are on. If it is exactly midline, then choose the side with fewer nodules being described.

Volume calculation in addition to linear dimensions is preferred since linear greatest dimension will determine if a nodule requires follow up or biopsy whereas true growth is best determined by volume comparison. The volume calculation can be obtained automatically from the ultrasound machine if the diagnostic medical sonographer plans to obtain the volume while acquiring images. Previous images may not indicate volume, however current or future imaging should include volume for comparison going forward.

Growth is defined as 50% increase in volume or 20% increase in each of two linear dimensions.

Composition

III. Composition:
- ○ (0 points) cystic/almost completely cystic
- ○ (0 points) spongiform: >50% small cystic spaces. DO NOT add points in other categories; skip to section VIII
- ○ (1 point) mixed cystic and solid
- ○ (2 points) solid/almost completely solid
- ○ (2 points) composition cannot be determined

If a nodule is definitely spongiform then DO NOT add points in other categories.
If a Radiologist is not certain whether a nodule is spongiform or mixed cystic and solid, assign as mixed cystic and solid.

If the rim is calcified or if much of the nodule is calcified, then use the "cannot be determined" category for composition

Echogenicity

IV. Echogenicity (assess solid component of mixed cystic and solid nodule):
- ○ (0 points) anechoic
- ○ (1 point) iso/hyperechoic
- ○ (2 points) hypoechoic
- ○ (3 points) very hypoechoic
- ○ (1 points) echogenicity cannot be determined

If the rim is calcified, then echogenicity of the underlying tissue may not be discernible. In this case, use the "echogenicity cannot be determined" category.

Shape

V. Shape:
- ○ (0 points) wider than tall or round
- ○ (3 points) taller than wide

Round shape gets 0 points.

Margins

VI. Margins:
- O (0 points) smooth
- O (0 points) ill-defined
- O (2 points) lobulated/irregular
- O (3 points) extra-thyroidal extension
- O (0 points) margin cannot be determined

Typically, the margin should be discernible. Calcification or difficult study may preclude accurate assessment of margins. "Lobulated or irregular margin" refers to a spiculated or jagged edge, with or without protrusions into the surrounding parenchyma. It may be difficult to recognize this finding if the nodule is ill defined, is embedded in a heterogeneous gland, or abuts multiple other nodules. If the margin cannot be determined for any reason, zero points should be assigned (American College of Radiology, n.d.).

Echogenic foci

VII. Echogenic foci (choose all that apply):
- O (0 points) none
- O (0 points) large comet-tail artifacts
- O (1 points) macrocalcifications
- O (2 points) peripheral calcifications
- O (3 points) punctate echogenic foci

Select all types of calcification that are present and add points together.

Composition, Echogenicity, Shape, Margins and Echogenic Foci

To accurately apply the ACR Criteria for composition, echogenicity, shape, margins and echogenic foci, review of the ACR Atlas for TIRADS (American College of Radiology, n.d.) is **strongly recommended.**

It is particularly important to familiarize oneself with the following distinctions:

- Spongiform versus mixed cystic and solid nodules
- Ill-defined versus irregular margins
- Punctate echogenic foci versus comet tail artifacts

It is also important to note the following assumptions, as described on slide 4 of the Atlas: 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". The Ontario Health (Cancer Care Ontario) template offers a "cannot be determined" option with the appropriate point allotments, as per these assumptions.

