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Real-world outcomes of first-line carboplatin–etoposide–atezolizumab in extensive-stage small-cell lung cancer

Yaygın evre küçük hücreli akciğer kanserinde birinci basamak karboplatin–etoposid–atezolizumab tedavisinin gerçek yaşam sonuçları

Abdülkadir Koçanoğlu[1] Oktay Ünsal[1] İbrahim Karadağ[2] Fırat Şirvan[3] Serdar Karakaya[2]

[1]Department of Medical Oncology, Ankara Atatürk Chest Diseases and Thoracic Surgery Training and Research Hospital, University of Health Sciences, Ankara-Türkiye

[2]Department of Medical Oncology, Ankara Dr. Abdurrahman Yurtaslan Oncology Training and Research Hospital, University of Health Sciences, Ankara-Türkiye

[3]Department of Internal Medicine, Faculty of Medicine, Hacettepe University, Ankara-Türkiye

ABSTRACT

Aim: The addition of atezolizumab to platinum-etoposide chemotherapy has become the standard first-line treatment for extensive-stage small-cell lung cancer (ES-SCLC). However, real-world data regarding treatment outcomes and prognostic factors remain limited. This study evaluated the effectiveness of first-line carboplatin-etoposide-atezolizumab and investigated clinical and PET/CT-derived prognostic factors in patients with ES-SCLC.

Materials and Methods: We retrospectively analyzed 59 consecutive patients with ES-SCLC who received first-line carboplatin, etoposide, and atezolizumab between January 2022 and December 2025. Progression-free survival (PFS) and overall survival (OS) were estimated using the Kaplan–Meier method. Prognostic factors for OS were evaluated using univariate and multivariable Cox proportional hazards regression analyses.

Results: The median PFS and OS were 6.1 months (95% CI, 5.6–6.6) and 8.9 months (95% CI, 6.9–10.9), respectively. Patients with ECOG performance status (PS) 0–1 had significantly longer PFS (6.3 vs. 4.9 months, p=0.001) and OS (13.9 vs. 6.5 months, p=0.002) than those with ECOG PS 2–3. In multivariable analysis, ECOG PS remained the only independent prognostic factor for OS (HR 2.104, 95% CI 1.183–3.741; p=0.016). Brain, liver, and bone metastases, prophylactic cranial irradiation status, and PET/CT-derived nodal and metastatic SUVmax values were not significantly associated with survival.

Conclusions: In this real-world cohort of patients with ES-SCLC treated with first-line carboplatin-etoposide-atezolizumab, ECOG performance status was the only independent prognostic factor for overall survival. PET/CT-derived metabolic parameters did not demonstrate prognostic value, emphasizing the continued importance of simple clinical assessment in the chemoimmunotherapy era.

Keywords: Extensive-stage small-cell lung cancer; atezolizumab; real-world study; prognostic factors

ÖZ

Amaç: *Atezolizumabın platin-etoposid kemoterapisine eklenmesi, yaygın evre küçük hücreli akciğer kanserinde (YE-KHAK) standart birinci basamak tedavi haline gelmiştir. Ancak gerçek yaşam verileri ve prognostik faktörlere ilişkin bilgiler sınırlıdır. Bu çalışmada, birinci basamak karboplatin-etoposid-atezolizumab tedavisinin gerçek yaşam sonuçları ile klinik ve PET/BT kaynaklı prognostik faktörler değerlendirildi.*

Corresponding author: Fırat Şirvan
Department of Internal Medicine, Faculty of Medicine, Hacettepe University, Ankara-Türkiye
E-mail: firatsirvan@gmail.com
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Gereç ve Yöntem: *Ocak 2022-Aralık 2025 tarihleri arasında birinci basamak karboplatin, etoposid ve atezolizumab tedavisi alan 59 YE-KHAK hastası retrospektif olarak incelendi. Progresyonsuz sağkalım (PSK) ve genel sağkalım (GSK) Kaplan-Meier yöntemiyle analiz edildi. GSK ile ilişkili prognostik faktörler tek ve çok değişkenli Cox regresyon analizleriyle değerlendirildi.*

