DOI: 10.4274/forbes.galenos.2025.78309
Forbes J Med 2025;6(2):180-7

Original Article / Orijinal Araştırma

Comparison of Prognostic Risk Models (IMDC, MSKCC, CFF) in Patients Diagnosed with Metastatic Renal Cell Cancer

Metastatik Renal Hücreli Kanser Tanılı Hastalarda Prognostik Risk Modellerinin (IMDC, MSKCC, CCF) Karşılaştırılması

Merve KESKİNKILIÇ, Kübra CANASLAN, Hüseyin Salih SEMİZ, Tuğba YAVUZŞEN

Dokuz Eylül University Faculty of Medicine, Department of Internal Medicine, Division of Medical Oncology, İzmir, Türkiye

Cite as: Keskinkılıç M, Canaslan K, Semiz HS, Yavuzşen T. Comparison of prognostic risk models (IMDC, MSKCC, CFF) in patients diagnosed with metastatic renal cell cancer. Forbes Med J.2025;6(2):180-7

ABSTRACT

Objective: The aim of this study is to reveal the relationship and correlation between the International metastatic renal cell carcinoma (mRCC) Database Consortium (IMDC) and Memorial Sloan Kettering Cancer Center (MSKCC) risk models used to determine first-line treatment in metastatic mRCC and, less commonly, the Cleveland Clinic Foundation (CCF) prognostic risk model.

Methods: The IMDC, MSKCC and CCF scores of mRCC patients who received immunotherapy (IO) and molecular targeted therapy were calculated retrospectively at the time of diagnosis.According to the score results, the patients were grouped as favorable,intermediate and poor risk.According to these risk groups,the median progression-free survival (mPFS) and median overall survival (mOS) of the patients were calculated and the correlation with each other was considered significant using appropriate statistical analyses, and $p<0.05$ was considered significant.

Results: The median follow-up time of 189 patients in the study was 45.5 months, mPFS 23.6 months [95% confidence interval (CI): 18.6-28.5 months] and mOS 34.6 months (95% CI: 23.3-45.9 months).The distribution of patients according to risk groups was similar in all three prognostic risk models. In the poor-risk group, both mPFS and mOS were statistically significantly shorter according to all three risk models (mPFS, IMDC: 14.2 months, MSKCC: 15.6 months, CCF: 17.1 months; mOS, IMDC: 17.6 months, MSKCC: 17.7 months, CCF: 22.4 months, $p<0.001$). A statistically significant positive correlation was observed between CCF, MSKCC and IMDC ($r=0.656$ vs. $r=0.690$, $p<0.001$). A stronger and statistically significant positive correlation was observed between MSKCC and IMDC ($r=793$, $p<0.001$).

Conclusion: Our study is the first study in the literature that we know of comparing the IMDC, MSKCC and CCF risk models in mRCC receiving IO and targeted therapy and as a result of our study, it was shown that all three risk models were correlated with each other.

Keywords: Cleveland Clinic Foundation (CCF), International mRCC Database Consortium (IMDC), Memorial Sloan Kettering Cancer Center risk (MSKCC), prognostic model, metastatic renal cell carcinoma (RCC)

ÖZ

Amaç: Bu çalışmanın amacı, metastatik renal hücreli karsinomda (mRHK) birinci basamak tedaviyi belirlemek için kullanılan Uluslararası mRCC Veritabanı Konsorsiyumu (IMDC) ve Memorial Sloan Kettering Kanser Merkezi (MSKCC) risk modelleri ile daha az yaygın olarak Cleveland Clinic Foundation (CCF) prognostik risk modeli arasındaki ilişkiyi ve korelasyonu ortaya koymaktır.

Yöntem: İmmünoterapi ve moleküler hedefli tedavi gören mRCC hastalarının IMDC, MSKCC ve CCF skorları tanı anında retrospektif olarak hesaplandı. Skor sonuçlarına göre hastalar düşük, orta ve kötü riskli olarak gruplandırıldı. Bu risk gruplarına göre hastaların medyan progresyonsuz sağkalım (mPSK) ve medyan genel sağkalım (mGSK) değerleri hesaplandı ve uygun istatistiksel analizler kullanılarak birbirleriyle korelasyon anlamlı kabul edildi ve $p<0,05$ anlamlı kabul edildi.