ACR TI-RADS™ risk category

IX. ACR TI-RADS risk category:

- ○ TR1 (0 points) Benign - Risk of malignancy <2%
  No FNA or follow-up
- ○ TR2 (2 points) Not suspicious - Risk of malignancy <2%
  No FNA or follow-up
- ○ TR3 (3 points) Mildly suspicious - Risk of malignancy <5%
  - ○ <1.5cm, no FNA or follow up
  - ○ 1.5cm - 2.4cm, Follow up US at 1, 3, 5 years. Stop if stable; continue following if there is growth until no growth over 5 years.
  - ○ ≥ 2.5cm, FNA
- ○ TR4 (4-6 points) Moderately suspicious - Risk of malignancy 5-20%
  - ○ <1cm, no FNA or follow up
  - ○ 1.0cm - 1.4cm, Follow up US at 1, 2, 3, and 5 years. Stop if stable; continue following there is growth until no growth over 5 years.
  - ○ FNA if ≥ 1.5cm
- ○ TR5 (≥7 points) Highly suspicious - Risk of malignancy >20%
  - ○ <0.5cm, no FNA or follow up
  - ○ 0.5cm - 0.9 cm, annual US for 5 years. Stop if stable; continue following if there is growth until no growth over 5 years.
  - ○ FNA if ≥ 1cm

The sum of points determines the nodule's ACR TI-RADS™ level: T1 (benign), T2 (not suspicious), T3 (mildly suspicious), T4 (moderately suspicious), or T5 (highly suspicious) for malignancy.

Lymph Nodes

3. **Lymph Nodes**
   A. Levels evaluated: ○ Levels 2-4 (lateral) and 6 (central) ○ Other [enter text]
   B. Suspicious lymph nodes: ○ yes: location/short axis size (cm): [enter text] ○ no

Levels evaluated

The Clinical Template Development Working Group agrees with the American Thyroid Association (ATA) recommendations that Levels 2-4 (lateral compartment) and 6 (central compartment) should be assessed on every patient.

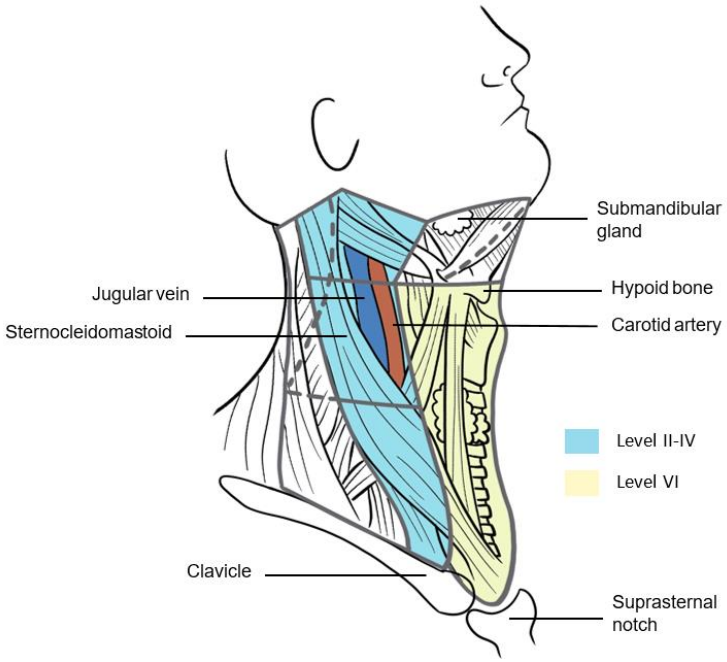
If a more limited scan is performed, a reason should be provided.

Levels 2-4 (lateral compartment) are bounded by: (Haugen, et al., 2016)

- Carotid arteries medially
- Posterior border sternomastoid muscle laterally
- Skull base and posterior edge of submandibular gland superiorly
- Clavicle inferiorly
- Submandibular nodes (level 1) are NOT included in this compartment

Level 6 (central compartment) is bounded by: (Haugen, et al., 2016)

- Carotid arteries laterally
- Hyoid bone superiorly
- Suprasternal notch inferiorly



Suspicious lymph nodes

The Clinical Template Development Working Group recognize the importance of size criteria and characteristics of lymph nodes for clinical relevance, surgical and treatment options.

The Working Group recognizes that young patients will have more lymph nodes and that these are often larger than in older patients and also that they are most often benign. Lymph nodes > 0.8 cm short axis dimension should be documented. Ultrasound guided fine needle aspiration (FNA) biopsy of sonographically suspicious lymph nodes ≥ 1.0 cm in the short axis diameter should be performed to confirm malignancy if this would change management.

