

# Value of Diffusion Weighted Imaging MRI in Differentiation Renal Tumors



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## Goals:

To assess whether the value of apparent diffusion coefficient (ADC) measured by diffusion weighted imaging (DWI) magnetic resonance imaging (MRI) is able to differentiate among various histological types of renal tumors.

## Methods:

Diffusion-weighted imaging is a MR modality using strong bipolar gradients to create a sensitivity of the signal to the thermally induced Brownian motion of water molecules. The apparent diffusion coefficient (ADC) is a quantitative parameter calculated from DWI which is used as a measure of diffusion.

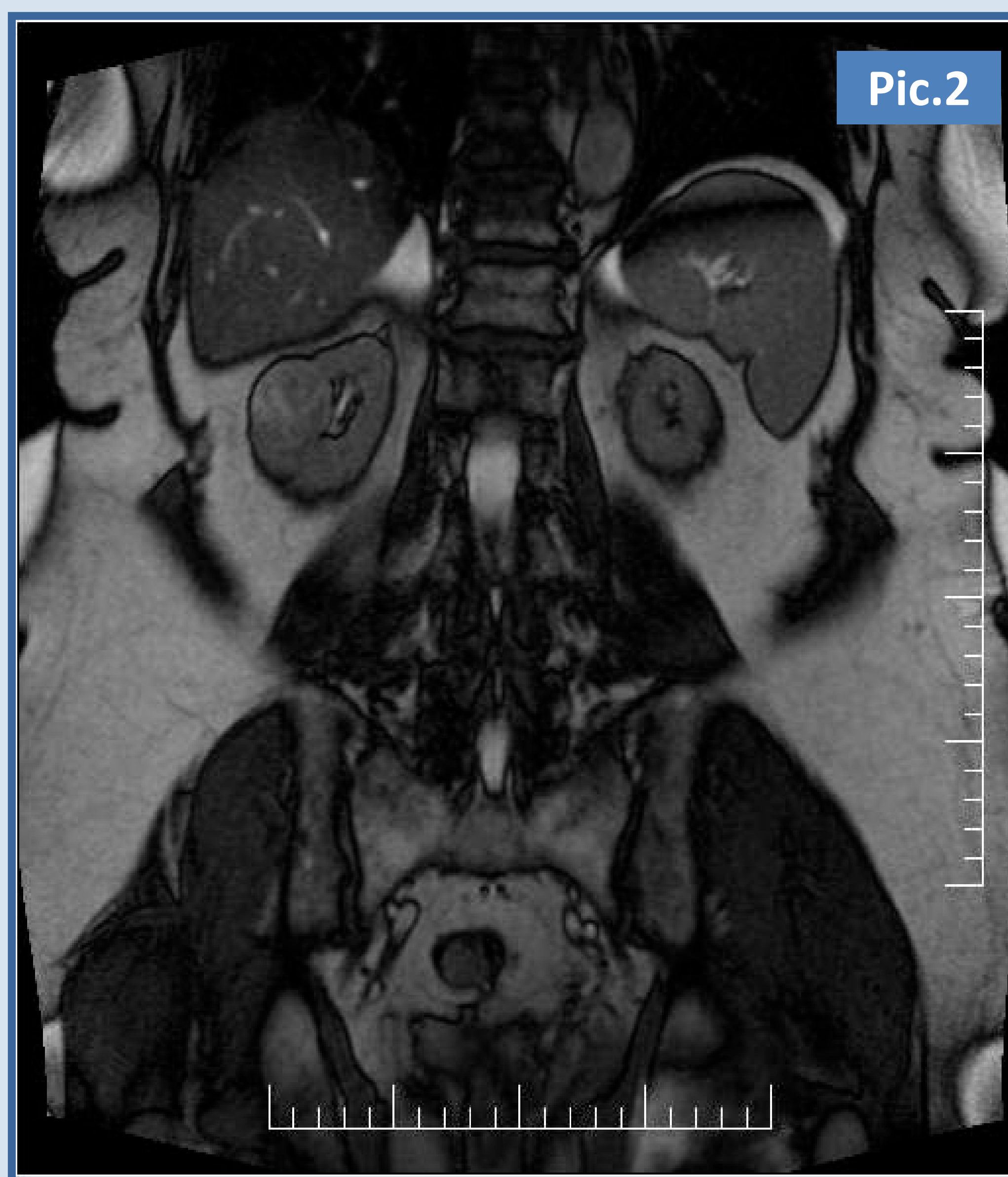
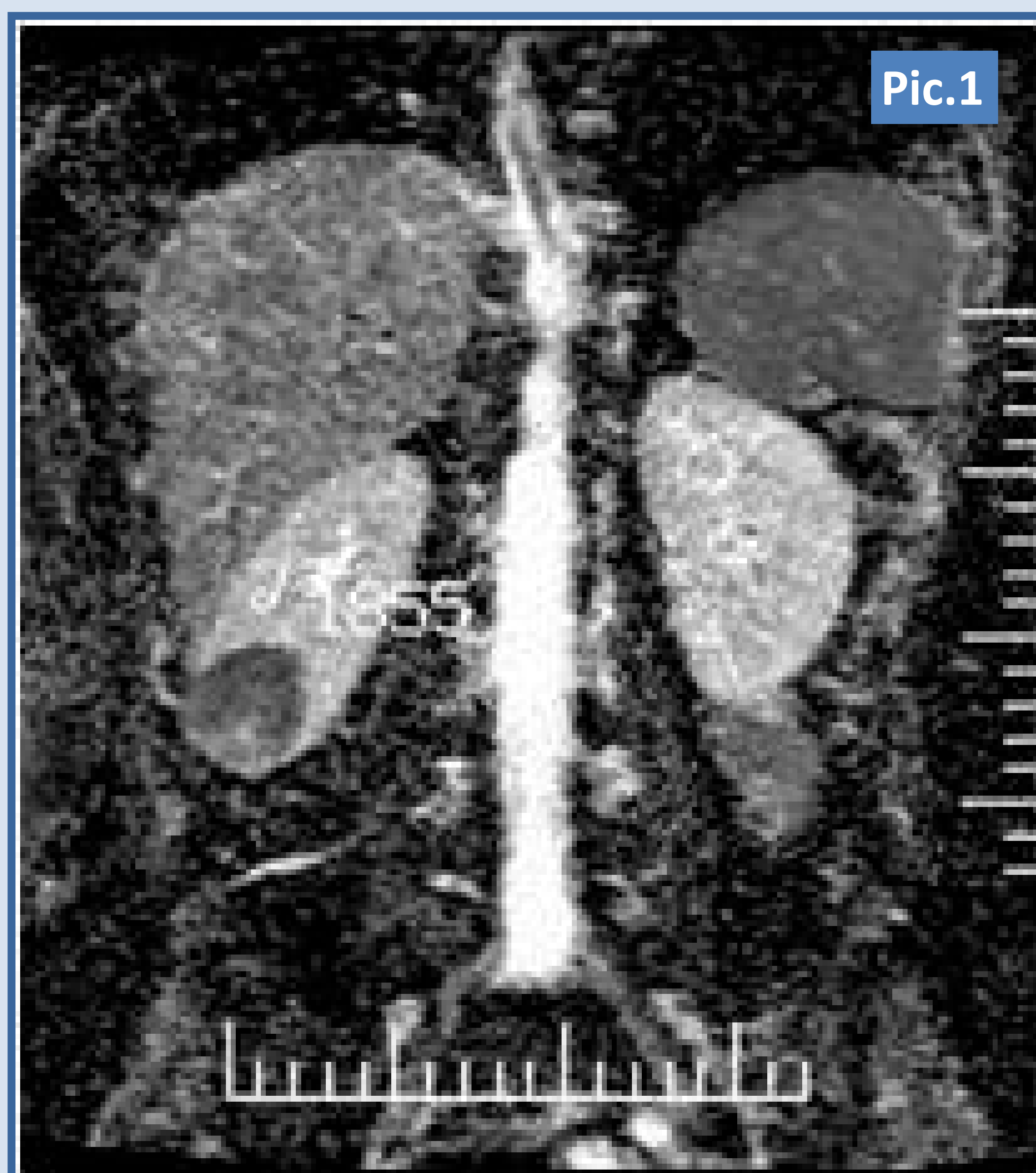
A total of 82 patients with a renal mass underwent preoperative MRI between January 2012 and June 2013 using Avanto Siemens MRI 1.5T. The examination included diffusion sequence with b-coefficients of 0.400 and 1000. Mean ADC value was assessed both in tumour and unaffected tissue. The results were correlated with the tumour final histopathology. Histopathological examination found clear cell renal cell carcinoma (ccRCC) 61 times, papillary RCC 8 times, chromophobe RCC twice, oncocytoma 5 times, angiomyolipoma 3 times, urothelial carcinoma twice and papillary adenoma once. T-test was used for statistical analysis.

