

Table S1 The reference standard for US lexicon of thyroid nodules in this study

Ultrasound features	ACR-TIRADS	C-TIRADS
Composition		
Solid	Composed entirely or nearly entirely of soft tissue, with only a few tiny cystic spaces	Composed entirely of soft tissue, without any cystic spaces
Predominately solid	Composed of soft tissue components occupying 50% or more of the volume of the nodule	Composed of soft tissue components occupying 50% or more of the volume of the nodule
Predominately cystic	Composed of soft tissue components occupying less than 50% of the volume of the nodule	Composed of soft tissue components occupying less than 50% of the volume of the nodule
Cystic	Entirely fluid filled	Completely or almost completely cystic
Spongiform	Composed predominantly (>50%) of small cystic spaces	Composed of a large number of small cystic spaces without any solid tissue
Echogenicity		
Hyperechoic	Increased echogenicity relative to thyroid tissue	Increased echogenicity relative to thyroid tissue
Isoechoic	Similar echogenicity relative to thyroid tissue	Similar echogenicity relative to thyroid tissue
Hypoechoic	Decreased echogenicity relative to thyroid tissue	Decreased echogenicity relative to thyroid tissue
Very hypoechoic	Decreased echogenicity relative to adjacent neck musculature	Decreased echogenicity relative to adjacent neck musculature
Anechoic	Applies to cystic or almost completely cystic nodules	Applies to cystic nodules
Shape/orientation		
Taller-than-wide/vertical	Evaluation: visual (suggest) or measurement section: axial plane	Evaluation: measurement (suggest) or visual section: transverse or longitudinal
Wide-than-taller/Horizontal		
Margin		
Smooth	Uninterrupted, well-defined, curvilinear edge typically forming a spherical or elliptical shape	The edge is a well-defined, smooth, and complete curve
Lobulated or irregular	A spiculate or jagged edge, with or without protrusions into the surrounding parenchyma	The outer border of the nodule is burred, angulated, or microlobulated
Ill-defined	Border of the nodule is difficult to distinguish from thyroid parenchyma; the nodule lacks irregular or lobulated margins	Border of the nodule is difficult to distinguish from thyroid parenchyma
ETE	Extensive ETE: frank invasion of adjacent soft tissue and/or vascular structures. Minimal ETE: border abutment, contour bulging, or loss of the echogenic thyroid border	The nodules involve the thyroid capsule, causing the destruction of the thyroid capsule, and when severely invading the adjacent soft tissues and/or vascular structures
Echogenic foci		
Punctate echogenic foci/ microcalcification	"Dot-like" foci having no posterior acoustic posterior artifacts	Punctate echogenic foci less than 1 mm, rear no sound shadow, can also appear sound shadow
Macrocalcification	Calcifications become large enough to result in posterior acoustic shadowing	Strong echo greater than 1 mm, usually accompanied by acoustic shadow
Peripheral calcifications	These calcifications occupy the periphery of the nodule. The calcification may not be completely continuous but generally involves the majority of the margin	Calcification is located at the periphery of the nodules, and might appear as a continuous or discontinuous ring or arc involving more than a third of the margin
Comet-tail artifacts	The deeper echoes become attenuated and are displayed as decreased width, resulting in a triangular shape	Dotted or short lines of strong echoes followed by gradually fading multiple parallel strong echoes

The US lexicons were used to determine risk stratification systems, but not all were listed in this table. US, ultrasound; ACR, American College of Radiology; TIRADS, Thyroid Imaging Reporting and Data System; C, Chinese; ETE, extrathyroidal extension.

Table S2 Risk stratification systems' classification scheme, including nodule sizes that dictate FNA recommendations