Received/Geliş: 16.06.2025
Accepted/Kabul: 09.07.2025
Yayınlanma Tarihi/ Publication Date: 06.08.2025

Corresponding Author/ Sorumlu Yazar:
Merve KESKİNKILIÇ, MD,
Dokuz Eylül University Faculty of Medicine, Department of Internal Medicine, Division of Medical Oncology, İzmir, Türkiye
mervekeskinkilic90@gmail.com
ORCID: 0000-0002-3342-3144

Bulgular: Çalışmaya katılan 189 hastanın medyan takip süresi 45,5 ay, mPSK 23,6 ay [95% güven aralığı (CI): 18,6-28,5 ay] ve mGSK 34,6 ay (95% CI: 23,3-45,9 ay) idi. Hastaların risk gruplarına göre dağılımı her üç prognostik risk modeline göre benzerdi. Düşük risk grubunda hem mPSK hem de mGSK her üç risk modeline göre istatistiksel olarak anlamlı şekilde daha kısaydı (mPSK, IMDC: 14,2 ay, MSKCC: 15,6 ay, CCF: 17,1 ay; mGSK, IMDC: 17,6 ay, MSKCC: 17,7 ay, CCF: 22,4 ay, p<0,001). CCF, MSKCC ve IMDC arasında istatistiksel olarak anlamlı pozitif bir korelasyon gözlendi (r=0,656 vs. r=0,690, p<0,001). MSKCC ve IMDC arasında daha güçlü ve istatistiksel olarak anlamlı pozitif bir korelasyon gözlemlendi (r=793, p<0,001).

Sonuç: Çalışmamız, immünoterapi ve hedefli tedavi alan mRHK'de IMDC, MSKCC ve CCF risk modellerini karşılaştıran literatürdeki bildiğimiz ilk çalışmadır ve çalışmamızın sonucunda, üç risk modelinin de birbirleriyle ilişkili olduğu gösterilmiştir.

Anahtar Kelimeler: Cleveland Clinic Foundation (CCF), International mRCC Database Consortium (IMDC), Memorial Sloan Kettering Cancer Center (MSKCC), prognostik model, metastatik renal hücreli kanser (RHK)

INTRODUCTION

Metastatic renal cell carcinoma (mRCC) presents significant challenges in clinical management due to its heterogeneous nature and variable patient outcomes. Accurate prognostic models are essential for guiding treatment decisions and optimizing patient care. Among the most widely recognized models are the Memorial Sloan Kettering Cancer Center (MSKCC) criteria and the International mRCC Database Consortium (IMDC) criteria. These models stratify patients based on clinical and laboratory parameters, facilitating personalized therapeutic approaches.

The MSKCC model, established in the cytokine therapy era, identifies five adverse prognostic factors: low Karnofsky performance status (PS) (<80%), elevated lactate dehydrogenase (>1.5 times the upper limit of normal), anemia, hypercalcemia, and a diagnosis-to-treatment interval of less than one year. Patients are categorized into favorable (0 factors), intermediate (1-2 factors), and poor (≥3 factors) risk groups, with corresponding median overall survival (mOS) times of 20, 10, and 4 months, respectively.[1]

Recognizing the advancements in targeted therapies, the IMDC model was developed to provide prognostic insights in the context of modern treatments. This model incorporates six factors: anemia, hypercalcemia, neutrophilia, thrombocytosis, poor PS, and a diagnosis-to-treatment interval of less than one year. Similar to the MSKCC criteria, the IMDC stratifies patients into favorable (0 factors), intermediate (1-2 factors), and poor (≥3 factors) risk categories. Studies have demonstrated that the IMDC model effectively predicts outcomes in patients receiving targeted therapies, with mOS times of 35.3, 16.6, and 5.4 months for favorable, intermediate, and poor risk groups, respectively.[2]

In addition to the most commonly used MSKCC and IMDC criteria, the Cleveland Clinic Foundation (CCF) criteria are also used as a prognostic risk model, and this model uses elevated lactate dehydrogenase (>1.5 times the upper limit of normal), anemia, hypercalcemia, a diagnosis-to-treatment interval of less than one year, prior radiotherapy, and presence of hepatic, lung, or retroperitoneal lymph node metastases as risk factors.[3] The CCF prognostic risk model stratifies patients into favorable (0-1 factors), intermediate (2 factors), and poor (>3 factors) risk categories.[4] Using these criteria, 353 patients were retrospectively evaluated. Thirty-seven percent were at favorable risk, 35% at intermediate risk, and 28% at poor risk. mOS for these groups was 26.0, 14.4, and 7.3 months, respectively.[4] This study has also shown that the CCF prognostic risk model criteria contribute to prognostic modeling in mRCC.[3]