Sonographic features suggestive of abnormal lymph nodes include (Haugen et al., 2016; Leenhardt et al., 2013):

- Hilar compression/displacement/replacement
- A rounded rather than oval shape
- Microcalcifications
- Cystic or necrotic
- Peripheral vascularity
- Hyperechoic tissue looking like thyroid.

Additional Findings

4. **Additional Findings**
   [enter text]

This section may be used to enter any additional comments regarding the thyroid or other visualized structures. For example, parathyroid enlargement and carotid stenosis can be noted here.

Impression

IMPRESSION

1. **Thyroid:**
   A. Pick all that are appropriate:
      - ○ Normal thyroid sonogram.
      - ○ Small thyroid nodules.
      - ○ Consistent with Hashimoto's (lymphocytic) thyroiditis.
      - ○ Nodules show stability over at least 5 years.
      - ○ No imaging follow up is recommended unless clinically indicated.

   B. US guided FNA should be considered for the following nodule(s):
      [Default None. If applicable, list which nodules should be considered for FNA]

   C. Follow up US is recommended until stability over 5 years has been demonstrated for the following nodules:
      [Default None or list nodules that are recommended for follow up]

   The follow up intervals are chosen based on the most worrisome nodules. Choose follow up schedule:
      - ○ TR5 0.5-1cm: US annually for 5 years
      - ○ TR4 1-1.5cm: US at 1,2,3 and 5 years
      - ○ TR3 1.5-2.5cm: US at 1,3 and 5 years

2. **Adenopathy:**
      - ○ None
      - ○ [enter text if abnormal nodes are present]

3. **Additional Findings:**
   [Default: no other abnormality demonstrated OR enter other pathology demonstrated here]

Radiologists may use their discretion for alternate wording in the case of a TR4 or TR5 nodule that is below the threshold for requiring follow up so as to diminish any alarm that might be caused by saying that a high risk nodule does not require follow up. If a biopsy is recommended, the nodule should be identified in the same way that it is on the Diagnostic Medical Sonographer Worksheet and in the body of the report, e.g. R2. For more information, refer to Tappouni et al. (2019).

There is an option to enter free text if required, either as an alternative to the pick list options or in addition to them.

Note should be made of certain specific clinical circumstances when biopsy of a nodule that is below threshold for biopsy may be warranted:

- Any nodule that is FDG avid on PET
- Most suspicious one or two nodules in the setting of adenopathy
- Any nodule in patients scheduled for parathyroid surgery at the discretion of the Surgeon
- Nodules adjacent to the recurrent laryngeal nerve or trachea (postero-medial)
- Nodules in patients with clinical risk factors for thyroid cancer (e.g. MEN2, radiation therapy in childhood, positive family history)

For more information please refer to the ACR TI-RADS™ 2nd Webinar:
https://www.youtube.com/watch?time_continue=2&v=Y9JU2i4IF-M

ACR TI-RADS™ *Chart* (points, FNA criteria and follow up recommendations)

This chart is recommended to be at the end of every report for reference. This has come forward through discussion and consensus of the Clinical Template Development Working Group, as clinical practice and reporting is migrating from ATA to ACR TI-RADS™.

Table 1: Chart - TR Risk Category, FNA criteria and Follow-up. Extracted from Thyroid Ultrasound Reporting Template

TR5	≥7 points	<0.5cm, no FNA or follow up 0.5cm - 0.9 cm, annual US for 5 years. Stop if stable; continue following if there is growth until no growth over 5 years. FNA if ≥ 1cm
TR4	4-6 points	<1cm, no FNA or follow up 1.0cm - 1.4cm, Follow up US at 1, 2, 3, 5 years. Stop if stable; continue following there is growth until no growth over 5 years. FNA if ≥ 1.5cm
TR3	3 points	<1.5cm, no FNA or follow up 1.5cm - 2.4cm, Follow up US at 1, 3, 5 years. Stop if stable; continue following if there growth until no growth over 5 years. ≥ 2.5cm, FNA
TR2	2 points	No FNA or follow-up
TR1	0 points	No FNA or follow-up

Tessler et al. (2017)

Additional Information

Follow up
All follow up ultrasound scans are recommended to be completed **according to the** ACR TI-RADS™ guidelines and to stop at 5 years if there is no further growth.