Bulgular: *Medyan PSK 6,1 ay (%95 GA, 5,6–6,6), medyan GSK ise 8,9 ay (%95 GA, 6,9–10,9) olarak bulundu. ECOG performans skoru (PS) 0–1 olan hastalarda hem PSK (6,3 vs. 4,9 ay;* p=*0,001) hem de GSK (13,9 vs. 6,5 ay;* p=*0,002), ECOG PS 2–3 olan hastalara göre anlamlı olarak daha uzundu. Çok değişkenli analizde ECOG PS, GSK için bağımsız prognostik faktör olarak saptandı (HR 2,104; %95 GA 1,183–3,741;* p=*0,016). Beyin, karaciğer ve kemik metastazları, profilaktik kraniyal ışınlama durumu ile PET/BT'den elde edilen nodal ve metastatik SUVmax değerleri sağkalımla ilişkili bulunmadı.*

Sonuç: *Gerçek yaşam verilerine dayanan bu çalışmada, birinci basamak karboplatin-etoposid-atezolizumab tedavisi alan YE-KHAK hastalarında genel sağkalımı öngören tek bağımsız prognostik faktör ECOG performans skoru olmuştur. PET/BT metabolik parametrelerinin prognostik katkı sağlamaması, kemoimmünoterapi döneminde klinik değerlendirmenin önemini koruduğunu göstermektedir.*

Anahtar Sözcükler: *Yaygın evre küçük hücreli akciğer kanseri; atezolizumab; gerçek yaşam verileri; prognostik faktörler.*

INTRODUCTION

Small-cell lung cancer (SCLC) accounts for approximately 15% of all lung cancers and remains one of the most aggressive malignancies in thoracic oncology (1). Approximately two-thirds of patients present with extensive-stage disease (ES) at diagnosis, limiting the potential for curative treatment (1, 2).

For more than three decades, platinum-etoposide chemotherapy remained the standard first-line treatment for ES-SCLC(3). Although response rates are initially high, most patients experience rapid relapse and long-term survival remains uncommon (3). The introduction of immune checkpoint inhibitors has modestly improved outcomes in this disease. In the phase III IMpower133 trial, the addition of atezolizumab to carboplatin and etoposide significantly improved both progression-free survival (PFS) and overall survival (OS) (4). Similarly, the CASPIAN trial demonstrated a survival benefit with the addition of durvalumab to platinum-etoposide chemotherapy. As a result, chemoimmunotherapy has become the standard first-line treatment for ES-SCLC (5).

Despite these advances, survival outcomes remain heterogeneous. While some patients achieve durable disease control, others experience early progression and death. Therefore, identifying prognostic factors that may predict treatment outcomes remains an important unmet need. Performance status, metastatic burden, prophylactic cranial irradiation and specific metastatic sites have been associated with survival in previous studies (6-10). In addition, positron emission tomography/computed tomography (PET/CT)-derived metabolic parameters such as maximum standardized uptake value (SUVmax) have been investigated as potential prognostic biomarkers, although available data remain limited and inconsistent (11).

While randomized clinical trials provide the highest level of evidence, their strict eligibility criteria often exclude patients frequently encountered in routine practice (4, 5). This issue is particularly relevant in ES-SCLC, a rapidly progressive disease in which treatment decisions often need to be made urgently and patients may present with poor performance status or substantial disease burden (12). Therefore, real-world data are essential for evaluating treatment outcomes and prognostic factors in unselected patient populations (12-14).

In this study, we evaluated the clinical outcomes of patients with ES-SCLC treated with first-line carboplatin, etoposide, and atezolizumab in a real-world single-center cohort. We also investigated the prognostic significance of baseline clinical characteristics, metastatic patterns, prophylactic cranial irradiation (PCI) status, and PET/CT-derived metabolic parameters on OS.

MATERIALS and METHODS

This retrospective single-center study included consecutive patients diagnosed with ES-SCLC who received first-line atezolizumab combined

with carboplatin and etoposide between January 2022 and December 2025 at the Department of Medical Oncology. Eligible patients were aged ≥18 years, had histologically confirmed ES-SCLC, and received at least one cycle of atezolizumab plus platinum-etoposide chemotherapy. Patients with incomplete clinical data or insufficient follow-up information were excluded.

