Thyroid Nodules - Understanding & Applying ACR TI-RADS
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Learning objectives:
1. Discuss the background behind thyroid nodule workup and thyroid malignancy epidemiology
2. Review ACR TI-RADS recommendations
3. Highlight the differences between ACR TI-RADS and other biopsy recommendations

Background
Thyroid cancer is the fastest increasing cancer in the USA. An exponential increase in incidence of thyroid cancer has been partly attributed to an increased work-up of incidentally detected thyroid nodules on imaging, especially ultrasound and CT. Excessive work-up of thyroid nodules and overdiagnosis of subclinical cancers is a costly healthcare problem. Although radiologists fear missing malignancies, the prognosis for most small localized small papillary cancers is excellent, even without treatment.

ACR TI-RADS
Recently, the American College of Radiology (ACR) published a new guideline called ACR TI-RADS (Thyroid Imaging, Reporting and Data System) (1), which aims to reduce the biopsy rate by recommending higher size thresholds for nodules that are not highly suspicious, while still detecting clinically significant cancers. Under ACR TI-RADS, nodules are evaluated based on composition, echogenicity, shape, margins and echogenic foci (Fig 1). Points associated with each ultrasound feature in a given nodule are summed to determine a suspicion level that ranges from TR1 (benign) through TR5 (highly suspicious). Nodules that fall into the TR1 or TR2 categories are not biopsied. Nodules in the other TR categories are sampled at maximum size thresholds that are inversely proportional to the suspicion of malignancy. The size thresholds for biopsy are higher than other existing biopsy guidelines from the American Thyroid Association (2), the Society of Radiologists in Ultrasound (SRU) consensus criteria, and the Korean and French TI-RADS (3-6).

Differences
A preliminary study of 100 thyroid nodules found that applying the ACR TI-RADS would have led to 21 to 35% fewer biopsies compared to the other guidelines. Three types of nodules accounted for the reduction in biopsy.
1. Solid iso- or hyperechoic nodules without suspicious features: ACR TI-RADS uses a 2.5 cm biopsy threshold. ATA, SRU and Korean TI-RADS use size ≥ 1.5 cm cutoff and the French TI-RADS uses a ≥2 cm threshold.
2. Mixed cystic and solid nodules without suspicious features were not deemed to warrant biopsy based on the ACR TI-RADS. A size threshold of ≥2 cm is used with the ATA, SRU and French TI-RADS, and ≥1.5 cm threshold is used by the Korean TI-RADS.
3. Spongiform nodules do not receive biopsy with the ACR TI-RADS, French TI-RADS or the SRU guidelines. ATA and Korean TI-RADS recommend biopsy for spongiform nodules using a $\geq 2$ cm threshold.

**Conclusion**

ACR TI-RADS provides recommendations to manage thyroid nodules detected on thyroid ultrasound. ACR TI-RADS offers a meaningful reduction in number of thyroid nodules biopsied comparing to other existing guidelines and significantly improves the specificity for cancer detection without sacrificing sensitivity.

**REFERENCES**