

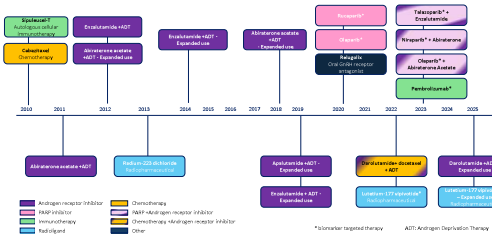
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## BACKGROUND

- Prostate cancer is the second-leading cause of cancer death in men in the United States.<sup>1</sup>
- Survival in prostate cancer is known to vary significantly by stage at diagnosis.<sup>1</sup>
- Over the last 15 years, several life-prolonging therapies have been approved for the treatment of metastatic prostate cancer (mPC). (Figure 1)
- The impact of these novel therapies on patient outcomes in the real world is unknown.
- The main objective of our study was to assess survival outcomes and related predictors in patients diagnosed with distant stage (metastatic) prostate cancer.

**Figure 1. Drug Approvals in the US for Prostate Cancer (2010-2025)**



## METHODS

### Study Design

- Non-interventional retrospective cohort study design

### Data Source

- Data was obtained from Surveillance, Epidemiology, and End Results (SEER) in the United States
- SEER collects cancer incidence and survival data from population-based cancer registries, that routinely collect data on patient demographics, tumor characteristics, and follow-up for vital status (survival).
- These data are collected on every cancer case reported from 22 US geographic areas which covers approximately 48% of the U.S. population.
- Data accessible to researchers via the SEER website<sup>2</sup>

- All data are de-identified

- ### Patient Inclusion Criteria
- Male patients of age  $\geq 18$  years at diagnosis
  - Primary diagnosis of prostate cancer interest between 2010 and 2021 (ICD10 code: C61.9)
  - Distant Stage as per SEER staging

### Patient Exclusion Criteria

- Prostate cancer not listed as the primary tumor
- Early-stage prostate cancer cases
- Stage information missing
- No follow up data post diagnosis
- Patients diagnosed with the tumor from autopsy or death certificate data.
- Uncertain/ invalid date at diagnosis

## Data Analyses

- Descriptive Statistics were estimated for patient demographics and clinical characteristics. Mean and median values were used to describe continuous data. Frequencies and percentages were used to describe categorical variables.
- The overall survival (OS) and cancer-specific survival (CSS) were estimated using Kaplan–Meier methods for the overall cohort and stratified by age (<65 years and ≥65 years).
- The OS and CSS was estimated from the time of diagnosis to time of death or last date of follow up.
- Cancer specific vs death due to any cause was determined by combining 'SEER cause-specific death' classification and 'SEER other cause of death' classification variables.
- Prostate CSS was defined as the time from the initial diagnosis of prostate cancer to the date of tumor-specific death or last follow-up.
- OS was defined as the time from the initial diagnosis of prostate cancer to the date of death due to any cause. Patients were censored at last follow up if death not reported.
- Median survival and 5-year survival rates were reported.

### Data Analyses (cont'd)

- Predictors of survival were assessed using multivariate Cox proportional hazards modeling adjusting for confounding factors. The p-value of 0.05 was used to determine statistical significance.
- 5-year relative survival was estimated.
- Relative cancer survival is defined as the ratio of the observed all-cause survival in a group of individuals with cancer to the expected all-cause survival of a similar group of individuals who do not have cancer.
- Expected all-cause survival for the general population is obtained using annual US life tables provided by the National Center for Health Statistics (NCHS) and embedded in the SEER STAT explorer tool used for the analyses.<sup>3</sup>

## RESULTS

- The cohort included 42,115 patients with mPC, 53% of whom were diagnosed in 2017 or later. (Table 1)
- The majority (72%) were aged  $\geq 65$  years, with a mean age of 71.
- Adenocarcinoma was the most common histologic subtype (84%).

Table 1. Patient Demographics and Clinical Characteristics

Patient Characteristic	Category	Overall (N=42,115)	<65 years (N=13,740)	≥65 years (N=28,375)
Race / Ethnicity	African American	7,013	2,919	4,093
	Caucasian	31,433	7,999	23,434
	Asian or Pacific Islander	2,802	637	2,165
	American Indian/Alaska Native	315	216	99
	Unknown	337	90	247
Histology	Adenomas and adenocarcinomas	35,548	10,091	24,857
	Unspecified	3,301	367	2,934
	Lymphoid	3,056	604	2,452
	Ductal and lobular	126	46	80
	Other	84	32	52
Prior surgery	Yes	4,314	1,164	2,950
	No	34,001	10,576	23,425
	None	36,546	10,085	26,461
Site of Metastasis	Brain	457	160	297
	Liver	1,827	555	1,272
	Lung	3,642	1,010	2,632
Stage of Metastasis	Distant LN	6,041	2,051	3,990
	Distant mets in known site(s) other than bone, brain, liver, lung, dist LN	1,446	408	1,038
	Genitourinary metastases such as carcinomatosis	18	5	13
	No other metastases	23,585	6,311	17,274
	2014	2,254	697	1,557
	2011	2,384	741	1,643
	2013	2,390	714	1,676
	2013	2,782	838	1,944
	2014	2,395	687	1,707
	2015	3,937	940	2,997
Year of Diagnosis	2010	3,387	1,004	2,383
	2017	4,012	1,088	2,924
	2018	4,237	1,174	3,063
	2019	4,471	1,199	3,272
	2020	4,487	1,146	3,341
	2021	5,061	1,272	3,789

Abbreviations: CCL, Cytoskeleton Cytoskeleton; LM, Lymphocyte; M, Mitochondria; N, Nucleus; P, Plasma; R, Rough Endoplasmic Reticulum; S, Smooth Endoplasmic Reticulum; T, Tumor; V, Vacuole; W, Wall; Z, Zonula.

