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Comparison between ACR-TIRADS and EU-TIRADS: Similarities and differences in the US lexicon for risk stratification of the thyroid nodules

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Abstract

Thyroid pathologies are a common occurrence in the day to day practice. However there is no set standardized protocols for reporting and guideline for management of these sometimes incidentally detected thyroid nodules. There are multiple guidelines formulated by various bodies in an attempt to standardize the reporting and ease up the management protocols. Here in this study we compare 2 such important thyroid reporting and data systems- ACR-TIRADS and EU-TIRADS, the similarities and differences of each of the 2 systems.

Keywords: ACR-TIRADS, EU-TIRADS, risk stratification, thyroid nodules

Introduction

Thyroid nodules are a common in the general population and are commonly encountered as an incidental finding in a large gamut of the general population. Most of the nodules (approximately 80%) are benign in nature, however incidence of malignancies in thyroid has seen an increase in the past decade. The early detection and intervention of these thyroid pathologies aids in the better patient care and early management to avoid further complications. Ultrasound has been a primary and initial investigation of choice for detection of the thyroid pathologies since many years. With the advent of high frequency ultrasound over the years, many data reporting systems have been devised by various bodies to qualitatively assess the nature of the thyroid pathology and differentiating whether it is benign or malignant based on the ultrasound findings. The 2 main and popular thyroid imaging and data reporting systems are: ACR-TIRADS proposed by American College of Radiology (first white paper made in 2015 and later revised and updated in 2017) and succeeded by EU-TIRADS which was published by European Thyroid Association (2017) [3].

Materials and Methods

30 patients with clinically suspected thyroid disease who were referred to the Department of Radio-diagnosis for ultrasound of the neck, were included in the study after taking written informed consent. The ultrasound neck was performed and both the data reporting systems were used in each patient and then they were followed up with FNAC, to see for the histological confirmation and correlate with the ultrasound findings.

Results

Out of the 30 patients that were studied, 19 were female and 11 were male patients. Ultrasound were performed on all these patients and ACR-TIRADS and EU-TIRADS category were given. All these patients were then followed up with FNAC to compare and correlate the results. Out of the 30 patients, 27 patients had a benign nodule and 3 patients had malignant nodule.

ACR-TIRADS

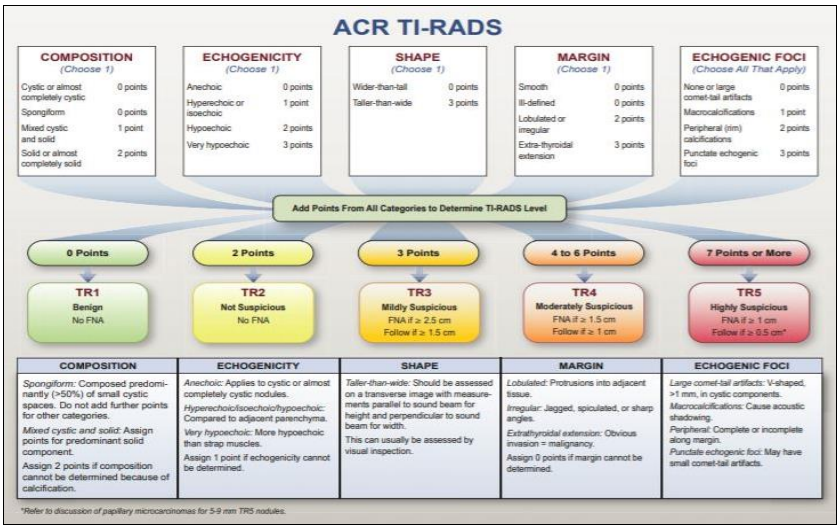


Fig 1

In ACR TIRADS, the higher the score, greater is the risk of malignancy. It stratifies the nodules into following suspicion groups:

TR 1: Benign. No FNAC indicated. Risk of malignancy: 0.3 %

TR 2: Not suspicious. No FNAC indicated. Risk of malignancy: 1.5 %

TR 3: Mildly suspicious. FNAC indicated if nodule >= 2.5 cm. Risk of malignancy: 4.8 %

TR 4: Moderately suspicious.FNAC indicated if nodule >=1.5 cm and follow up if nodule > 1 cm. Risk of malignancy: 9.1 %

TR 5: Highly suspicious. FNAC indicated if nodule > 1cm and follow up if nodule > 0.5 cm. Risk of malignancy: 35 %.