Growth
Growth is defined as 50% increase in volume or 20% increase in each of two linear dimensions compared to oldest previous available ultrasound.

If there is growth or an upgrade in the nodule's TR category, the follow up schedule will be restarted. A decrease in size or a downgrade of the nodule's TR category will not warrant a restart of the follow up schedule.

(Post) Biopsy Addendum Template

(Post) Biopsy Addendum Template

The Clinical Template Development Working Group created a post Biopsy Addendum Template for follow up recommendations after pathology results from an FNA are received.

These recommendations align with the updated 2019 Thyroid Cancer Diagnosis Pathway Map regarding next steps in patient management based on biopsy results and nodule TR category.

A comparison document of Ontario Health (Cancer Care Ontario)'s previous Thyroid Pathway (2017), ATA (2015), ACR TI-RADS™ (2017) , and Thyroid US Working Group feedback has been collated to help understand adjustments, refinements or no changes made, in some instances (Appendix A). Ontario Health (Cancer Care Ontario)'s Thyroid Cancer Diagnosis Pathway Map (2019) has been updated to reflect the Clinical Template Development Working Group's expert consensus for thyroid nodule management in Ontario and can be found on Ontario Health (Cancer Care Ontario)'s website here: https://www.cancercareontario.ca/en/pathway-maps/thyroid-cancer

(Post) Biopsy Addendum Template

Note: this template format is for content only. Format will be altered to fit a voice recognition system

PATHOLOGY

[Dictate an abbreviated version of the pathology report]

Pathology concordance:

- ○ Pathology is concordant with sonographic findings.
- ○ Pathology is NOT concordant with sonographic findings.
- ○ Optional free text: [ ]

RECOMMENDED FOLLOW UP AFTER FNA

[based on Ontario Health (Cancer Care Ontario)'s Thyroid Cancer Diagnosis Pathway Map (2019) (https://www.cancercareontario.ca/en/pathway-maps/thyroid-cancer)]

- ○ Malignant, suspicious for malignancy, follicular neoplasm, or suspicious for follicular neoplasm:
  Surgical consultation.
  Consider ultrasound (US) Neck and US guided FNA of Suspicious Lymph Nodes

- ○ Atypia of undetermined significance (AUS) or follicular lesion of undetermined significance (FLUS):
  Repeat FNA at 3-12 months OR consider second opinion (for cytology)
  If repeat FNA is AUS/FLUS: Consider specialist or surgical consultation.

- ○ Non-diagnostic or unsatisfactory sample:
  Repeat FNA in 3-12 months.
  If repeat FNA is non-diagnostic or unsatisfactory: Consider specialist or surgical consult

- ○ Benign TR5 nodule:
  Repeat FNA at 3-12 months.
  If benign at repeat FNA:
  Consider annual ultrasound for 5 years; stop if stable. If nodule shows growth, then consider repeat FNA or surgical consultation for diagnostic resection.

- ○ Benign TR4 nodule:
  Repeat US at 12-24 months for 5 years; stop if stable. If nodule shows growth or TR upgrade, repeat FNA.
  If benign at repeat FNA, no further follow up is required.

- ○ Benign TR3 nodule:
  No follow up is required.