In studies comparing the correlation between the widely used MSKCC and IMDC prognostic risk model criteria in the literature, it was shown that these two prognostic models were statistically significantly correlated. In one study, 19% of the MSKCC intermediate group were reclassified as belonging to the IMDC poor risk group.[5-7] In the external validation study of the IMDC prognostic risk model, the CCF model, the International Kidney Cancer Working Group (IKCWG) model, the french model, and the MSKCC prognostic risk model were compared, and the MSKCC and IMDC prognostic risk models showed the highest concordance.[8] Although there are studies in the literature comparing the IMDC and MSKCC prognostic risk models one-on-one, and the CCF prognostic risk model indirectly for validation purposes, there is no study comparing the CCF prognostic risk model, which includes the metastasis site and the treatment received, with the IMDC and MSKCC prognostic risk models. In this study, we aimed to evaluate the prognostic value and correlation of IMDC, MSKCC, and CCF prognostic risk models in terms of selecting appropriate treatment strategies and counseling patients about prognosis in patients with mRCC receiving treatment with an anti-vascular endothelial growth factor (VEGF) inhibitor and immunotherapy (IO) treatment.

METHODS

Study Design and Population

In this retrospective study, patients diagnosed with mRCC between January 2010 and September 2023 at the Dokuz Eylül University Faculty of Medicine, Department of Medical Oncology were evaluated. The inclusion criteria of the study were determined as follows: i) being diagnosed with RCC, ii) receiving treatment for at least 3 months, iii) having complete blood count and serum biochemical

values at the beginning of treatment, iv) having complete data, v) being male and female aged 18 years and over. The exclusion criteria of the study were determined as follows: (i) patients with non-RCC histology; (ii) patients with less than 3 months follow-up; (iii) clinical trial patients; (iv) patients with a second malignancy were excluded. At the time of diagnosis, the demographic characteristics, clinicopathological characteristics, complete blood count, and biochemical laboratory values of the patients were recorded through the hospital database retrospectively.

Ethical Approval

This retrospective study was designed in accordance with the principles of the Declaration of Helsinki. Use of participant data was permitted without obtaining informed consent with the permission of the hospital administration. Based on this, the study was approved by the Dokuz Eylül University Faculty of Medicine Non-Interventional Research Ethics Committee (decision number: 2022/42-12, date: 28.12.2022).

Cleveland Clinic Foundation, International Metastatic Renal Cell Carcinoma Database Consortium and Memorial Sloan Kettering Cancer Center Risk Models

CCF, IMDC, and MSKCC prognostic risk models were used to determine the risk group of the patients. The parameters specified in Table 1 were used in these risk models, and the study population was grouped as favorable (no risk factors), intermediate (1-2 risk factors) and poor risk (>2 risk factors) according to the presence of the parameters in these models.

Response and Toxicity Assessment

Positron emission tomography/computed tomography (CT) and CT were performed every three to four months during the treatment. T Tumor staging was performed according to "Eighth Edition of American Joint Committee on Cancer and the Union for International Cancer Control TNM stage classification." Response assessments. It was conducted in accordance with the "Response Evaluation Criteria in Solid Tumors v1.1 guidelines". Toxicity assessments were made according to the National Cancer Institute Common Toxicity Criteria.

Statistical Analysis

Demographic and clinicopathological features of the patients were obtained from the hospital database. The Statistical Package for the Social Sciences version 24.0 (SPSS 24.0, IBM Corporation, Armonk, New York, USA) was used in the analysis of variables. The Kolmogorov-Smirnov Test was used to evaluate the conformity of the data to normal distribution. Independent Samples t-test and the Mann-Whitney U test, were used to compare two independent groups according to quantitative data. The Pearson chi-square test and Fisher's exact test were used to compare categorical variables. Multiple linear regression analyses were used to evaluate the relationship between the CCF, IMDC, and MSKCC prognostic risk models. Median progression-free survival (PFS) in the entire population was defined as the time from the start date of systemic therapy to progression, death, or last follow-up, whichever occurred first. OS was defined as the time from the date of diagnosis to death or last follow-up. Median follow-up time in the study was calculated using the inverse Kaplan-Meier. The Kaplan-Meier (product limit method) and Log Rank (Mantel-Cox) analyses were used to examine the effects of variables on survival times, according to the determined cut-off value. Quantitative variables are expressed in the tables as mean ± standard deviation and median (minimum/maximum), while categorical variables are shown as n (%). Variables were evaluated at a 95%

