

# ADDED VALUE OF DIFFUSION WEIGHTED MAGNETIC RESONANCE IMAGING IN DIAGNOSING MALIGNANT THYROID NODULES

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## Introduction

Thyroid nodules are a common clinical problem. Their incidence increases on ultrasound to reach 18%-68% of asymptomatic individuals. The most important aspect of management of thyroid nodules is excluding malignancy which occurs in 5-15% of all thyroid nodules. Since the most common presentation of thyroid cancer is the presence of asymptomatic thyroid nodule or mass. Different imaging modalities play a role in diagnosing thyroid nodules ; ultrasound remains the most common sensitive and non-invasive diagnostic imaging modality for thyroid lesions, however, MRI with DWI is emerging as another non invasive imaging modality for differentiating benign and malignant lesions , helping in tumor staging and detection of post-operative recurrent or residual masses.

## Aim of the work

The aim of our study was to evaluate the role of diffusion weighted MRI in primarily differentiating benign and malignant thyroid nodules.

## Patients and Methods

Our study included 23 patients with suspicious thyroid lesions referred to the Radiology department of Alexandria Main University Hospitals for conventional MR with DW imaging , mean ADC value was calculated for every case . The findings were correlated with histopathology results from FNAC and/or thyroidectomy or excisional biopsy from lymph nodes. 19 of the cases were presenting with thyroid swelling under investigation for the first time, the remaining four were presenting with recurrent lesions after thyroidectomy.

## Results

Our study showed a statistically significant difference between the mean ADC value of benign and malignant thyroid lesions; mean ADC for benign cases was found to be 1.79 +- 0.47 significantly higher than the mean ADC for malignant cases of 0.92 +- 0.34 with P-value >0.001. a cut-off value of  $1.2 \times 10^{-3}$  mm<sup>2</sup>/sec. with a diagnostic ability of 88.24% sensitivity, 100 % specificity.

Table (1):Comparison between benign and malignant groups according to their ADC value

ADC	Benign (n=6)	Malignant (n=17)	U	p
Min. – Max.	1.40 – 2.70	0.58 – 1.70	5.500*	<0.001*
Mean ± SD.	1.79 ± 0.47	0.92 ± 0.34		
Median (IQR)	1.68 (1.50 – 1.80)	0.80 (0.70 – 1.10)		

IQR: Inter quartile range

SD: Standard deviation

U: Mann Whitney test

p: p value for comparing between Benign and Malignant

\*: Statistically significant at  $p \leq 0.05$

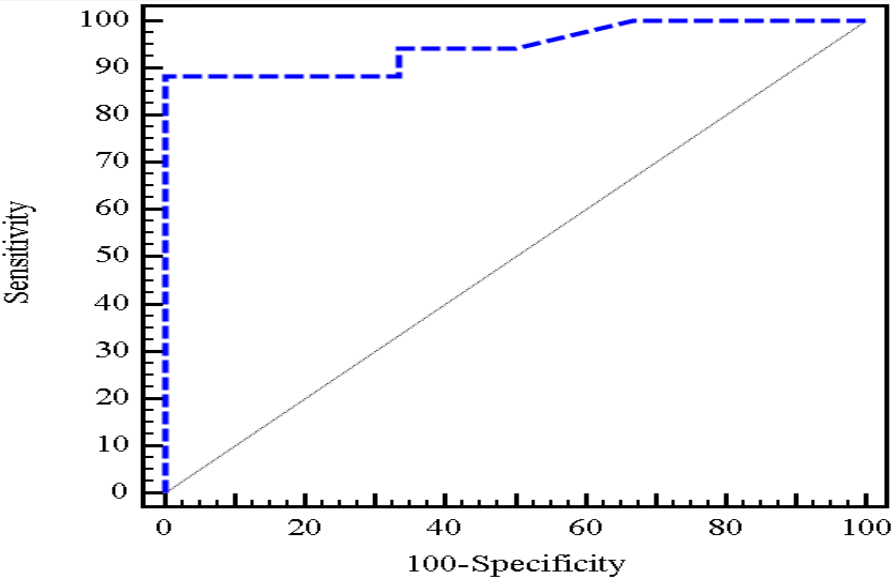


Figure (1):Receiver operating curve (ROC)curve for ADC value computed at b=1000 to discriminate malignant (n = 17) from benign (n = 6) thyroid lesions. Maximum area under the curve 0.946.

Table (2): Validity (AUC, sensitivity, specificity) for ADC value to discriminate malignant (n = 17) from benign (n = 6).

	AUC	p	95% C.I	Cut off#	Sensitivit >	Specificit >	PPV	NPV
ADC	0.946*	0.001*	0.857 - 1.035	≤1.2	88.24	100.0	100.0	75.0

AUC: Area Under a Curve

p value: Probability value

CI: Confidence Intervals

NPV: Negative predictive value

PPV: Positive predictive value

\*: Statistically significant at  $p \leq 0.05$

#Cut off was choose according to Youden index

## Conclusion

DW-MR imaging is a non-invasive imaging modality that can differentiate between benign and malignant thyroid nodules and detect postoperative recurrence using ADC value as a predictive parameter for malignancy.



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