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Appendix A: Cross Comparison of the Ontario Health (Cancer Care Ontario) Thyroid Cancer Diagnosis Pathway Map (2017), American Thyroid Association (2015) Guidelines, ACR Thyroid Imaging, Reporting and Data System (TI-RADS) (2017) Guidelines and consensus of the Clinical Thyroid Ultrasound Template Development Working Group

	CCO Differentiated Thyroid Cancer Diagnosis Pathway Map (2017)	ATA (Original Paper, 2015)	ACR TI-RADS (2017)	Clinical Template Development Working Group (Thyroid US)
Cross Comparison		**Benign** Purely cystic nodules (no solid component)	**TR1 – Benign:** Includes cyst and spongiform nodule	**TR1 – Benign:** Includes cyst and spongiform nodule
	Very Low suspicion Spongiform or partially cystic nodules **without** any of the sonographic features described in low, intermediate, or high suspicion patterns	**Very low suspicion** Spongiform or partially cystic nodules **without** any of the sonographic features described in low, intermediate, or high suspicion patterns	**TR2 - Not suspicious:** Includes mixed cystic and solid as long as solid components are hyperechoic or isoechoic	**TR2 - Not suspicious:** Includes mixed cystic and solid as long as solid components are hyperechoic or isoechoic
	Low suspicion Isoechoic or hyperechoic solid nodule, or partially cystic nodule with eccentric uniformly solid areas **without** microcalcifications, irregular margin or extrathyroidal extension, or taller than wide shape	**Low suspicion** Isoechoic or hyperechoic solid nodule, or partially cystic nodule with eccentric solid areas, **without** microcalcification, irregular margin or extrathyroidal extension, or taller than wide shape.	**TR3 - Mildly Suspicious**: Includes mixed cystic and solid with hyperechoic solid components or solid/almost completely solid with hyperechoic or isoechoic solid components	**TR3 - Mildly Suspicious**: Includes mixed cystic and solid with hyporechoic solid components or solid/almost completely solid with hyperechoic or isoechoic solid components
	Intermediate suspicion Hypoechoic solid nodule with a smooth regular margin, but **without** microcalcifications, extrathyroidal extension, or taller than wide shape	**Intermediate suspicion** Hypoechoic solid nodule with smooth margins **without** microcalcifications, extrathyroidal extension, or taller than wide shape	**TR4 - Moderately suspicious:** Includes solid or almost completely solid nodule with hypoechoic or very hypoechoic solid component. Could have macro-calcifications or peripheral calcifications. If solid/almost completely solid and hyperechoic or isoechoic, could have one worrisome feature such as taller than wide or extrathyroidal extension or punctate echogenic focus and still fit in TR4. Also could be solid/almost completely solid, hypoechoic and lobulated or irregular border with no calcifications and still fit in T4.	**TR4 - Moderately suspicious:** Includes solid or almost completely solid nodule with hypoechoic or very hypoechoic solid component. Could have macro-calcifications or peripheral calcifications. If solid/almost completely solid and hyperechoic or isoechoic, could have one worrisome feature such as taller than wide or extrathyroidal extension or punctate echogenic focus and still fit in TR4. Also could be solid/almost completely solid, hypoechoic and lobulated or irregular border with no calcifications and still fit in T4.
	High suspicion Solid hypoechoic nodule or a solid hypoechoic component in a partially cystic nodule **with** one or more of the following features: irregular margins (specifically defined as infiltrative, microlobulated, or spiculated), microcalcifications, taller than wide shape, disrupted rim calcifications with small extrusive, hypoechoic soft tissue component, or evidence of extrathyroidal extension	**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 extrathyroidal extension	**TR5 - Highly suspicious:** Any two worrisome features such as very hypoechoic, taller than wide, extrathyroidal extension, punctate echogenic foci	**TR5 - Highly suspicious:** Any two worrisome features such as very hypoechoic, taller than wide, extrathyroidal extension, punctate echogenic foci.