Table 1. CCF, IMDC and MSKCC prognostic risk models

Risk factor	CCF risk factors	IMDC risk factors	MSKCC risk factors
Time from diagnosis to systemic treatment <1 year	✓	✓	✓
Hemoglobin < lower limit of normal	✓	✓	✓
Calcium level > upper limit of normal	✓	✓	✓
Performance status <80% (Karnofsky)		✓	✓
LDH > 1.5x upper limit of normal	✓	✓	
Neutrophils > upper limit of normal			✓
Platelets > upper limit of normal			✓
Prior radiotherapy	✓		
Presence of hepatic, lung or retroperitoneal node metastases	✓		

CCF: Cleveland Clinic Foundation, IMDC: International Metastatic Renal Cell Carcinoma Database Consortium, MSKCC: Memorial Sloan Kettering Cancer Center, LDH: Laktat dehidrogenaz

confidence interval (CI) and statistical significance was determined as $p<0.05$.

RESULTS

Patients and Clinicopathological Characteristics

The median age of the 189 patients included in the study population was 62.4 years (range: 27.4-89.9). The male population in the study was approximately 3 times as many as the female population [male/female: 75.1% (n=142)/24.9% (n=47)]. The majority of the patients [62.4% (n=118)] had Eastern Cooperative Oncology Group PS 0, and the majority of the population (68.8%) had comorbidities. The distributions of tumor localization were quite similar, although the localization in the right kidney was slightly higher [right kidney/left kidney: 51.9% (n=98)/48.1% (n=91)]. It was observed that 69.8% (n=132) of the patients were de novo metastatic at the time of diagnosis, and the most common metastatic site was the lung [64.6% (n=122)]. The most common histological subtype in the population was clear cell RCC [66.1% (n=125)]. Clinicopathological features of the population are shown in Table 2.

Patients Treatment Characteristics

In the study population, the most frequently preferred treatment for metastatic cancer first-line was sunitinib (34.4%), followed by nivolumab (28%), axitinib (19.6%), and cabozantinib (2.6%). 79.9% of patients (n=151) who received treatment had progressed after first-line treatment. In addition, 70.9% of patients were able to reach second-line treatment, 37.6% were able to reach third-line treatment, and 6.9% were able to reach fourth-or more-line treatment.

Distribution of Patients According to Prognostic Models

When we evaluated the distribution of the patient population according to the IMDC prognostic risk model, 9.5% (n=18) of the patients were in the favorable-risk group, 62.4% (n=118) were in the intermediate-risk group, and 28% (n=53) were in the poor-risk group. According to the MSKCC prognostic risk model, 7.7% (n=14) were in the favorable-risk group, 60.8% (n=115) were in the intermediate-risk group, and 31.7% (n=60) were in the poor-risk group. In contrast, in the CCF prognostic model, a distribution almost similar to the MSKCC prognostic model was observed, with 7.9% (n=15) in the favorable-risk group, 61.9% (n=117) in the intermediate-risk group, and 30.2% (n=57) in the poor-risk group. The distribution of the population is shown in Table 3.

Survival Analysis

The mean follow-up period in the study was 45.5 months, and 29.6% (n=56) of patients were still alive. Without stratification according to prognostic risk group and stage, mPFS was 23.6 months (95% CI: 18.6-28.5 months) and mOS was 34.6 months (95% CI: 23.3-45.9 months) in the entire group.

Survival Analyses According to Prognostic Risk Models

The IMDC prognostic risk model reliably discriminated three risk groups to predict survival: the mPFS mOS for the favorable, intermediate, and poor risk groups were 40.9,

Table 2. Clinicopathological features of the patients

Characteristic	(n) %
Gender	
Male	75.1% (n=142)
Female	24.9% (n=47)
ECOG performance score	
0	62.4% (n=118)
1	28.6% (n=54)
2	17 % (n=9)
Comorbidity	69.8 % (n=132)
Hypertansion	46% (n=87)
Tip 2 diabetes mellitus	23.8% (n=45)
Chronic renal disease	20% (n=38)
Coronary arter disease	18.5% (n=35)
Other	16.9% (n=32)
Smoking status	
Present	22.8% (n=43)
Absent	42.9% (n=81)
Unknown	34.4% (n=65)
Tumor location	
Right kidney	51.9% (n=98)
Left kidney	48.1% (n=91)
Stage at the time of diagnosis	
Stage 4	69.8% (n=132)
Stage 3	15.3% (n=29)
Stage 2	7.4% (n=14)
Stage 1	6.3% (n=12)
Unknown	1.1% (n=2)
Histologic subtype	
Clear cell	66.1% (n=125)
Unclassifiable	7.9% (n=15)
Sarcomatoid	7.9% (n =15)
Papillary type type 1	4.2% (n=8)
Chromophobe	4.2% (n=8)
Papillary type 2	1.1% (n=2)
Others	8.6% (n=10)
Site of metastasis	
Lung	64.6% (n=122)
Lymph node	44.4% (n=84)
Non-regional	13.2% (n=25)
Regional	31.7% (n=60)
Bone	24.3% (n=46)
Liver	10.1% (n=19)
Brain	

