

# Pattern of Distant Organ Metastasis and Effects on Survival in Rectal Adenocarcinoma: A Population-Based Study

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## Introduction

Metastasis to distant organs is associated with a poorer prognosis in patients with rectal adenocarcinoma (RAC). Identification of risk factors for metastasis is crucial for early detection. We used the Surveillance, Epidemiology and End-Results (SEER) database to determine the frequency, risk factors, and prognosis of metastasis in RAC patients.

## Methods

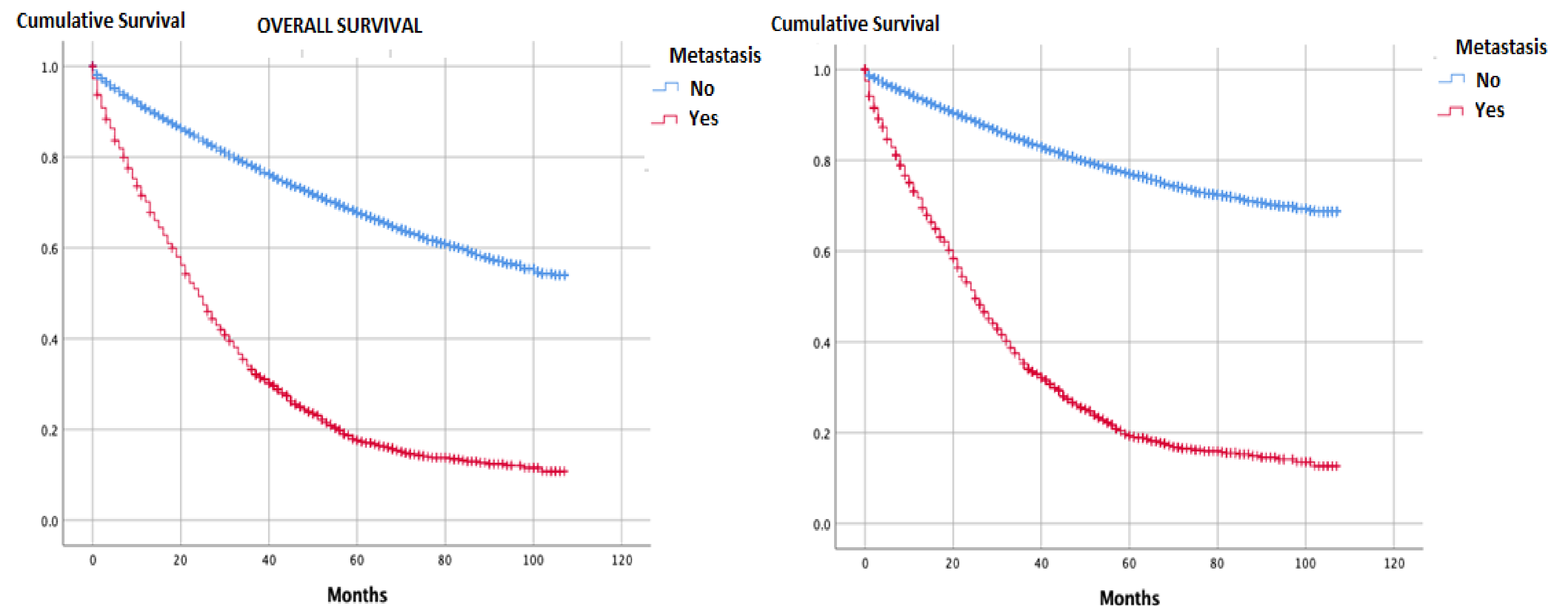
Using SEER data from 2010-2018 we calculated OS and CSS. Descriptive statistics, multivariate logistic regression, and Cox regression were applied using SPSS version 25. Kaplan Meier survival curves were constructed.

**Table. 1**

Features	No metastasis, n (%)	Any metastasis, n (%)	P-value
Total	12,005	1,559	
Race			0.001
Caucasian	9439 (88.8)	1196 (11.2)	
African American	974 (85.2)	169 (14.8)	
Other	1592 (89.1)	194 (10.9)	
Sex			0.065
Male	7084 (88.1)	958 (11.9)	
Female	4921 (89.1)	601 (10.9)	
Age, years			< 0.001
Less than 50	2085 (86.0)	339 (14.0)	
50-75	7123 (88.3)	941 (11.7)	
More than 75	2797 (90.1)	279 (9.1)	
Tumor grade			< 0.001
1	963 (93.8)	64 (6.2)	
2	9488 (88.8)	1194 (11.2)	
3	1355 (83.6)	266 (16.4)	
4	199 (85.0)	35 (15.0)	
T Stage			< 0.001
1	2633 (91.4)	249 (8.6)	
2	2007 (96.4)	75 (3.6)	
3	6172 (87.8)	860 (12.2)	
4	1193 (76.1)	375 (23.9)	
N Stage			< 0.001
0	7041 (93.5)	490 (6.5)	
1	3679 (83.8)	711 (16.2)	
2	1285 (78.2)	358 (21.8)	
Surgery			< 0.001
Yes	10889 (92.6)	870 (7.4)	
No	1116 (61.8)	689 (38.2)	
Size >200mm	187.51	260.52	< 0.001
Annual income			0.076
Less than 50,000	1557 (86.9)	234 (13.1)	
50,000-75,000	6296 (88.8)	791 (11.2)	
>75,000	4152 (88.6)	534 (11.4)	

## Results

We included 13,564 patients with RAC. Metastasis to any site, liver, lung, bone, and brain, was reported in 11.5%, 9.6%, 4.1%, 0.8%, and 0.1% of patients, respectively. Sociodemographic and tumor characteristics of patients with and without metastasis are reported in Table 1. On logistic regression, significant risk factors for metastasis were age < 50 years (adjusted odds ratio (aOR) 1.168), grade 4 (aOR 2.119), T4 (aOR 1.866), N2 (aOR 4.520), and patients without surgery (aOR 9.71). The median OS and CSS in metastatic RAC were 24 and 25 months, respectively. Median OS of one, two, and three metastatic sites were 27, 15, and 8 months, respectively (P < 0.001) (Figure. 1). On Cox regression, variables significantly associated with decreased OS were age greater than 75 years (adjusted hazard ratio (aHR) 2.13), grade 4 (aHR 1.436), T4 (aHR 1.31), N2 (aHR 1.257), and tumors >200mm (aHR 1.229). Variables significantly associated with decreased CSS were age greater than 75 years (aHR 2.009), grade 4 (aHR 1.487), T4 (aHR 1.278), N2 (1.304), and tumors >200 mm (aHR 1.259).



## Conclusion

Metastasis was reported in 11.5% of patients, most commonly in the liver (9.6%). The site-specific risk factors for metastasis reported in our study may facilitate the identification of high-risk groups that need careful surveillance.



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