Cross Comparison	CCO Differentiated Thyroid Cancer Diagnosis Pathway Map (2017)	ATA (Original Paper, 2015)	ACR TI-RADS (2017)	Clinical Template Development Working Group (Thyroid US)
Size	Nodule size in three dimensions (max dimension)	Nodule size in three dimensions (max dimension)	Nodule size in three dimensions (max dimension)	Nodule size in three dimensions (max dimension)
Composition	High Suspicion (malignancy risk >70-90%): Solid hypoechoic nodule or a solid hypoechoic component in a partially cystic nodule with one or more of the following features: irregular margins (specifically defined as infiltrative, microlobulated, or spiculated), microcalcifications, taller than wide shape, disrupted rim calcifications with small extrusive, hypoechoic soft tissue component, or evidence of extrathyroidal extension Intermediate Suspicion (malignancy risk 10-20%): Hypoechoic solid nodule with a smooth regular margin, but without microcalcifications, extrathyroidal extension, or taller than wide shape Low Suspicion (malignancy risk 5-10%): Isoechoic or hyperechoic solid nodule, or partially cystic nodule with eccentric uniformly solid areas without microcalcifications, irregular margin or extrathyroidal extension, or taller than wide shape Very Low Suspicion (malignancy risk ≤3%): Spongiform or partially cystic nodules without any of the sonographic features described in low, intermediate, or high suspicion patterns	Cyst Completely calcified Spongiform Partially cystic Solid	Cystic or almost completely cystic (0 points) Spongiform (0 points) Mixed cystic and solid (1 points) Solid or almost completely solid (2 points)	Cystic or almost completely cystic (0 points) Spongiform (0 points) Mixed cystic and solid (1 points) Solid or almost completely solid (2 points)
Echogenicity of solid component		Isoechoic or hyperechoic Hypoechoic	Anechoic (0 points) Isoechoic or hyperechoic (1 point) Hypoechoic (2 points) Very hypoechoic (3 points)	Anechoic (0 points) Isoechoic or hyperechoic (1 point) Hypoechoic (2 points) Very hypoechoic (3 points)
Shape		Wider-than-tall Taller-than-wide	Wider-than-tall (0 points) Taller-than-wide (3 points)	Wider-than-tall (0 points) Taller-than-wide (3 points)
Margin		Smooth Irregular (infiltrative, microlobulated, spiculated) Extrathyroidal extension	Smooth (0 points) Ill-defined (0 points) Lobulated or irregular (jagged, spiculated or sharp angles) (2 points) Extrathyroidal extension (3 points)	Smooth (0 points) Ill-defined (0 points) Lobulated or irregular (jagged, spiculated or sharp angles) (2 points) Extra-thyroidal extension (3 points)
Echogenic Foci/ Calcifications		None Macrocalcifications Microcalcifications Interrupted peripheral calcifications with soft tissue extrusion	None or large comet-tail artifacts (0 points) Macrocalcifications (1 point) Peripheral (rim) calcifications (2 points) Punctate echogenic foci (3 points)	None or large comet-tail artifacts (0 points) Macrocalcifications (1 point) Peripheral (rim) calcifications (2 points) Punctate echogenic foci (3 points)
Lymph Nodes	Assessment of the cervical lymph nodes	Presence or absence of any suspicious cervical lymph nodes. Sonographic evaluation of the anterior cervical lymph node compartments (central and lateral) should be performed whenever thyroid nodules are detected.	Presence or absence of any suspicious cervical lymph nodes	Presence or absence of any suspicious cervical lymph nodes
Recommendations	Synoptic reporting of US results are strongly recommended, and the radiologist should provide a recommendation for risk category [Consensus].		Evaluation of cervical lymph nodes is a vital part of every thyroid sonographic examination. US guided FNA of sonographically suspicious lymph nodes	Lymph nodes at levels 2-4 (lateral compartment) and 6 (central compartment) should be assessed on every patient. Lymph nodes > 8mm in the short axis dimension should be documented.

				Ultrasound guided fine needle aspiration (FNA) biopsy of sonographically suspicious lymph nodes ≥ 10mm in the short axis diameter should be performed to confirm malignancy if this would change management.
Assessment Criteria	Ultrasound report should include: nodule size, nodule location, description of nodule's sonographic features (including composition (solid, cystic proportion, or spongiform), echogenicity, margins, presence and type of calcifications, and shape if taller than wide, and adenopathy), and an assessment of the cervical lymph nodes	US guided FNA of sonographically suspicious lymph nodes > 8-10 mm short axis should be performed to confirm malignancy if this would change management.	Location not specified Size not specified Shape: globular (round) Calcification: microcalcifications Composition: partly cystic or heterogeneous Vascularity: peripheral Echogenicity: loss of fatty hilum	Location: central (6) vs. lateral (2-4) Size: Lymph nodes > 8 mm short axis dimension should be documented. Sonographic features suggestive of abnormal lymph nodes include: • Hilar compression/ displacement/ replacement • A rounded rather than oval shape • Microcalcifications • Cystic or necrotic • Peripheral vascularity • Hyperechoic tissue looking like thyroid.