Clinical, pathological, laboratory, and radiological data were collected from electronic medical records. Baseline demographic characteristics, smoking history, Eastern Cooperative Oncology Group performance status (ECOG PS), metastatic sites, laboratory parameters, and PET/CT findings were recorded. Baseline PET/CT examinations performed before treatment initiation were reviewed. Primary tumor SUVmax was recorded separately. When multiple nodal or distant metastatic lesions were present, the highest SUVmax among nodal lesions and the highest SUVmax among distant metastatic lesions were recorded as the nodal SUVmax and metastatic SUVmax, respectively.

All patients received first-line treatment with atezolizumab in combination with carboplatin and etoposide according to standard treatment protocols. Following four cycles of induction chemoimmunotherapy, maintenance atezolizumab was administered until disease progression, unacceptable toxicity, death, or physician decision.

The primary endpoint was OS, defined as the time from treatment initiation to death from any cause or last follow-up. The secondary endpoint was PFS, defined as the time from treatment initiation to radiological or clinical disease progression or death, whichever occurred first.

Tumor response and disease progression were assessed primarily using contrast-enhanced CT imaging according to RECIST version 1.1. PET/CT findings and clinical evaluation were considered as supplementary information only when clinically indicated. Survival status was obtained from hospital records and national health databases when available.

Continuous variables were expressed as median (range), while categorical variables were presented as frequencies and percentages. Survival analyses were performed using the Kaplan-Meier method, and differences between groups were compared using the log-rank test. Univariate Cox proportional hazards regression analyses were conducted to identify factors associated with OS. Variables with a p-value <0.20 in univariate analysis were entered into a multivariable Cox regression model using a backward stepwise likelihood ratio approach. Hazard ratios (HR) and 95% confidence intervals (CI) were reported.

All statistical analyses were performed using IBM SPSS Statistics software (version 26.0; IBM Corp., Armonk, NY, USA). A two-sided p-value <0.05 was considered statistically significant.

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Scientific Research Ethics Committee of Ankara Atatürk Sanatorium Training and Research Hospital (Approval No: 2024-BÇEK/423; December 10, 2025). Due to the retrospective nature of the study, the requirement for informed consent was waived.

RESULTS

A total of 59 patients with ES-SCLC who received first-line carboplatin, etoposide, and atezolizumab were included in the study. The mean age was 64.0 years, and 51 patients (86.4%) were male. ECOG PS was 0–1 in 43 patients (72.9%) and 2–3 in 16 patients (27.1%). Sixteen patients (27.1%) had no comorbidities, 35 (59.3%) had one or two comorbidities, and eight (13.6%) had three or more comorbidities.

Fifty-five patients (93.2%) presented with de novo extensive-stage disease, whereas four patients (6.8%) had progression to extensive-stage disease. Sixteen patients (27.1%) had oligometastatic disease, while 43 (72.9%) had widespread metastatic disease. At treatment initiation, brain, liver, and bone metastases were present in 12 (20.3%), 16 (27.1%), and 34 patients (57.6%), respectively.

Among patients with available primary tumor staging data, four of 55 patients (7.3%) had T1 disease, 16 (29.1%) had T2 disease, 20 (36.4%) had T3 disease, and 15 (27.3%) had T4 disease. Among 56 patients with available nodal staging data, one patient (1.8%) had N0 disease, five (8.9%) had N1 disease, 39 (69.6%) had N2 disease, and 11 (19.6%) had N3 disease. The median primary tumor SUVmax was 12.48 (range, 2.62–39.93; n=53), the median nodal SUVmax was 11.07 (range, 2.80–36.58; n=51), and the median metastatic lesion SUVmax was 10.00

(range, 2.50–33.11; n=52). During follow-up, disease progression occurred in 47 patients (79.7%), and 30 patients (50.8%) died. The median PFS for the entire cohort was 6.1 months (95% CI, 5.6–6.6 months), while the median OS was 8.9 months (95% CI, 6.9–10.9 months). Baseline characteristics are summarized in (Table-1).

