

# USING AORTA-LESION-ATTENUATION-DIFFERENCE (ALAD) ON PREOPERATIVE CONTRAST-ENHANCED CT SCAN TO DIFFERENTIATE BETWEEN MALIGNANT AND BENIGN RENAL TUMORS

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## INTRODUCTION

- The incidental detection of small (<4cm) renal tumors is common.
- 20% of small renal tumors are found to be benign following surgical excision.
- The most common benign renal tumor histology is oncocytoma.
- Pretreatment biopsy can not reliably differentiate oncocytomas from renal cell carcinomas.
- Our goal was to evaluate the ability of ALAD to differentiate malignant renal tumors from oncocytomas based on the preoperative contrasted CT scan.

## METHODS

- Retrospective review of preoperative CT scans and surgical pathology from 227 robotic assisted partial nephrectomy specimens from a single surgeon was performed.
- ALAD was calculated by measuring the difference in Hounsfield units (HU) between the aorta and the lesion of interest on the same image on the CT scan in the nephrographic phase.
- The ability of ALAD to differentiate malignant pathology from oncocytoma was evaluated by sensitivity, specificity, positive predictive value, negative predictive value and area under the curve (AUC) using ROC analysis.



ALAD = Aorta HU (132) – Mass HU (113) = 19  
Pathology demonstrated oncocytoma

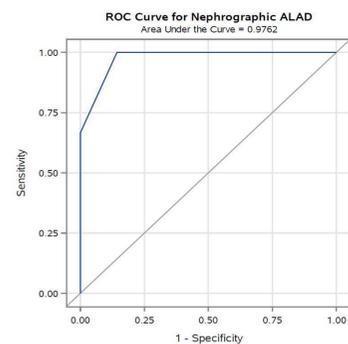
## RESULTS

Table 1: Patient Characteristics

Age (Mean)	59 years
Gender	65% male
Pathology	
• Clear cell RCC	148 (65%)
• Papillary RCC	37 (16%)
• Chromophobe RCC	11 (5%)
• Oncocytoma	22 (10%)
• AML	9 (4%)

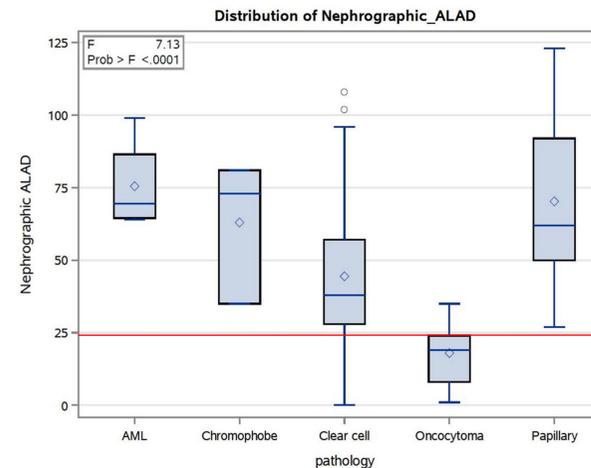
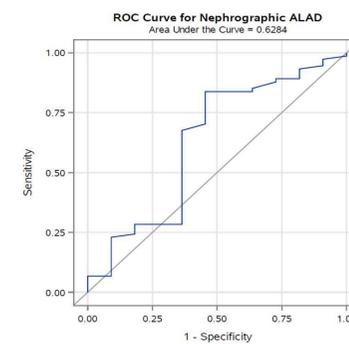
### Chromophobe vs Oncocytoma

	Sensitivity	Specify	Negative Predictive Value	Positive Predictive Value
Nephrogenic ALAD				
Chromophobe RCC vs. Oncocytoma	100%	86%	100%	75%
Papillary RCC vs. Oncocytoma	94%	100%	88%	100%
Clear Cell RCC vs. Oncocytoma	77%	86%	33%	98%
RCC any vs. Oncocytoma/AML	84%	55%	33%	93%
RCC any vs. Oncocytoma	84%	86%	33%	98%



### Any RCC vs Oncocytoma/AML

	Sensitivity	Specify	Negative Predictive Value	Positive Predictive Value
Nephrogenic ALAD				
Chromophobe RCC vs. Oncocytoma	100%	86%	100%	75%
Papillary RCC vs. Oncocytoma	94%	100%	88%	100%
Clear Cell RCC vs. Oncocytoma	77%	86%	33%	98%
RCC any vs. Oncocytoma/AML	84%	55%	33%	93%
RCC any vs. Oncocytoma	84%	86%	33%	98%



## RESULTS

Table 2: Summary of ROCs association statistics

	Nephrographic AUC (95%CI)
Chromophobe RCC vs. oncocytoma	<b>0.98(0.91-1.00)</b>
Papillary RCC vs. oncocytoma	0.99(0.97-1.00)
Clear cell RCC vs. oncocytoma	0.82(0.69-0.93)
RCC any vs. oncocytoma/AML	<b>0.63(0.42-0.84)</b>
RCC any vs. oncocytoma	0.86(0.77-0.96)

## DISCUSSION

- ALAD has been shown previously to reliably differentiate between chromophobe RCC and oncocytoma on CT.
- We found that a nephrographic ALAD  $\leq 24$  predicted non-chromophobe RCC with 100% probability. This could aid in the management of patients with indeterminate diagnosis of oncocytic neoplasm on renal mass biopsy.
- We also found that ALAD  $>24$  predicted malignant RCC histology with 93% positive predictive value.

## CONCLUSIONS

- Nephrographic ALAD with a threshold of 24 HU appears to discriminate particularly well between oncocytoma and chromophobe RCC.
- It also provides good overall discrimination between benign and malignant renal tumors.
- Additional validation of this is initial data is needed and is currently underway.



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