ECOG: Eastern Cooperative Oncology Group.

Table 3. Distribution of prognostic risk models			
Prognostic risk models	**Favorable risk (%/n)**	**Intermediate risk (%/n)**	**Poor risk (%/n)**
IMDC	9.5% (n=18)	62.4% (n=118)	28 % (n=53)
MSKCC	7.7% (n=14)	60.8% (n=115)	31.7% (n=60)
CCF	7.9% (n=15)	61.9% (n=117)	30.2% (n=57)

CCF: Cleveland Clinic Foundation, IMDC: International Metastatic Renal Cell Carcinoma Database Consortium, MSKCC: Memorial Sloan Kettering Cancer Center

29.7, and 14.2 months (p=0.001); 75, 47.7, and 17.6 months (p<0.001), respectively. The MSKCC prognostic risk model also reliably distinguished three risk groups, quite similar to the IMDC, with survival times of 40.6, 33.5, and 15.6 months (p=0.001), and 76.3, 47.7, and 17.7 months (p=0.001). Again, as in the IMDC and MSKCC prognostic risk models, the CCF prognostic risk model statistically and significantly separated survival in the three risk groups, although patients had shorter PFS and OS times than the other two prognostic models: 35.7, 25.8, and 17.1 months (p=0.011); 67.9, 40.8, and 22.4 months (p=0.016), respectively. Survival analyses are shown in Figure 1.

Comparison of Cleveland Clinic Foundation, International Metastatic Renal Cell Carcinoma Database Consortium and Memorial Sloan Kettering Cancer Center Risk Models

When correlation indices were calculated for each model, it was observed that the CCF prognostic risk model showed a statistically significant positive correlation with both the MSKCC prognostic risk model (r=0.656) and the IMDC prognostic risk model (r=0.690), with p<0.001 for both). A statistically significant stronger positive correlation is observed between the MSKCC prognostic risk model and the IMDC prognostic risk model, which are more frequently used in current practice, respectively (r=793, p<0.001).

DISCUSSION

To our knowledge, this study is the first to evaluate the comparison of the most commonly used IMDC and MSKCC models in determining the treatment strategy for mRCC, and the CCF prognostic risk model, which includes the metastasis site and the given treatment (radiotherapy) as prognostic risk criteria. This is in contrast to two other less commonly used risk models. In our study population diagnosed with metastatic clear cell RCC treated with tyrosine kinase inhibitor (TKI) and IO, these three prognostic risk models were similarly effective in determining good, intermediate, and poor risk groups and were related to each other in terms of prognostic value. Although there is no direct comparison of these IMDC, MSKCC and CCF prognostic risk models in the literature, Heng et al.[8] reported that the IMDC prognostic risk model was comparable to the CCF, IKCWG, french and MSKCC risk models in their study. This supports our study focusing on only three prognostic risk models.

When the history of the development of prognostic risk models in mRCC was evaluated, the MSKCC prognostic risk model, developed by Motzer et al.[9], combined five poor prognostic factors: not having undergone nephrectomy, a Karnofsky-PS score below at the beginning of treatment, anemia, elevated serum laktat-dehidrogenaz, and hypercalcemia (corrected Ca >10), during the period of systemic chemotherapy and cytokine therapy in mRCC. This model was validated and reported as the CCF prognostic risk model. After previous radiotherapy, the presence of liver, lung, and retroperitoneal nodal metastases were found to be independent prognostic factors.[4,8] With the introduction of VEGF molecular targeted therapies over time, the treatment paradigm in mRCC has changed, and new prognostic profiles are needed. The IMDC prognostic risk model, derived from a multicenter cohort, was constructed consisting of six independent predictive factors [Karnofsky PS <80%, time from diagnosis to treatment <1 year, anemia (hemoglobin concentration < lower limit of normal), hypercalcemia (corrected calcium concentration > upper limit of normal), neutrophilia (neutrophil count > upper limit of normal), and thrombocytosis (platelet count > upper limit of normal)].[8,10]