Patients with ECOG PS 0–1 achieved significantly longer PFS compared with those with ECOG PS 2–3 (median PFS: 6.3 vs. 4.9 months, log-rank p=0.001). Similarly, median OS was significantly longer in patients with ECOG PS 0–1 than in those with ECOG PS 2–3 (13.9 vs. 6.5 months, log-rank p=0.002).

In univariate Cox regression analysis for OS, ECOG performance status was significantly associated with survival (HR 2.019, 95% CI 1.192–3.421, p=0.009). Brain metastasis (HR 0.969, p=0.946), bone metastasis (HR 1.375, p=0.397), liver metastasis (HR 1.056, p=0.889), sex (HR 0.849, p=0.790), nodal SUVmax (HR 1.045, p=0.156), metastatic SUVmax (HR 1.056, p=0.141), and PCI status (HR 0.045, p=0.486) were not significantly associated with OS. Variables with a p-value <0.20 in the univariable analysis were entered into the multivariable Cox regression model. ECOG PS remained the only independent prognostic factor for OS (HR 2.104, 95% CI 1.183–3.741, p=0.016). Neither nodal SUVmax nor metastatic SUVmax retained statistical significance in multivariable analysis (Table-2).

Kaplan–Meier survival curves demonstrated a clear separation according to ECOG PS for both PFS and OS, confirming the adverse prognostic impact of poor performance status in patients receiving first-line carboplatin–etoposide–atezolizumab treatment (Figure-1)

Table-1. Clinicopathological characteristics of patients

Characteristic	Value
Total number of patients	**59**
Age, years, mean (sd)	64 (8.96)
Sex, n (%)	
Male	51 (86.4)
Female	8 (13.6)
ECOG performance status, n (%)	
0–1	43 (72.9)
2–3	16 (27.1)
Comorbidity burden, n (%)	
No comorbidity	16 (27.1)
One or two comorbidities	35 (59.3)
Three or more comorbidities	8 (13.6)
Disease presentation, n (%)	
De novo extensive-stage disease	55 (93.2)
Progression to extensive-stage disease	4 (6.8)
Metastatic burden, n (%)	
Oligometastatic disease	16 (27.1)
Widespread metastatic disease	43 (72.9)
Metastatic sites at treatment initiation, n (%)	
Brain metastasis	12 (20.3)
Liver metastasis	16 (27.1)
Bone metastasis	34 (57.6)
Primary tumor stage, n/N (%)	
T1	4/55 (7.3)
T2	16/55 (29.1)
T3	20/55 (36.4)
T4	15/55 (27.3)

Nodal stage, n/N (%)	
N0	1/56 (1.8)
N1	5/56 (8.9)
N2	39/56 (69.6)
N3	11/56 (19.6)
Baseline PET/CT parameters, median (range)	
Primary tumor SUVmax, n=53	12.48 (2.62–39.93)
Nodal SUVmax, n=51	11.07 (2.80–36.58)
Metastatic lesion SUVmax, n=52	10.00 (2.50–33.11)

ECOG, Eastern Cooperative Oncology Group; PET/CT, positron emission tomography/computed tomography; SD, standard deviation; SUVmax, maximum standardized uptake value

Table-2. Prognostic factors on overall survival with univariate and multivariate analysis

Variable	Univariate HR (95% CI)	P value	Multivariate HR (95% CI)	P value
ECOG Performance Status	2.019 (1.192–3.421)	0.009	2.104 (1.183–3.741)	0.016
Brain Metastasis	0.969 (0.393–2.389)	0.946	–	–
Bone Metastasis	1.375 (0.659–2.869)	0.397	–	–
Liver Metastasis	1.056 (0.491–2.272)	0.889	–	–
Sex	0.849 (0.253–2.841)	0.790	–	–
Nodal SUVmax	1.045 (0.983–1.111)	0.156	NS	0.616
Metastatic SUVmax	1.056 (0.982–1.135)	0.141	NS	0.614
PCI Status	0.045 (0.000–280.783)	0.486	–	–

CI, confidence interval; ECOG, Eastern Cooperative Oncology Group; HR, hazard ratio; NS, not statistically significant in the multivariate model; PCI, prophylactic cranial irradiation; SUVmax, maximum standardized uptake value.

