



# Hemodialysis is an Independent Negative Predictor of Renal Cell Carcinoma

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## BACKGROUND

Renal cell carcinoma (RCC) is a common and severe complication in patients on hemodialysis. It is known that the incidence of renal cell carcinoma (RCC) is high in patients on dialysis.

There are some reports that the prognosis of RCC was better than that of non-hemodialysis patients. But it is unclear that hemodialysis is an independent predictor of RCC-specific survival.

## OBJECTIVES

This study aimed to determine whether hemodialysis is associated with RCC-specific survival.

## METHODS

388 patients who treated by radical or partial nephrectomy for RCC from 2005 to 2013 at Toranomom Hospital was enrolled in this study. We excluded patients who received dialysis after transplantation. The following demographic and clinical-pathologic features were analyzed: Age, sex, hemodialysis treatment, discovery by imaging or by symptom, histological subtype, tumor stage and grade. Tumor staging was reassessed according to the 2009 American Joint Committee on Cancer/Union International Contre le Cancer(UICC) TNM classification. The Fuhrman grading system was used to define the tumor grade. All patients were preoperatively staged by thoraco-abdominal computed tomography (CT). Survival estimates were calculated according to the Kaplan-Meier method and compared with the log-rank test. Multivariate analyses were performed using the Cox proportional hazards regression model to identify the most significant variables for predicting RCC-specific survival.

## RESULTS

388 patients included 66 hemodialysis patients and 322 non-hemodialysis patients. Patients had the following characteristics; mean follow-up time  $54.7 \pm 33$  months, mean age  $61 \pm 11$  years old, mean BMI  $23.3 \text{ kg/m}^2$ , male 76%, asymptomatic cancer 76%, cancer size  $4.6 \pm 3.3 \text{ cm}$ , bilateral cancer 11(2.8%). The most common histological subtype was clear cell (82%), next was papillary (9.0%). Clear cell papillary (2%), ACD-associated (2%) and chromophobe (1%) were seen. Multivariate analysis revealed that risk factors of RCC-specific survival were hemodialysis and tumor stage.

