Objective: To evaluate 3.0T MR-DWI and ADC value in diagnosis, histological grade, tumor staging, and short-time therapeutic effect of renal clear cell carcinoma.

Materials and methods: Fifty-one consecutive cases of renal clear cell carcinoma confirmed by surgery and pathology between June 2007 and February 2008 were reviewed. All patients underwent diffusion-weighted imaging (b value=0 and 800) at 3.0T superconducting magnet. ADC values of tumors and corresponding areas of lateral renal parenchyma were measured and compared by Independent-Samples T Test. Set a cut-off value at $1.8 \times 10^{-3}$ mm$^2$/s to divide entire cohort into two groups. To these two groups, the tumors’ histological grade, staging and surgical method were analyzed by Chi-square test, and Kaplan-Meier way and log-rank test were used to study the short-time therapeutic effect.

Result: Statistical difference (p<0.01) was observed between ADC value of renal clear cell carcinoma ($1.778 \pm 0.582 \times 10^{-3}$ mm$^2$/s) and those of normal renal parenchyma ($2.314 \pm 0.223 \times 10^{-3}$ mm$^2$/s). ADC values of 24 cases were less than $1.8 \times 10^{-3}$ mm$^2$/s (group one) and those of 27 cases were more than and equal to $1.8 \times 10^{-3}$ mm$^2$/s (group two). The percentages of cases with tumor grade higher than II, equal to T3/T4 and M1 (staging TNM), III/IV (clinical staging) and palliative operation in these two groups were 44%, 33%, 26%, 48%, 26% and 4%, 4%, 4%, 8%, 4% respectively. There were statistical differences in histological grade, staging T and clinical staging (p<0.01) between these two groups. Up to February 2009, there were 49 cases followed up by reexaminations and telephone (period: 1-20 months, median: 14 months). The tumor control rate of these two groups by follow-up one year was 62% and 95% respectively. Kaplan-Meier curve and log-rank test showed statistical difference in tumor short-term control rate between these two groups.

Conclusion: 3.0T MR-DWI can accurately differentiate renal clear cell carcinoma and normal renal parenchyma. Quantitative analysis of ADC value was helpful to evaluate the histological grade, tumor staging and short-term therapeutic effect of renal clear cell carcinoma.