Currently, in the determination of risk groups in Phase 3 studies, combination therapies (TKIs/IO and IO) recommended by international guidelines as first-line treatment in both favorable and intermediate/poor risk groups at category 1 level in the treatment of mRCC have received Food and Drug Administration approval. The IMDC and MSKCC risk models constitute the two most commonly used risk models, with the IMDC risk model validated for cytokine and targeted therapies being more prevalent.[11-14] It has been observed that other prognostic risk models, including CCF, are not used for determining treatment decisions in clinical phase studies other than these two risk models.[15] In our study, in addition to the IMDC and MSKCC prognostic risk models, the CCF prognostic risk model was also evaluated, and it was shown that in the study population including mRCC patients receiving targeted therapy and IO treatment, PFS and OS were similar according to all three risk models in all risk groups.

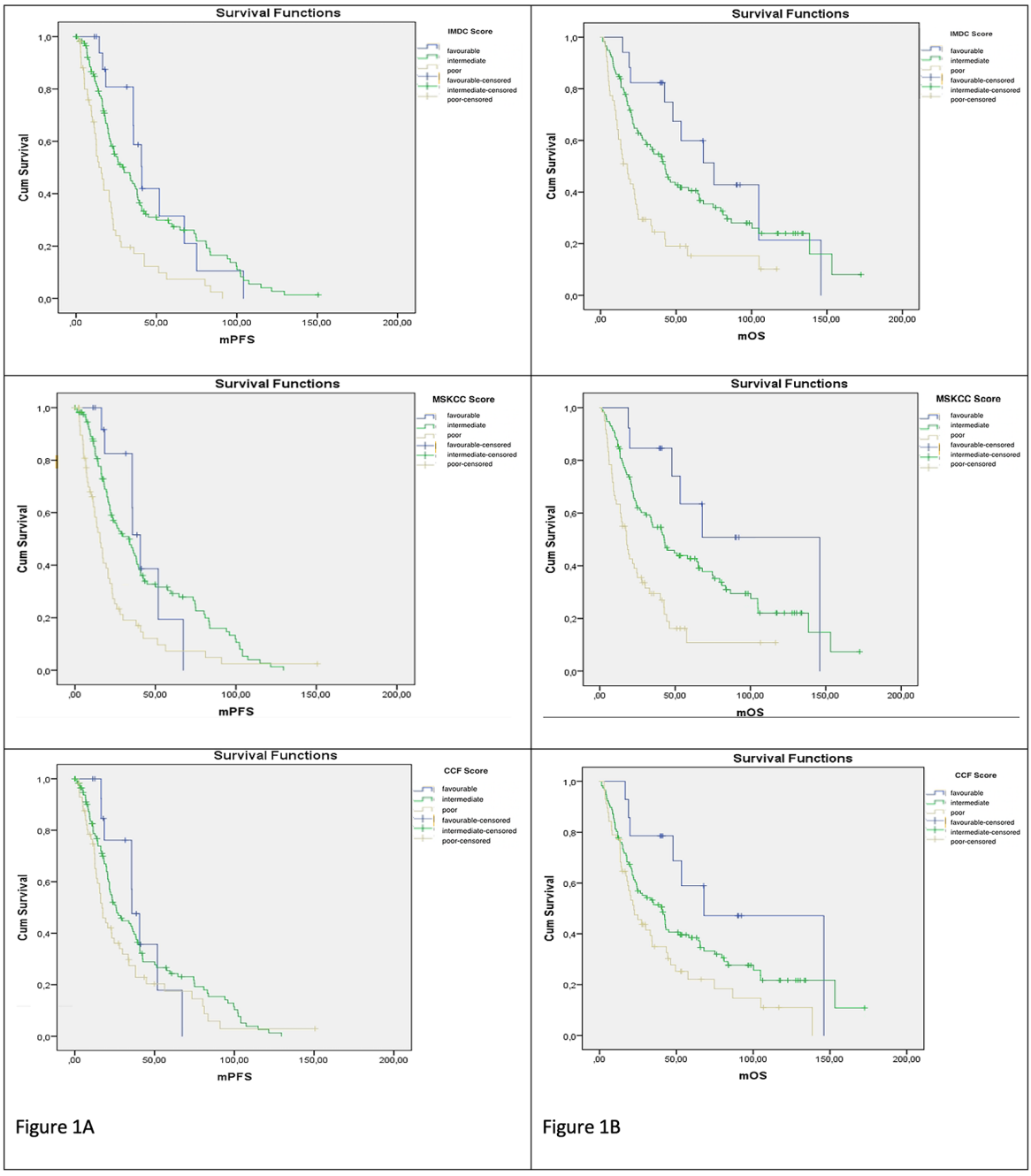

Figure 1. (A) PFS comparison of risk groups in IMDC, MSKCC and CCF risk models. (B) OS comparison of risk groups in IMDC, MSKCC and CCF risk models. PFS: Progression-Free Survival, IMDC: International Metastatic Renal Cell Carcinoma Database Consortium: MSKCC: Memorial Sloan Kettering Cancer Center, CCF: Cleveland Clinic Foundation, OS: Overall survival

The IMDC and MSKCC prognostic risk models were shown to be more highly correlated with each other, consistent with the literature.[16-19] Although there is no study in the literature comparing the CCF with the IMDC prognostic risk model and the MSKCC prognostic risk model, the results of the study by Heng et al.[8] comparing the IMDC with the CCF, IKCWG, the french, and the MSKCC prognostic risk models in mRCC patients reported that all risk models showed concordance with each other, as in our study.

In the studies in the literature where the distribution of risk groups was evaluated according to the IMDC and the MSKCC risk model, it was shown that patients in the intermediate risk group according to the MSKCC risk model were included in the poor risk group according

to the IMDC risk model at varying rates (19%, 31.2%).[7,16] In previous studies, although it was reported that the IMDC and MSKCC risk models showed concordance with each other in terms of PFS and OS, it was shown that, secondary to this difference in risk group distribution, the group that was intermediate according to the MSKCC risk model had shorter OS than the group that was intermediate according to the IMDC risk model. In our study, contrary to these studies, the distribution rate of the risk groups (favorable, intermediate, and poor group) was similar in all three prognostic risk models. As a result, no disagrrement was observed in terms of PFS and OS between both the IMDC and MSKCC risk models and between the risk groups according to all three prognostic risk models.