	CCO Differentiated Thyroid Cancer Diagnosis Pathway Map (2017))	**ATA (Original Paper, 2015)**	**ACR TI-RADS (2017)**	**Clinical Template Development Working Group (Thyroid US)**
Risk of malignancy	-	Benign: < 1%	TR1 Benign: <2%	TR1 Benign: <2%
	Very Low Suspicion:≤ 3%	Very low suspicion: < 3%	TR2 Not suspicious: <2%	TR2 Not suspicious: <2%
	Low Suspicion: 5-10%	Low suspicion: 5-10%	TR3 Mildly Suspicious: <5%	TR3 Mildly Suspicious: <5%
	Intermediate Suspicion:10-20%	Intermediate suspicion: 10-20%	TR4 Moderately Suspicious: 5-20%	TR4 Moderately Suspicious: 5-20%
	High Suspicion: >70-90%	High suspicion: >70-90%	TR5 Highly Suspicious: >20%	TR5 Highly Suspicious: >20%

	CCO Differentiated Thyroid Cancer Diagnosis Pathway Map (2017)	**ATA (Original Paper, 2015)**	**ACR TI-RADS (2017)**	**Clinical Template Development Working Group (Thyroid US)**
Minimum size for FNA		Benign: no biopsy	TR1 Benign: No FNA or follow-up	TR1 Benign: No FNA or follow-up
	Very low suspicion and any suspicion ≥ 4cm	Very low suspicion: Consider FNA at ≥ 2cm. *Observation without FNA is also a reasonable option*	TR2 Not suspicious: No FNA or follow-up	TR2 Not suspicious: No FNA or follow-up
	Low suspicion ≥ 2cm	Low suspicion: Recommend FNA at ≥ 1.5cm	TR3 Mildly Suspicious: FNA if ≥ 2.5cm	TR3 Mildly Suspicious: FNA if ≥ 2.5cm
	Intermediate suspicion ≥ 2cm	Intermediate suspicion: Recommend FNA at ≥ 1cm	TR4 Moderately Suspicious: FNA ≥ 1.5 cm	TR4 Moderately Suspicious: FNA ≥ 1.5 cm
	High suspicion & ≥ 1cm	High suspicion: Recommend FNA at ≥ 1cm	TR5 Highly Suspicious: FNA if ≥ 1cm	TR5 Highly Suspicious: FNA if ≥ 1cm