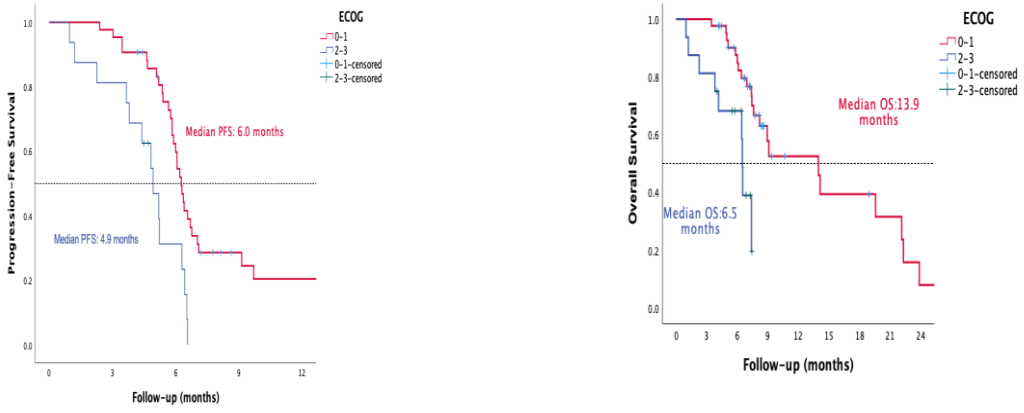

Figure-1. Kaplan–Meier Analysis of Progression-Free Survival and Overall Survival Stratified by ECOG Performance Status

DISCUSSION

In this retrospective real-world study, we evaluated the outcomes of patients with ES-SCLC treated with first-line carboplatin, etoposide, and atezolizumab. The median PFS and OS were 6.1 and 8.9 months, respectively. Among all evaluated variables, ECOG PS emerged as the only independent prognostic factor for OS. Patients

with ECOG PS 0–1 experienced significantly longer survival compared with those with ECOG PS 2–3, whereas metastatic sites, PCI status, and PET-derived metabolic parameters did not demonstrate prognostic significance.

The IMpower133 trial established atezolizumab plus carboplatin-etoposide as a standard first-line treatment for ES-SCLC by demonstrating significant improvements in both PFS and OS compared with chemotherapy alone (4). In the updated analysis, median OS reached 12.3 months in the atezolizumab arm compared with 10.3 months in the chemotherapy arm, while median PFS was 5.2 and 4.3 months, respectively (15). Our observed PFS of 6.1 months appears comparable to the outcomes reported in IMpower133, whereas the median OS in our cohort was somewhat shorter. This difference may be attributable to the real-world nature of our population, which included patients with poorer performance status and a higher burden of comorbidities than those typically enrolled in randomized clinical trials. Furthermore, nearly one-quarter of our cohort consisted of patients with ECOG PS 2–3, a population that was underrepresented in pivotal studies. These findings highlight the challenges of translating clinical trial outcomes into routine practice and emphasize the importance of real-world evidence in ES-SCLC.

The survival benefit observed with atezolizumab in IMpower133 was subsequently confirmed by the CASPIAN trial, in which durvalumab combined with platinum-etoposide significantly prolonged OS compared with chemotherapy alone (16). Long-term follow-up analyses demonstrated durable survival benefits and established chemoimmunotherapy as the standard first-line treatment in ES-SCLC(16). Similar findings were later reported in CAPSTONE-1 and ASTRUM-005, further supporting the role of PD-1/PD-L1 inhibition in this disease (17, 18). Despite differences in patient populations and treatment regimens, these studies consistently showed that the addition of immunotherapy provides clinically meaningful improvements in survival outcomes. Our results support the effectiveness of this treatment approach in routine clinical practice and provide additional evidence from a real-world cohort treated outside the setting of randomized clinical trials.