## Results:

Mean ADC value was  $1.85 \times 10^{-3} \text{ mm}^2/\text{s}$  in healthy tissue. (Pic.1) There was a statistically significant correlation between mean ADC value and tumour histology ( $p < 0.05$ ). (Tab.1) Mean ADC values for specific histological types were as follows: ccRCC  $1.51 \times 10^{-3} \text{ mm}^2/\text{s}$  (Pic.2, 3), papillary RCC  $0.855 \times 10^{-3} \text{ mm}^2/\text{s}$  (Pic.4, 5), chromophobe RCC  $0.82 \times 10^{-3} \text{ mm}^2/\text{s}$ , oncocytoma  $1.351 \times 10^{-3} \text{ mm}^2/\text{s}$ , angiomyolipoma  $1.72 \times 10^{-3} \text{ mm}^2/\text{s}$ , urothelial carcinoma  $1.1 \times 10^{-3} \text{ mm}^2/\text{s}$ , papillary adenoma  $1.445 \times 10^{-3} \text{ mm}^2/\text{s}$ . There was a statistically significant correlation between histological grade and mean ADC value in ccRCC ( $p < 0.03$ ).

## Conclusion:

ADC value assessment provides useful information in the diagnosis of renal cancer in terms of differentiation of specific tumours.



	N	Mean ADC value
Healthy tissue	82	$1.85 \times 10^{-3} \text{ mm}^2/\text{s}$
ccRCC	61	$1.51 \times 10^{-3} \text{ mm}^2/\text{s}$
Papillary	8	$0.855 \times 10^{-3} \text{ mm}^2/\text{s}$
Chromophobe	2	$0.82 \times 10^{-3} \text{ mm}^2/\text{s}$
Oncocytoma	5	$1.351 \times 10^{-3} \text{ mm}^2/\text{s}$
Angiomyolipoma	3	$1.72 \times 10^{-3} \text{ mm}^2/\text{s}$
Urothelial ca	2	$1.1 \times 10^{-3} \text{ mm}^2/\text{s}$
Papillary adenoma	1	$1.445 \times 10^{-3} \text{ mm}^2/\text{s}$

