Prognostic Models for Renal Cell Carcinoma

Comparison Results Using Different Models for Jeff Kallis May 22, 2025

Patient Jeff Kallis Radical Nephrectomy: February 15, 2023 Stage 3, Grade 3, 5 cm mass With renal vein invasion (Tp3a).

Details of Model Predictions for Jeff Kallis

1. ASSURE RCC Nomogram

A post-operative prediction model which provides a comprehensive review of expected oncological outcomes in patients with renal cell carcinoma. The nomogram is intended to be used for patients with an intermediate or high risk of recurrence (pT1b and G3-4; pT2/pT3/pT4; N1) based on ASSURE eligibility criteria.

Disease Free Survival (DFS) Risk Group

DFS: Low Risk Category

99.3%

1 year	2-year	3-year	4-year	<mark>5-year</mark>	6-year	7-year	8-year	9-year	10-year
94.1%	87.2%	81.2%	76.0%	<mark>71.5%</mark>	67.6%	64.1%	61.0%	58.1%	55.6%
Overall Survival (OS) Risk Group OS: Favorable Intermediate Risk Category									
1-year	2-year	3-year	4-year	<mark>5-year</mark>	6-year	7-year	8-year	9-year	10-year

88.7%

Probability of Early Disease Progression (EDP) = 4.7% No - patient is classified as NOT having a high risk for EDP.

83.0%

80.3%

77.7%

75.2%

85.8%

2. Leibovich RCC Model: Prediction of progression after radical nephrectomy for patients with clear cell renal cell carcinoma (2018 model)

A post-operative prediction model that assesses the risk of recurrence in patients with resected clear cell Renal Cell Carcinoma. Prognostic models for progression-free (PFS) and cancer-specific survival (CSS) in patients with clear cell renal cell carcinoma (ccRCC), papillary RCC (papRCC), and chromophobe RCC (chrRCC). Models were generated for each histologic subtype and a risk score/grouping was developed for each subtype and outcome (PFS/CSS).

Risk Group: Intermediate Risk

97.2%

94.6%

91.7%

Estimated Cancer-Free Survival Rate (2018 Model)

1 year	3-year	<mark>5-year</mark>	7-year	10-year	15-year
		<mark>75%</mark>		67%	61%

Estimated Overall Survival Rate (2018 Model)

1 year	3-year	5-year	7-year	10-year	15-year
		90%		85%	81%

3. Mayo D-SSIGN Model: Postoperative Cancer Specific Survival following Radical Nephrectomy for Clear **Cell Renal Cell Carcinoma**

What is my cancer specific survival if I had a radical nephrectomy for clear cell cancer and I am X number of years post-surgery?

1 year	<mark>5-year</mark>	10-year	
97%	<mark>82%</mark>	70%	

4. UISS RCC Model: Postoperative RCC Prognostic Model based on UCLA Risk Group Stratification What are my chances of being alive and of being free from recurrence 1, 2, 3, 4, and 5 years after surgery?

Freedom nom tocat recurrence after nepmectomy						
Year 1	Year 2	Year 3	Year 4	<mark>Year 5</mark>		
98.8%	98.8%	96.7%	96.7%	<mark>94.7%</mark>		
Disease-S	pecific Survi	val				
Year 1	Year 2	Year 3	Year 4	<mark>Year 5</mark>		
97.2%	90.6%	87.7%	85.5%	<mark>80.4%</mark>		
Overall Survival						
Year 1	Year 2	Year 3	Year 4	<mark>Year 5</mark>		
95.4%	87.5%	81.6%	79.0%	<mark>71.9%</mark>		

Freedom from local recurrence after penbrectomy

5. Memorial Sloan Kettering – Risk of Recurrence Following Surgery (Radical or Partial)

This kidney cancer nomogram is for patients with newly diagnosed renal cell carcinoma. The nomogram predicts the probability of remaining free of renal cell carcinoma five years after surgery - to predict the 5-year probability of treatment failure among patients with newly diagnosed renal cell carcinoma. Based on data from patients treated at Memorial Sloan Kettering Cancer Center. Data is applicable to T stages T1 to T3c only. Combines all types of renal cell carcinoma - chromophobe, papillary, and clear cell. Based on 4 data points: Histology, Symptoms, T Stage, and Tumor Size.

Year 5

<mark>89%</mark>

6. Karakiewicz – RCC Cancer-Specific Survival

The Karakiewicz nomogram is a clinical predictor used to estimate the survival outcomes of patients with localized renal cell carcinoma (RCC). It's considered a helpful tool for understanding patient prognosis, particularly for those with stage I and II RCC. The nomogram helps predict survival outcomes, including cancer-specific survival (CSS), overall survival, and freedom from recurrence.

Year 1	Year 2	<mark>Year 5</mark>	Year 10
92%	85%	<mark>74%</mark>	56%

Comparison of Models

https://www.sciencedirect.com/science/article/pii/S0305737223000191#t0005

The **"UCLA integrated staging system" (UISS)**, published in 2001, was intended to integrate pathologic tumor information with other variables to stratify patients into prognostic categories. 477 patients who underwent partial or radical nephrectomy were included in the study. Patients were stratified combining three parameters: tumor stage (5th edition (1997) of the TNM classification), Fuhrman's nuclear grade, and ECOG Performance Status (PS). The endpoint of interest was survival time, defined as the time from nephrectomy to the date of death or last follow-up.

The **Stage, Size, Grade and Necrosis (SSIGN)** score was developed from data of 1,801 patients with sporadic unilateral clear cell RCC (ccRCC) threated with radical nephrectomy. Both clinical (age, sex, smoking history, and signs and symptoms at presentation) and pathological (1997 TNM stage, tumor size, nuclear grade, histological tumor necrosis, sarcomatoid component, cystic architecture, multifocality and surgical margin status) factors were evaluated. Estimated cancer specific survival was the endpoint of interest.

The **Leibovich** score stratifies patients according to primary tumor stage (pT1b-4), regional lymph node status (pN1-2), tumor size (10 cm or greater), nuclear grade (G3-4) and presence of histologic tumor necrosis in order to predict the risk of disease recurrence. Each factor has its own numerical score and, according to the algorithm, patients could be classified as low, intermediate and high risk of relapse. Given the different prognosis related to the diverse histopathology of RCC, Leibovich et al. introduced different algorithms for each histologic subtype analyzing data from 3,633 RCC patients, of whom 2,726 (75%) had ccRCC, 607 (17%) had papillary RCC (pRCC) and 222 (6%) had chromophobe RCC (ChRCC).

Karakiewicz et al. analyzed 2,530 RCC patients treated with radical or partial nephrectomy, with cancerspecific overall survival (OS) representing the endpoint of interest. Published in 2007. At multivariate analysis, TNM stages, age, symptoms, Fuhrman grade and tumor size represented statistically significant predictors of cancer-specific survival (p < 0.001).