Study Limitations

Our study had some limitations. The first two of these limitations are that the study results belong to a single center and the study design is retrospective; therefore, we believe that the study should be planned and repeated as a prospective, large, multi-center study. Another limitation of the study is that since combination therapies (IO/TKI and IO) have become the standard treatment in mRCC today, this study involving patients receiving IO and VEGF-targeted therapy, does not reflect mRCC patients receiving combination therapy. It would be more appropriate to plan a study including this patient group. The last limitation of the study is that the CCF prognostic risk model was compared and correlated only with the most commonly used IMDC and MSKCC prognostic risk models. Since it was not compared with the french and IKCWG prognostic risk models, it is suggested that examining its correlation with these models may increase the power of the CCF prognostic risk model.

CONCLUSION

In our study, it was shown that the CCF prognostic risk model, which uses the given treatment and metastasis site as risk factors, is correlated with the most comprehensive and widely used MSKCC and IMDC prognostic risk models in clinical practice. It can be used as a prognostic risk model in mRCC in addition to other risk models, especially in the patient group where the metastasis site may be important in treatment decisions. These risk models are important for designing clinical trials, selecting appropriate treatment strategies, and counseling patients about their prognosis. Ongoing research continues to improve these models, combining new biomarkers and molecular insights to increase their predictive accuracy in the evolving environment of mRCC, where treatment strategies change over time.

Ethics

Ethics Committee Approval: This study was approved by the Dokuz Eylül University Faculty of Medicine Non-Interventional Research Ethics Committee (decision number: 2022/42-12, date: 28.12.2022).

Informed Consent: Retrospective study.

Presented in: The study was previously presented as an oral presentation at the 12th Symposium on Searches in Oncology held in Çeşme/İzmir on 13-15 December 2024.

Footnotes

Authorship Contributions

Surgical and Medical Practices: M.K., K.C., H.S.S., T.Y., Concept: M.K., K.C., H.S.S., T.Y., Design: M.K., Data Collection or Processing: M.K., K.C., Analysis or Interpretation: M.K., Literature Search: M.K., K.C., H.S.S., Writing: M.K.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