EU-TIRADS

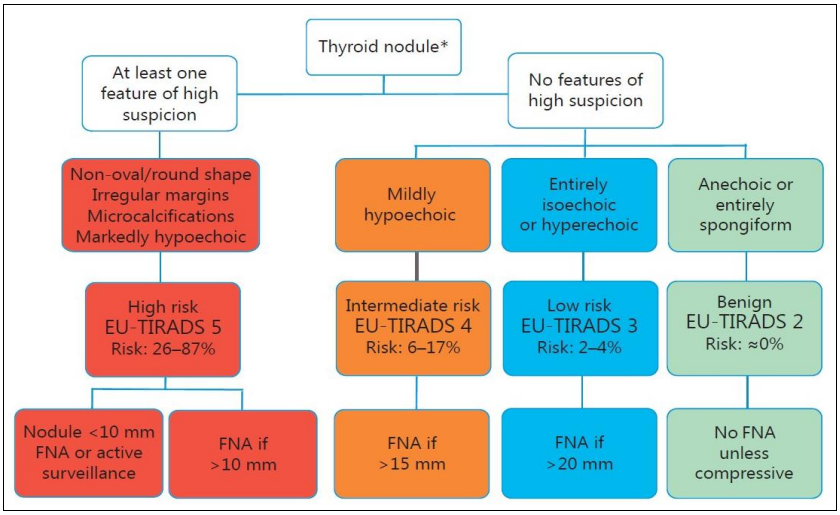


Fig 2

In EU-TIRADS, main goal was to develop simplified classification system and reduce the interobserver variability and improve the reproducibility. It is based on "classic pattern categories":

It has following categories:

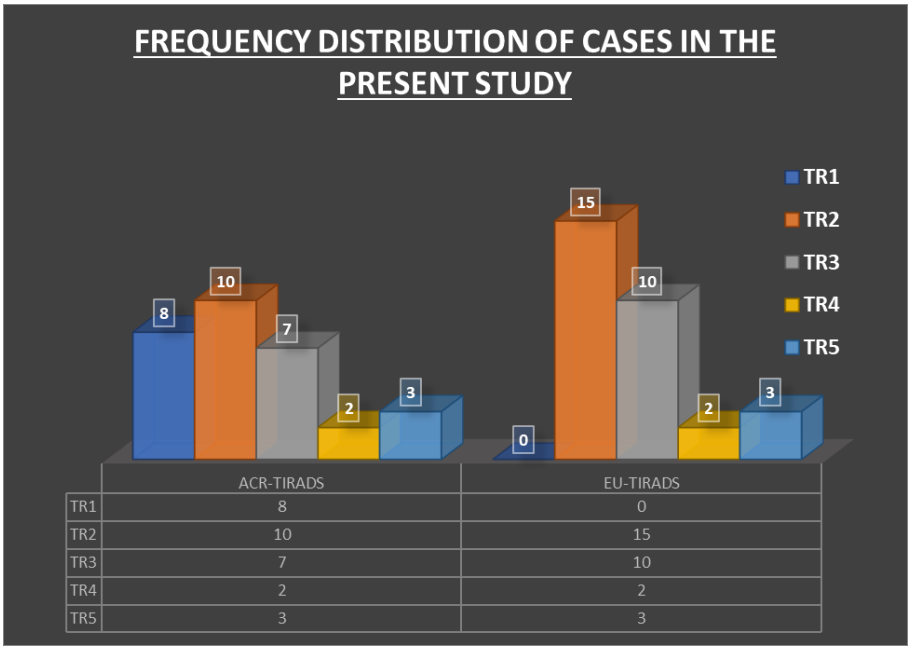
Normal gland, no nodules (EU-TIRADS 1)

Benign (EU-TIRADS 2): Risk of malignancy: 0%. No FNAC indicated, unless compressive symptoms.

Low Risk (EU-TIRADS 3): Risk of malignancy: 2-4 %, FNAC if nodule > 2 cm

Intermediate Risk (EU-TIRADS 4): Risk of malignancy 6-17 %, FNAC if nodule > 1.5 cm

High Risk (EU-TIRADS 5): Risk of malignancy 26-87 %, FNAC if nodule > 1 cm.



	ACR-TIRADS	EU-TIRADS
TR1	8	0
TR2	10	15
TR3	7	10
TR4	2	2
TR5	3	3

Fig

Discussion

Both EU-TIRADS and ACR-TIRADS are practical and useful means for stratification of the thyroid nodules. They share certain common characteristics but also several differences. Categorisation differences are shown in the table below.

Table 1

Category	USG Features
EU-TIRADS 1: Normal	No nodule
EU-TIRADS 2: Benign	Cyst, spongiform
EU-TIRADS 3: Low Risk	Ovoid, smooth, isoechoic/hyperechoic. No features of high suspicion.
EU-TIRADS 4: Intermediate Risk	Ovoid, Smooth, mildly hypoechoic. No features of high suspicion
EU-TIRADS 5 : High Risk	At least 1 out of these features which are highly suspicious: Irregular shape Irregular margin Microcalcifications Marked hypoechogenicity (and solid)

Table 2: Differences in terms of classification of nodules

	ACR-TIRADS	EU-TIRADS
Normal gland	-	EU-TIRADS 1
Benign	TR 1t	EU-TIRADS 2
Not suspicious	TR 2	-
Mildly suspicious / Low risk	TR 3	EU-TIRADS 3
Moderately suspicious / Intermediate risk	TR 4	EU-TIRADS 4
Highly suspicious / High Risk	TR 5	EU-TIRADS 5