**Overall survival, cancer-specific survival (CSS) and 5-year relative survival:**

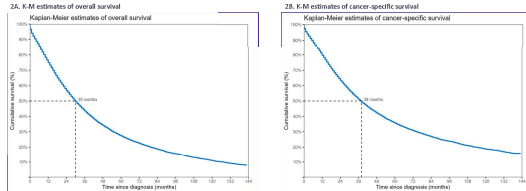
- Median OS was 30 months, with a 5-year OS rate of 27%. (Table 2, Figure 2)
- Median CSS was 38 months, with a 5-year CSS rate of 36%. (Table 2, Figure 2)
- Among patients aged  $\geq 65$ , median OS and CSS were 27 and 35 months, respectively, with 5-year survival rates of 24% and 34%. (Table 2 and Figure 3)
- Five-year relative survival improved from 29% in 2010 to 35% in 2015 and 43% in 2021. (Table 2, Figure 4)
- Significant ( $p < 0.05$ ) predictors of OS and CSS included age, race, histology, and absence of prior surgery. (Table 3)

Table 2. Median and 5-year survival rates among patients with mPC

Parameter	Population	Median, months (CI, CI)	5-year survival (%)	5-year relative survival (%)
OS	Overall	30 (12, 66)	27	2010: 29% 2013: 35%
	< 65 years	40 (18, 89)	36	2013: 43% 2010: 51%
	≥ 65 years	27 (10, 58)	24	2013: 39% 2010: 48%
				2010: 27% 2013: 33%
CSS	Overall	38 (16, 90)	36	
	< 65 years	46 (21, 107)	41	NA
	≥ 65 years	35 (14, 84)	34	

Abbreviations: OS, overall survival; mPFS, metastasis-free survival; OS, overall survival; Q1, first quartile; Q3, third quartile.

**Figure 2. Overall Survival and Cancer Specific Survival in the metastatic prostate cancer cohort**



**Figure 3. Overall Survival and Cancer Specific Survival in metastatic prostate cancer, stratified by age group (<65 and 65 or older)**

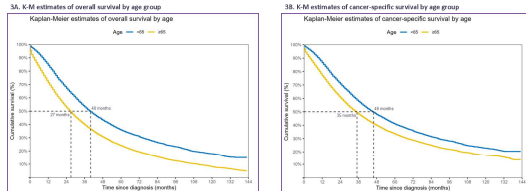
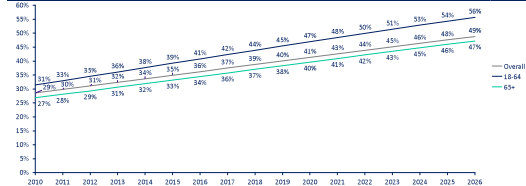


Table 3. Cox proportional hazards model results

Variable	Category	Overall Survival (%)		Prostate Cancer-Specific Survival (%)	
		HR	95%CI	HR	95%CI
Age (years)	<65	1.00		1.00	
	≥65	1.45	1.41-1.50	<0.001	1.29 1.25-1.33
Age	Continuous	1.00		1.00	
Race	African American	1.07	1.03-1.11	<0.001	1.04 1.01-1.08
	American Indian/Alaska Native	1.03	0.90-1.18	0.676	1.00 0.88-1.10
	Hispanic or Pacific Islander	0.76	0.72-0.80	<0.001	0.69-0.74
	Adonomeans and adonomeans	1.00		1.00	
Stability	Ethiopian	2.00	1.91-2.08	<0.001	2.00 1.91-2.12
	English and Indian	0.70	0.76-1.21	0.744	0.81-1.19
	Unspecified	1.07	1.11-2.39	<0.001	3.10 2.00-3.20
	Other	1.38	1.03-1.80	0.019	1.42 1.06-1.90
Survival	No	1.00		1.00	
	Yes	1.07	1.02-1.12	0.004	1.06 1.01-1.11

Figure 4. Five-year relative survival trends in the metastatic prostate cancer cohort, stratified by age group (<65 and 65 or older)



## LIMITATIONS

- Detailed information on treatment and related dosing is not available within SEER.
- Observed survival trends might not reflect recently approved treatments in non-metastatic prostate cancer, which could eventually impact treatment choice and hence survival outcomes in metastatic prostate cancer.

## CONCLUSIONS

- Survival outcomes for patients with metastatic prostate cancer have improved over the past decade, coinciding with the introduction of novel therapies in clinical practice.
- Continued development of novel therapies, particularly those designed for patient subgroups with poorer prognoses, will be key to achieving further improvements in survival outcomes.

## REFERENCES

1. Key Statistics for Prostate Cancer. | Prostate Cancer Facts | American Cancer Society  
2. <https://seer.cancer.gov>  
3. SEER Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute; Available from: <https://seer.cancer.gov/statistics/explore/>  
**Acknowledgements:** This study was sponsored by Pfizer, Inc. Research and editorial support were provided by Putnam, Inc./Initio Advisors.  
**Disclosures:** Pedro Barata reports grants or personal fees from Abbott; AstraZeneca; Auro Oncology; Bayser; BMS; Denovant; Eisai; EMD Serono; ESSA Pharma; Guardant Health; Ipsen; Celis Life Sciences; Exelixis; Janssen; Merck; Merck; MJM; Moltisano; Novartis; Pfizer; Seattle Genetics; Unilever.

Poster Presented at the European Society for Medical Oncology (ESMO) Congress, 17–21 October 2025, Berlin, Germany

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