Classification scheme	ACR-TIRADS	AI-TIRADS	Kwak-TIRADS	C-TIRADS
US features	<ul style="list-style-type: none"> • Mixed cystic/solid (1), Solid or almost completely solid (2), Can't classify (2); • Hyperechoic /Isoechoic (1), Hypoechoic (2), Very hypoechoic (3), Can't classify (1); • Taller-than-wide (3); • Lobulated or irregular (2), Extra-thyroidal extensions (3); • Macrocalcifications (1), Peripheral calcifications (2), Punctate echogenic foci (3) 	<ul style="list-style-type: none"> • Solid or almost completely solid (3); • Hypoechoic (2), Very hypoechoic (3); • Taller-than-wide (1); • Lobulated or irregular (2), Extra-thyroidal extensions (3); • Peripheral calcifications (2), Punctate echogenic foci (3) 	<ul style="list-style-type: none"> • Solid (1); • Hypoechoic (1), Markedly hypoechoic (1); • Taller-than-wide (1); • Microlobulated margins (1), Irregular margins (1); • Macrocalcifications (1) 	<ul style="list-style-type: none"> • Solid (1); • Markedly hypoechoic (1); • Taller-than-wide (1); • Ill-defined (1), Irregular margins (1), Extrathyroidal extension (1); • Comet-tail artifacts (-1), Macrocalcifications (1)
Add Points From All Categories to Determine Risk Stratification Level				
US-based risk stratification system	TR 1 (0 points/≤1 points, no FNA)	TR 1 (0 points/≤1 points, No FNA)	TR 1 (negative)	TR 1 (negative)
	TR 2 (2 points, no FNA)	TR 2 (2 points, no FNA)	TR 2 (-1 points, no FNA)	TR 2 (-1 points, no FNA)
	TR 3 (3 points, FNA if ≥2.5 cm)	TR 3 (3 points, FNA if ≥2.5 cm)	TR 3 (0 points, no FNA)	TR 3 (0 points, no FNA)
	TR 4 (4-6 points/ FNA if ≥1.5 cm)	TR 4 (4-6 points/FNA if ≥1.5 cm)	TR 4a (1 points, FNA if ≥1.0 cm)	TR 4a (1 points, FNA if >1.5 cm)
			TR 4b (2 points, FNA if ≥1.0 cm)	TR 4b (2 points, FNA if >1.0 cm)
			TR 4c (3-4 points, FNA if ≥1.0 cm)	TR 4c (3-4 points, FNA if >1.0 cm)
	TR 5 (≥7 points, FNA if ≥1.0 cm)	TR 5 (≥7 points, FNA if ≥1.0 cm)	TR 5 (5 points, FNA if ≥1.0 cm)	TR5 (5 points, FNA if >1.0 cm)
	N/A	N/A	N/A	TR6 (confirmed malignant by FNA)

The US lexicons were used to determine risk stratification systems, but not all were listed in this table. The numbers in parentheses represented the points of each US features assigned. FNA, fine-needle aspiration; ACR, American College of Radiology; TIRADS, Thyroid Imaging Reporting and Data System; AI, artificial intelligence; C, Chinese; US, ultrasound; TR, risk stratification category; N/A, not applicable.

Table S3 Comparison of malignancy rates with the four risk stratification systems

Category	Pathological diagnosis		P value	Suggested risk of malignancy (%)	Calculated risk of malignancy (%)
	Benign (n=2,163)	Malignant (n=1,781)			
ACR-TIRADS					
TR1	82	0	<0.001	≤2	0
TR2	562	28		≤2	4.7
TR3	584	31		≤5	5.0
TR4	640	351		5–20	35.4
TR5	295	1,371		≥20	82.3
AI-TIRADS					
TR1	709	31	<0.001	≤2	4.2
TR2	282	22		≤2	7.2
TR3	392	35		≤5	8.2
TR4	484	209		5–20	30.2
TR5	296	1,484		≥20	83.4
Kwak-TIRADS					
TR1	NA	NA	<0.001	0	0
TR2	114	0		0	0
TR3	579	29		2–2.8	4.8
TR4a	684	60		3.6–12.7	8.1
TR4b	458	180		6.8–37.8	28.2
TR4c	302	1,234		21–91.9	80.3
TR5	26	278		88.7–97.9	91.4
C-TIRADS					
TR1	NA	NA	<0.001	0	0
TR2	64	0		0	0
TR3	686	30		<2	4.2
TR4a	674	102		2–10	13.1
TR4b	459	467		10–50	50.4
TR4c	242	1,147		50–90	82.6
TR5	2	35		>90	94.6

ACR, American College of Radiology; TIRADS, Thyroid Imaging Reporting and Data System; TR, risk stratification category; AI, Artificial Intelligence; NA, not available; C, Chinese.