A major finding of our study was the prognostic importance of ECOG PS. Patients with ECOG PS 0–1 achieved significantly longer PFS and OS, and ECOG PS remained the only independent prognostic factor in the multivariable analysis. Performance status has long been recognized as one of the most important determinants of outcome in ES-SCLC. Nevertheless, patients with ECOG PS 2–3 in our cohort had a median overall survival of approximately 6.5 months. Because patients with poor performance status are frequently excluded from clinical trials, evidence regarding this population remains limited. In clinical practice, performance impairment may partly result from tumor burden and may improve after treatment initiation. Therefore, carefully selected patients with ECOG PS 2–3 should not necessarily be excluded from first-line chemoimmunotherapy solely on the basis of performance status.

Interestingly, unlike many historical studies, liver, brain, and bone metastases were not associated with survival in our cohort (19-21). One possible explanation is that all patients had extensive-stage disease and received contemporary chemoimmunotherapy, resulting in a more homogeneous population in which patient-related factors may have outweighed the prognostic impact of individual metastatic sites. Moreover, the limited sample size may have reduced the ability to detect smaller survival differences associated with specific metastatic locations.

Another notable observation was the lack of prognostic significance of PCI status and PET-derived metabolic parameters. The role of PCI in extensive-stage SCLC remains controversial, particularly following the widespread adoption of MRI surveillance strategies. Earlier studies reported reductions in the incidence of brain metastases and potential survival benefits, whereas more recent studies conducted in the MRI surveillance era have produced less consistent results (22-23). In our cohort, PCI was not associated with overall survival. However, because only a small number of patients received PCI, no firm conclusions regarding its prognostic value can be drawn.

We also evaluated PET/CT-derived metabolic parameters. Neither nodal SUVmax nor metastatic SUVmax was associated with survival. Previous studies investigating the prognostic value of FDG-PET findings in SCLC have reported

conflicting results, with some showing an association between higher metabolic activity and worse outcomes, while others failed to confirm this relationship (24, 25). The absence of a significant association in our study may indicate that baseline SUVmax alone does not fully reflect the biological behavior of extensive-stage disease in patients receiving chemoimmunotherapy.

This study has several strengths. The patient population reflects routine clinical practice and includes individuals who are often underrepresented in prospective trials. In addition, all patients received the same first-line treatment backbone consisting of carboplatin, etoposide, and atezolizumab, reducing treatment-related heterogeneity. We also examined clinical factors together with metastatic patterns, PCI status, and PET/CT parameters within the same cohort.

Some limitations should be considered when interpreting our results. The retrospective design carries an inherent risk of selection bias. The study was conducted at a single center and included a relatively small number of patients, which may have limited the power to detect smaller prognostic effects, particularly in subgroup analyses involving metastatic sites and PCI. PET/CT data were not available for every patient, which may have affected the robustness of the imaging-based analyses. In addition, molecular biomarkers, treatment-related toxicities, response depth, and subsequent lines of therapy were not systematically evaluated and may have influenced survival outcomes. Therefore, our findings should be interpreted cautiously and validated in larger prospective multicenter cohorts.

Overall, our results reinforce the importance of real-world evidence in ES-SCLC. While randomized clinical trials such as IMpower133 and CASPIAN established chemoimmunotherapy as the standard of care, real-world studies remain essential for understanding treatment outcomes in broader and more heterogeneous patient populations. Such studies are particularly valuable in SCLC, where the disease is highly aggressive, treatment decisions often need to be made rapidly, and patients with poor performance status are commonly encountered in clinical practice.

CONCLUSION

In conclusion, ECOG performance status appeared to provide greater prognostic information than PET/CT-derived nodal and metastatic SUVmax parameters. Larger prospective studies are warranted to validate these observations and identify more robust biomarkers for risk stratification in patients with ES-SCLC.