Table 3: Difference in terms of management of nodules

	ACR-TIRADS	EU-TIRADS
TIRADS 1	No FNAC/ No follow up.	-
TIRADS 2	No FNAC/ No follow up.	No FNAC unless compressive feature present
TIRADS 3	FNAC > 2.5 cm Follow up > 1.5 cm	FNAC > 2 cm
TIRADS 4	FNAC > 1.5 cm Follow up > 1 cm	FNAC > 1.5 cm
TIRADS 5	FNAC > 1 cm Follow up > 0.5 cm	FNAC > 1 cm Follow up/FNAC < 1 cm

- EU -TIRADS assigns each lesion into risk group based on presence of certain US findings.
- ACR-TIRADS is a score based system, according to the US features of the nodule – a particular score is assigned and then classified into groups.
- In ACR-TIRADS, the score increases in a summatory way with every US feature added. So, a nodule must have a sum of features to be classified into a determined risk category, instead of definitory feature alone as in case of EU-TIRADS.
- In EU-TIRADS, threshold to perform the FNAC are 2 cm, 1.5 cm and 1 cm for low risk, intermediate risk and high risk categories respectively.
- In ACR-TIRADS, threshold to perform FNAC are 2.5 cm, 1.5 cm and 1 cm for TR3, TR4 and TR5 respectively.
- In EU-TIRADS 5, guideline recommends repeating the FNAC in 3 months, if the FNAC result is benign to rule out false negative report.
- In EU-TIRADS, threshold to indicate active surveillance is < 1 cm high risk nodules. No such specification is made for the low risk and intermediate risk nodules.
- In ACR-TIRADS, threshold size to initiate active surveillance are 1.5 cm (TR3), 1 cm (TR4) and 0.5 cm (TR5). The system states that performing a biopsy of a nodule between 5-9 mm can be appropriated under certain circumstances.
- EU-TIRADS includes a standardized reporting form, which is more extensive and may be more time consuming.
- Only EU-TIRADS includes a visual diagram of thyroid gland to standardize the nodule location for reporting.
- In EU-TIRADS normal gland (1 category) does not exist in ACR-TIRADS, in which TR1 is for benign nodule
- EU-TIRADS 2 means a benign nodule and ACR-TR 2 means a nodule that is not suspicious. Both of them have distinct US characteristics. EU-TIRADS 2 is equivalent to ACR-TR 1.
- Although there are differences among the systems in categories 1 and 2, they do not imply changes in terms of patient management.
- ACR-TIRADS 2 is an intermediate category, which is not included in EU-TIRADS.
- EU-TIRADS states that there are 4 US categories (non oval shape, irregular margins, microcalcifications or marked hypoechogenicity) that if present, would be enough to classify a nodule as a high risk one. Such findings were first described in 2002, having high sensitivity but low specificity.
- EU-TIRADS takes into account several factors and situations excluded from the given scheme, which may reduce its usability Examples to this are: macrocalcification and extrathyroidal extension.
- EU-TIRADS considers the possibility of nodule formed by coalition of the smaller ones.
- Nodule growth seems to weigh less in EU-TIRADS than in ACR-TIRADS. In ACR-TIRADS, they tell us specific parameters to consider significant growth: at least in 2 diameters, at least 50 % or more increase in volume.
- EU-TIRADS takes into account scars as very hypoechoic lesions and downscales its category. Such scars can be mistaken as a highly suspicious nodule using ACR-TIRADS.
- Both systems recommend to check lymphadenopathies, specially intermediate and high risk groups, and puncture them in case of suspicion. Suspicious features: globular shape, loss of fatty hilum, peripheral colour

flow, heterogenicity and gland-like tissue within the node.
- Respecting the multinodular disease, recommendation is to report at least the 3 nodules with highest TIRADS (EU-TIRADS) and a maximum 4 (ACR-TIRADS).

Both the systems are newly developed and designed to differentiate the high risk from the low risk nodule and avoid unnecessary intervention in terms of FNAC and surgery.
ACR-TIRADS has been used for a while, and it has high sensitivity and specificity to discriminate the lesions.
EU-TIRADS is relatively newer and more studies are needed to judge its capability.
A recent study was published prospectively comparing the 5 most used classification systems (ACR, ATA, AACE/ACE/AME, EU-TIRADS and K-TIRADS). All of these systems have good discriminatory capacity, however ACR has an overall better performance amongst all, classifying half of the biopsies as unnecessary with a false negative rate of 2%

Conclusion
ACR-TIRADS and EU-TIRADS are good and very useful scores for risk stratification of malignancy of a determined thyroid lesion in ultrasound.
However, owing to the slight differences between the data systems, it is recommended to use the lexicon and reporting template of one of them anssd clearly convey the reporting system that is being used in the radiological report to aid the clinician, avoid the confusion and offer standardized management to the patients.

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