	CCO Differentiated Thyroid Cancer Diagnosis Pathway Map (2017)	ATA (Original Paper, 2015)	ACR TI-RADS (2017)	Clinical Template Development Working Group (Thyroid US)
Repeat/ Follow Up after FNAs	• Benign (very low to intermediate suspicion ultrasound pattern) ○ Repeat US in 1-2 years. If results show growth → repeat FNA OR surgical consult and consider diagnostic resection. If results show no growth → follow up as appropriate with specialist or PCP. ○ If benign result at repeat FNA – follow up as appropriate with specialist or PCP	• Very low suspicion US pattern ○ utility of surveillance US and assessment of nodule growth as an indicator for repeat FNA to detect a missed malignancy is limited. If US is repeated, it should be done at ≥ 24 months. • Low to intermediate suspicion US pattern ○ repeat US at 12-24 months. If sonographic evidence of growth, or new suspicious features, repeat FNA or observation continued with repeat US, with repeat FNA if continued growth	*No follow up recommendations given based on biopsy results.*	*Information combined from "minimum size for FNA (pg 3)" and "follow up if too small for biopsy (pg 4)" tables* • TR3 ○ **<1.5cm**, no FNA or follow up ○ **1.5cm - 2.4cm,** Follow up US at 1, 3, 5 years. Stop if stable; continue following if there is growth until no growth over 5 years. ○ **≥ 2.5cm**, FNA ▪ If FNA is benign, follow up is not required • TR4 ○ **<1cm,** no FNA or follow up ○ **1.0cm - 1.4cm**, annual US for 5 years. Follow up US at 1, 2, 3, 5 years; continue following there is growth until no growth over 5 years. ○ **FNA if ≥ 1.5cm** ▪ If FNA is benign, repeat US every 12-24 months for 5 years; stop if stable. If nodule shows growth or TR upgrade, repeat FNA. ▪ If benign at repeat FNA, no further follow up is required
	• Benign (high suspicion US pattern or high clinical suspicion) ○ Repeat US guided FNA in 3-12 months. ○ If benign result at repeat FNA – optional surgical consult and consider diagnostic resection	• High suspicion US pattern ○ repeat US and US guided FNA within 12 months		• TR5 ○ **<0.5cm,** no FNA or follow up ○ **0.5cm - 0.9 cm**, annual US for 5 years. Stop if stable; continue following if there is growth until no growth over 5 years. ○ **FNA if ≥ 1cm** ▪ Repeat FNA at 3-12 months. ▪ If benign at repeat FNA: • Consider annual ultrasound for 5 years; stop if stable. If nodule shows growth, then consider repeat FNA or surgical consultation for diagnostic resection
	• Non-diagnostic or unsatisfactory ○ repeat FNA (at least 3 months post initial biopsy) → optional surgical consult and consider diagnostic resection	• Non-diagnostic or unsatisfactory ○ repeat FNA (at least 3 months post initial biopsy. Optional surgical consult and consider diagnostic resection		• Non-diagnostic or unsatisfactory ○ repeat FNA in 3-12 months ○ If repeat FNA is non-diagnostic or unsatisfactory: ▪ Consider specialist or surgical consult

	• Atypia of undetermined significance (AUS)/ Follicular lesion of undetermined significance (FLUS) ○ Consider second opinion (optional) ○ Repeat FNA (at least 3 months post initial biopsy). Optional – consider surgical consult and consider diagnostic resection	• Atypia of undetermined significance (AUS)/ Follicular lesion of undetermined significance (FLUS) ○ Consider second opinion (optional) ○ Repeat FNA (at least 3 months post initial biopsy). Optional – consider surgical consult and consider diagnostic resection		• Atypia of undetermined significance (AUS)/ Follicular lesion of undetermined significance (FLUS) ○ Repeat FNA at 3-12 months OR consider second opinion (on cytology) ○ If repeat FNA is AUS/FLUS: ▪ Consider specialist or surgical consult.
	• Follicular neoplasm (FN)/ Suspicious for a follicular neoplasm (SFN) ○ Repeat FNA (at least 3 months post initial biopsy). ○ Consider second opinion ○ Consider surgical consult and diagnostic resection ○ Consider US Neck and US guided FNA of Suspicious Lymph Nodes			• Follicular neoplasm (FN)/ Suspicious for a follicular neoplasm (SFN) ○ Surgical consult ○ Consider US Neck and US guided FNA of Suspicious Lymph Nodes
	• Suspicious for Malignancy (SFM) and Malignant ○ Surgical consult ○ Consider US Neck and US guided FNA of Suspicious Lymph Nodes	• Suspicious for Malignancy (SFM) and Malignant ○ Surgical consult ○ (optional) US neck → US guided FNA Suspicious Lymph Node		• Suspicious for Malignancy (SFM) and Malignant ○ Surgical consult ○ Consider US Neck and US guided FNA of Suspicious Lymph Nodes
Other		• Follow up of nodules with two benign FNA cytology results ○ if a nodule has undergone repeat US guided FNA with a second benign cytology result, US surveillance for this nodule for continued risk of malignancy is no longer indicated.		

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