Abbreviations:
CI: confidence interval
CT: computed tomography
ECOG: Eastern Cooperative Oncology Group
ES: extensive stage
ES-SCLC: extensive-stage small-cell lung cancer
FDG: fluorodeoxyglucose
GA: güven aralığı
GSK: genel sağkalım
HR: hazard ratio
MRI: magnetic resonance imaging
NS: not significant
OS: overall survival
PCI: prophylactic cranial irradiation
PD-1: programmed cell death protein 1
PD-L1: programmed death-ligand 1
PET: positron emission tomography
PET/BT: pozitron emisyon tomografisi/bilgisayarlı tomografi
PET/CT: positron emission tomography/computed tomography
PFS: progression-free survival
PS: performance status
PSK: progresyonsuz sağkalım
RECIST: Response Evaluation Criteria in Solid Tumors
SCLC: small-cell lung cancer
SD: standard deviation
SPSS: Statistical Package for the Social Sciences
SUVmax: maximum standardized uptake value
YE-KHAK: yaygın evre küçük hücreli akciğer kanseri

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References

1. Wang X, Chiang AC. Big Decisions on Small Cell Lung Cancer: A Focus on Clinical Care Updates and Patient Perspectives. American Society of Clinical Oncology Educational Book. 2024;44(3):e432520.
2. Shalata W, Naamneh R, Najjar W, Asla M, Abu Gameh A, Abu Amna M, et al. Current and Emerging Therapeutic Strategies for Limited- and Extensive-Stage Small-Cell Lung Cancer. Med Sci (Basel). 2025;13(3).