REFERENCES

1. Fitzgerald KN, Lee CH. Personalizing first-line management of metastatic renal cell carcinoma: leveraging current and novel therapeutic options. J Natl Compr Canc Netw. 2022;20.
2. Yang J, Wang K, Yang Z. Treatment strategies for clear cell renal cell carcinoma: past, present and future. Front Oncol. 2023;13:1133832.
3. Choueiri TK, Rini B, Garcia JA, et al. Prognostic factors associated with long-term survival in previously untreated metastatic renal cell carcinoma. Ann Oncol. 2007;18:249-55.
4. Mekhail TM, Abou-Jawde RM, Boumerhi G, et al. Validation and extension of the Memorial Sloan-Kettering prognostic factors model for survival in patients with previously untreated metastatic renal cell carcinoma. J Clin Oncol. 2005;23:832-41.
5. Ko JJ, Xie W, Kroeger N, et al. The International Metastatic Renal Cell Carcinoma Database Consortium model as a prognostic tool in patients with metastatic renal cell carcinoma previously treated with first-line targeted therapy: a population-based study. Lancet Oncol. 2015;16:293-300.
6. Kim JK, Kim SH, Song MK, et al. Application of the International Metastatic Renal Cell Carcinoma Database Consortium and Memorial Sloan Kettering Cancer Center risk models in patients with metastatic non-clear cell renal cell carcinoma: a multi-institutional retrospective study using the Korean Metastatic Renal Cell Carcinoma Registry. Cancer Res Treat. 2019;51:758-68.
7. Okita K, Hatakeyama S, Tanaka T, et al. Impact of disagreement between two risk group models on prognosis in patients with metastatic renal-cell carcinoma. Clin Genitourin Cancer. 2019;17:e440-6.
8. Heng DY, Xie W, Regan MM, et al. External validation and comparison with other models of the International Metastatic Renal-Cell Carcinoma Database Consortium prognostic model: a population-based study. Lancet Oncol. 2013;14:141-8.

9. Motzer RJ, Mazumdar M, Bacik J, Berg W, Amsterdam A, Ferrara J. Survival and prognostic stratification of 670 patients with advanced renal cell carcinoma. J Clin Oncol. 1999;17:2530-40.
10. Heng DY, Xie W, Regan MM, et al. Prognostic factors for overall survival in patients with metastatic renal cell carcinoma treated with vascular endothelial growth factor-targeted agents: results from a large, multicenter study. J Clin Oncol. 2009;27:5794-9.
11. Tannir NM, Albigès L, McDermott DF, et al. Nivolumab plus ipilimumab versus sunitinib for first-line treatment of advanced renal cell carcinoma: extended 8-year follow-up results of efficacy and safety from the phase III CheckMate 214 trial. Ann Oncol. 2024;35:1026-38.
12. Plimack ER, Powles T, Stus V, et al. Pembrolizumab plus axitinib versus sunitinib as first-line treatment of advanced renal cell carcinoma: 43-month follow-up of the phase 3 KEYNOTE-426 study. Eur Urol. 2023;84:449-54. Epub 2023;25. Erratum in: Eur Urol. 2023;84:e123-4. Erratum in: Eur Urol. 2024;85:e58-9. Available from: 10.1016/j.eururo.2023.11.016.
13. Choueiri TK, Powles T, Burotto M, et al. Nivolumab plus cabozantinib versus sunitinib for advanced renal-cell carcinoma. N Engl J Med. 2021;384:829-41.
14. Motzer R, Alekseev B, Rha SY, et al. Lenvatinib plus pembrolizumab or everolimus for advanced renal cell carcinoma. N Engl J Med. 2021;384:1289-1300.
15. Shinohara N, Abe T. Prognostic factors and risk classifications for patients with metastatic renal cell carcinoma. Int J Urol. 2015;22:888-97.
16. Kubackova K, Melichar B, Bortlicek Z, et al. Comparison of two prognostic models in patients with metastatic renal cancer treated with sunitinib: a retrospective, registry-based study. Target Oncol. 2015;10:557-63.
17. Noe A, de Bruijn RE, Blank C, Horenblas S, Haanen J, Bex A. Comparison of pre-treatment MSKCC and IMDC prognostic risk models in patients with synchronous metastatic renal cell carcinoma treated in the era of targeted therapy. World J Urol. 2016;34:1067-72.
18. Sella A, Michaelson MD, Matczak E, Simantov R, Lin X, Figlin RA. Heterogeneity of patients with intermediate-prognosis metastatic renal cell carcinoma treated with sunitinib. Clin Genitourin Cancer. 2017;15:291-299.e1.
19. Tanaka N, Mizuno R, Ito K, et al. External validation of the MSKCC and IMDC risk models in patients treated with targeted therapy as a first-line and subsequent second-line treatment: a Japanese multi-institutional study. Eur Urol Focus. 2016;2:303-9.