

# THYROID IMAGING REPORTING AND DATA SYSTEM (TI-RADS) CAN REDUCE THE NEEDED NUMBER OF FNA

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## OBJECTIVES

In the presence of a solid thyroid nodules the Endocrine Societies Guidelines recommend the use of ultrasound-guided Fine Needle Aspiration Biopsy (FNAB) in order to establish a proper therapeutic attitude. American Thyroid Association (ATA) stated that FNAB is the procedure of choice for the evaluation of thyroid nodules. Analyzing the indications of AACE, ETA, ATA and the Korean Guideline, it can be observed that there are some differences for FNAB indications, especially concerning the size and the category of nodules that should be referred to FNAB.

TI-RADS	Interpretation	Ultrasonographic findings
2	Constantly benign aspect	simple cyst, spongiform nodules "white knight" isolated macrocalcification, nodular hyperplasia
3	Very probably benign	no signs of high suspicion, isoechoic or hyperechoic, partial in capsulated
4A	Undetermined	no signs of high suspicion, mildly hypoechoic, encapsulated nodule
4B	Suspicious	irregular shape taller than wide, irregular borders, micro calcifications, markedly hypoechoic, high stiffness with elastography 1 or 2 signs and no lymph node metastasis
4c and 5	Highly suspicious	irregular shape/ taller than wide, irregular borders micro calcifications markedly hypoechoic high stiffness with elastography: strain ratio > 4 3 to 5 signs and/or lymph node metastasis

## TI-RADS categories and risk of malignancy

TI-RADS category	Benign	Malignant	Total	Risk of malignancy
2	15	0	15	0%
3	84	1	85	1.125%
4A	43	3	46	6.52%
4B	2	9	11	81.81%
4c and 5	1	16	17	94.11%
Total	145	29	174	-

## TI-RADS categories and diagnostic performance of US+ES

Method	Sensitivity	Specificity	PPV	NPV	LR+	Accuracy
TI-RADS 2	10.34	100	100	18.23	-	25.28
TI-RADS 3	57.93	96.55	98.82	31.46	10.36	58.62
TI-RADS 4A	29.65	89.65	93.47	20.31	2.63	39.65
TI-RADS 4 B	24.13	96.55	81.81	86.41	7.08	84.48
TI-RADS 5	44.82	97.93	98.25	89.87	21.64	89.08

## CONCLUSIONS

The TI-RADS system, proposed by Russ, with 5 conventional ultrasound parameters and 1 elastography parameter, is a useful tool in the risk stratification of thyroid nodular masses. It may be used for reducing the number of unnecessary FNAB evaluations. Quantitative elastography brings constant, valuable but also clear criteria in the TI-RADS model of risk stratification. Further studies are required in order to validate the TI-RADS analysis for daily clinical endocrine practice

## METHODS

- Patients with uninodular or polinodular goiter examined in our Elastography Unit between January 2013- June 2014;
- From the total of 432 evaluated cases, 174 cases were operated by December 2014;
- Histopathological analysis was performed in all cases and was considered the golden standard diagnosis;
- Conventional Gray scale, Ultrasound (US), Doppler Ultrasound, and strain elastography (SE) were performed prior surgery by one operator with more than 10 years experience in conventional ultrasound and 5 years in elastography, maximum 2 month before surgery;
- The surgical indication was made in the presence of large nodules (>4 ml), positive FNAB result (Bethesda IV, V, and VI), compression effects, functional autonomy (defined by suppressed TSH levels), and multinodularity;
- US and SE were performed using Hitachi Preirus (Hitachi Medical Corporation, Tokyo, Japan) machine with 6-13 MHz linear probe. SE was performed using recommendations of Rago et al with mild external pressure, always checked on the pressure scale, using only 3-4 grade images and loops. The Tsukuba (Ueno-Itoh) classification was used for qualitative analysis of SE. The nodules were classified according to simplified TI-RADS system described by Russ;

## RESULTS

From the total 174 analyzed cases, 29 (16.7%) were histologically proven to be malignant: papillary carcinoma 23 cases, 3 cases of follicular carcinoma and 2 medullar carcinoma: 1 isolated case and 1 familial case.

### TI-RADS categories and overall diagnostic performance

TI-RADS category	Benign	Malignant	Total
TI-RADS 2,3,4A	142	4	146
TI-RADS 4B,C	3	25	28
Total	145	29	174

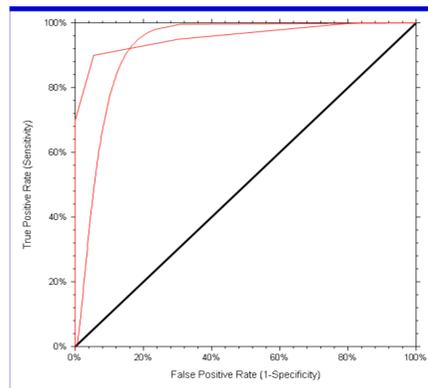


Figure 1 ROC results for the TI-RADS US+ strain ratio in the diagnosis of thyroid cancer (prevalence of 16.66%)

## References

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