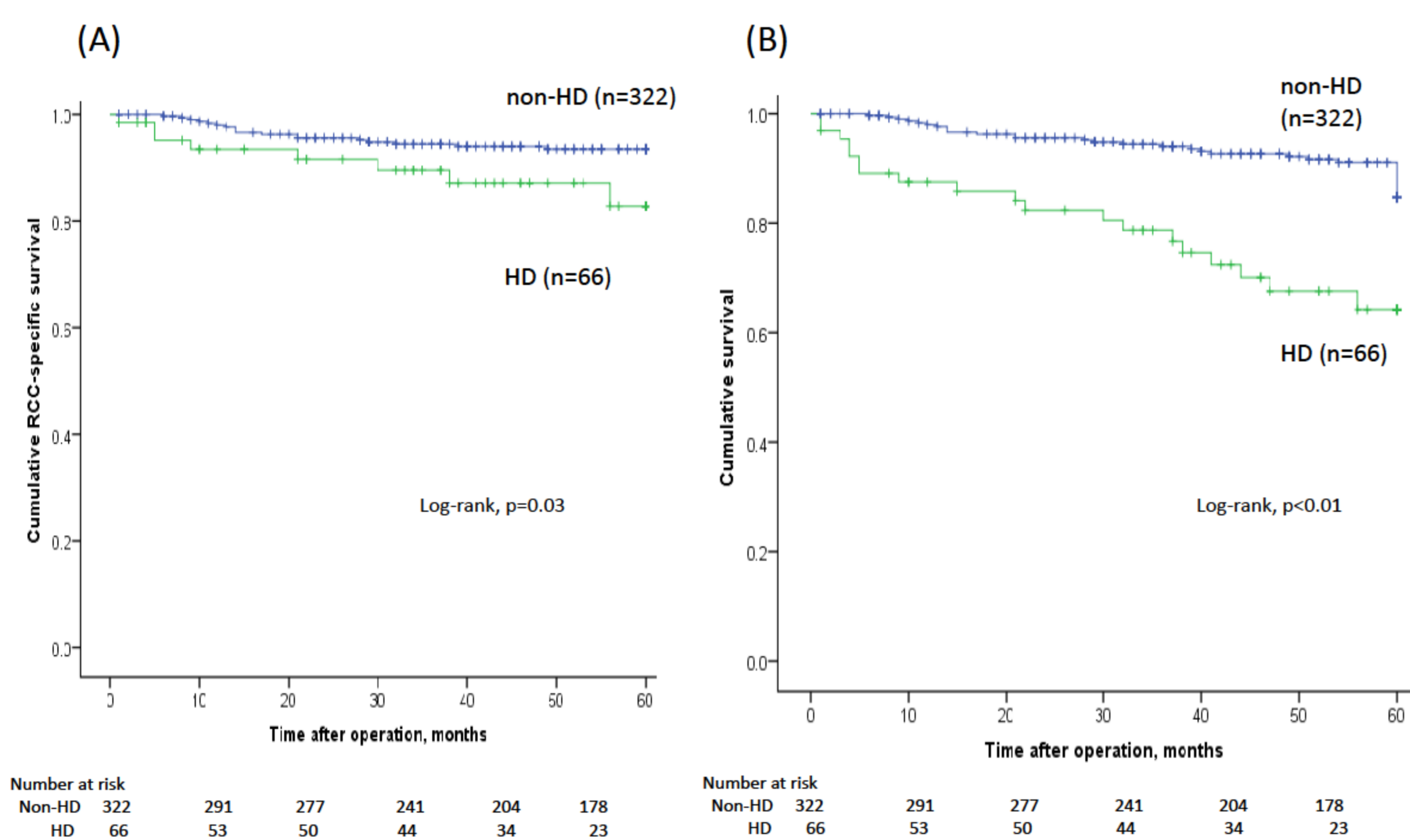


Figure 1. Kaplan-Meier estimates of (A) cancer-specific survival and (B) overall survival  
RCC: renal cell carcinoma, HD: hemodialysis

Parameter	Univariate			Multivariate Model 1			Multivariate Model 2*			
	HR	95%CI	p value	HR	95%CI	p value	HR	95%CI	p value	
Age (per 10 yrs increase)	1.00	0.96-1.03	0.87	1.04	0.96-1.07	0.59	1.01	0.96-1.06	0.69	
Male (vs. Female)	0.75	0.28-2.06	0.58	0.84	0.24-2.97	0.79	0.59	0.19-1.81	0.34	
<b>HD (vs. non-HD)</b>	<b>1.64</b>	<b>0.68-3.96</b>	<b>0.27</b>	<b>4.33</b>	<b>1.04-18.1</b>	<b>0.04</b>	<b>4.93</b>	<b>1.67-14.5</b>	<b>0.04</b>	
Discovery by imaging (VS. by symptom)	0.29	0.12-0.69	<0.01	1.54	0.48-5.00	0.47				
Histology Subtype	Clear cell	1.09	0.37-3.25	0.874	0.45	0.07-3.05	0.42			
	Papillary	1.56	0.53-4.65	0.42	1.26	0.17-9.37	0.82			
	Sarcomatoid component	5.23	1.74-15.7	<0.01	0.55	0.08-3.83	0.55			
Stage	I	Reference		Reference			Reference			
	II	2.11	0.25-18.1	0.495	3.19	0.30-34.2	0.34	2.03	0.23-18.0	0.53
	III	19.5	6.65-57.2	<0.01	<b>60.6</b>	<b>11.6-315</b>	<b>&lt;0.01</b>	<b>47.5</b>	<b>14.0-160</b>	<b>&lt;0.01</b>
	IV	61.2	17.2-218	<0.01	<b>153</b>	<b>20.8-1129</b>	<b>&lt;0.01</b>	<b>135</b>	<b>26.1-693</b>	<b>&lt;0.01</b>
Grade	1	Reference		Reference			Reference			
	2	1.89	0.51-7.02	0.34	0.80	0.18-3.59	0.77			
	3	12.1	3.21-45.9	<0.01	2.26	0.32-16.1	0.42			

Table1. Univariate and multivariate analysis of factors that contribute to RCC specific death in 388 patients.

RCC: renal cell carcinoma, HD: hemodialysis, HR hazard ratio, CI confidence interval

\* Multivariate model 2 incorporating baseline covariates including patient age, sex, HD and Stage

## CONCLUSIONS

This study suggested that hemodialysis is an independent negative predictor of RCC-specific survival as well as tumor stage. We should try to find RCC at early stage in patients on hemodialysis particularly.