3. Barba A, Martínez-Recio S, Portu M, Soto-Cambres AM, Trujillo JC, Farré N, Majem M. Small cell lung cancer: a therapeutic update in the era of immunotherapy and beyond—a narrative review. Chinese Clinical Oncology. 2026;15(2):34.
4. Horn L, Mansfield Aaron S, Szczęsna A, Havel L, Krzakowski M, Hochmair Maximilian J, et al. First-Line Atezolizumab plus Chemotherapy in Extensive-Stage Small-Cell Lung Cancer. New England Journal of Medicine. 2018;379(23):2220-9.
5. Paz-Ares L, Dvorkin M, Chen Y, Reinmuth N, Hotta K, Trukhin D, et al. Durvalumab plus platinum–etoposide versus platinum–etoposide in first-line treatment of extensive-stage small-cell lung cancer (CASPIAN): a randomised, controlled, open-label, phase 3 trial. The Lancet. 2019;394(10212):1929-39.
6. Wu Y, Zhang J, Zhou W, Yuan Z, Wang H. Prognostic factors in extensive-stage small cell lung cancer patients with organ-specific metastasis: unveiling commonalities and disparities. Journal of Cancer Research and Clinical Oncology. 2024;150(2):74.
7. Jiang X, Wang Z, Zhang X, Xie L, Ji S, Song Q, et al. A SEER prognostic nomogram analysis for extensive-stage small cell lung cancer: comparing the immune checkpoint inhibitors (ICIs) and non-ICIs eras. Journal of Thoracic Disease. 2025;17(5):2866-87.
8. Zhou J-X, Sun Y-C, Xiao L, Lu H-L, Yin X-M, Fan K, Zhou Y-N. Efficacy analysis and prognostic factors of first-line chemotherapy combined with immunotherapy in extensive-stage small cell lung cancer: a real-world study. Scientific Reports. 2025;15(1):13063.
9. Tang L, Tian G, Li N. Current dilemma and future directions over prophylactic cranial irradiation in SCLC: a systematic review in MRI and immunotherapy era. Frontiers in Oncology. 2024;Volume 14 - 2024.
10. Zhou S, Zhai W, Zhang Q, Li H, Fan Y. Impact of prophylactic cranial irradiation on survival in extensive-stage small cell lung cancer receiving first-line chemoimmunotherapy: a propensity score-matched study. Ther Adv Med Oncol. 2025;17:17588359251341158.
11. Christensen TN, Andersen PK, Langer SW, Fischer BMB. Prognostic Value of 18F–FDG–PET Parameters in Patients with Small Cell Lung Cancer: A Meta-Analysis and Review of Current Literature. Diagnostics. 2021;11(2):174.
12. Li M, Min M, Deng F. Real-world evaluation of immunotherapy in multi-line treatment of small cell lung cancer. Curr Med Res Opin. 2026;42(1):99-118.
13. Sun M, Ji H, Deng F, Li J, Xu N, Li Y. Clinical outcomes and synergistic effect between radiotherapy and immunotherapy in patients with extensive-stage small cell lung cancer: a real-world study. BMC Cancer. 2024;24(1):1206.
14. Tomic K, Begagic E, Voloder E, Naletilic MP, Jozic GB, Cale S, et al. Outcomes of extensive-stage small cell lung cancer treatment in a real-world clinical setting: a single-center experience. Contemp Oncol (Pozn). 2025;29(3):271-80.
15. Liu SV, Reck M, Mansfield AS, Mok T, Scherpereel A, Reinmuth N, et al. Updated Overall Survival and PD-L1 Subgroup Analysis of Patients With Extensive-Stage Small-Cell Lung Cancer Treated With Atezolizumab, Carboplatin, and Etoposide (IMpower133). J Clin Oncol. 2021;39(6):619-30.
16. Paz-Ares L, Chen Y, Reinmuth N, Hotta K, Trukhin D, Statsenko G, et al. Durvalumab, with or without tremelimumab, plus platinum-etoposide in first-line treatment of extensive-stage small-cell lung cancer: 3-year overall survival update from CASPIAN. ESMO Open. 2022;7(2):100408.
17. Wang J, Zhou C, Yao W, Wang Q, Min X, Chen G, et al. Adebrelimab or placebo plus carboplatin and etoposide as first-line treatment for extensive-stage small-cell lung cancer (CAPSTONE-1): a multicentre, randomised, double-blind, placebo-controlled, phase 3 trial. Lancet Oncol. 2022;23(6):739-47.
18. Cheng Y, Han L, Wu L, Chen J, Sun H, Wen G, et al. Effect of First-Line Serplulimab vs Placebo Added to Chemotherapy on Survival in Patients With Extensive-Stage Small Cell Lung Cancer: The ASTRUM-005 Randomized Clinical Trial. Jama. 2022;328(12):1223-32.
19. Huang L, Hu X, Wang Y. Survival and pretreatment prognostic factors for extensive-stage small cell lung cancer: a comprehensive analysis of 358 patients. Thorac Cancer. 2021; 12 (13): 1943–51.
20. Bria E, Morgillo F, Garassino MC, Ciardiello F, Ardizzoni A, Stefani A, et al. Atezolizumab plus carboplatin and etoposide in patients with untreated extensive-stage small-cell lung cancer: interim results of the MAURIS phase IIIb trial. The Oncologist. 2024;29(5):e690-e8.
21. Sonusen SD, Isleyen ZS, Satis NA, Yilmaz M, Dogan B, Gunenc S, et al. Prognostic factors and survival outcomes in older adults with extensive-stage small cell lung cancer: A multicenter retrospective cohort study. Medicine. 2026;105(19):e48711.
22. Reed N, Mangioni C, Malmström H, Scarfone G, Poveda A, Pecorelli S, et al. Phase III randomised study to evaluate the role of adjuvant pelvic radiotherapy in the treatment of uterine sarcomas stages I and II: an European Organisation for Research and Treatment of Cancer Gynaecological Cancer Group Study (protocol 55874). European Journal of Cancer. 2008;44(6):808-18.

23. Takahashi T, Yamanaka T, Seto T, Harada H, Nokihara H, Saka H, et al. Prophylactic cranial irradiation versus observation in patients with extensive-disease small-cell lung cancer: a multicentre, randomised, open-label, phase 3 trial. The Lancet Oncology. 2017;18(5):663-71.
24. Choi EK, Park M, Im JJ, Chung Y-A, Oh JK. Prognostic value of 18F-FDG PET/CT metabolic parameters in small cell lung cancer. Journal of International Medical Research. 2020;48(4):0300060519892419.
25. Nie K, Zhang YX, Nie W, Zhu L, Chen YN, Xiao YX, et al. Prognostic value of metabolic tumour volume and total lesion glycolysis measured by 18F-fluorodeoxyglucose positron emission tomography/computed tomography in small cell lung cancer: a systematic review and meta-analysis. Journal of Medical Imaging and Radiation Oncology. 2019;63(1):84-93.