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INTRODUCTION

Small cell lung cancer (SCLC) is a high-grade neuroendocrine carcinoma that accounts for approximately 10–15% of all lung cancers. Concurrent chemotherapy (CCRT) remains the standard treatment for limited-disease (LD)-SCLC, but the optimal timing of thoracic radiotherapy (RT) during CCRT remains controversial. In addition, the survival benefit of prophylactic cranial irradiation (PCI) in the modern treatment era is still uncertain. Therefore, this study evaluated treatment outcomes, prognostic factors, and the impact of PCI according to thoracic RT timing in patients with LD-SCLC.

METHODS

Study design

Single-center, retrospective observational study of patients with LD-SCLC treated at Asan Medical Center between January 2018 and December 2022.

Patients who received CCRT were included for analysis. Propensity score matching (1:1) was performed to minimize selection bias.

Timing of thoracic RT

Early thoracic RT (ERT) : RT initiated within **9 weeks** after chemotherapy initiation or during the **first three chemotherapy cycles**.
Late thoracic RT (LRT) : RT initiated >9 weeks after chemotherapy initiation or after **≥3 chemotherapy cycles**.

Outcome

Overall survival (OS), progression-free survival (PFS), and brain metastasis-free survival (BMFS) according to thoracic RT timing.

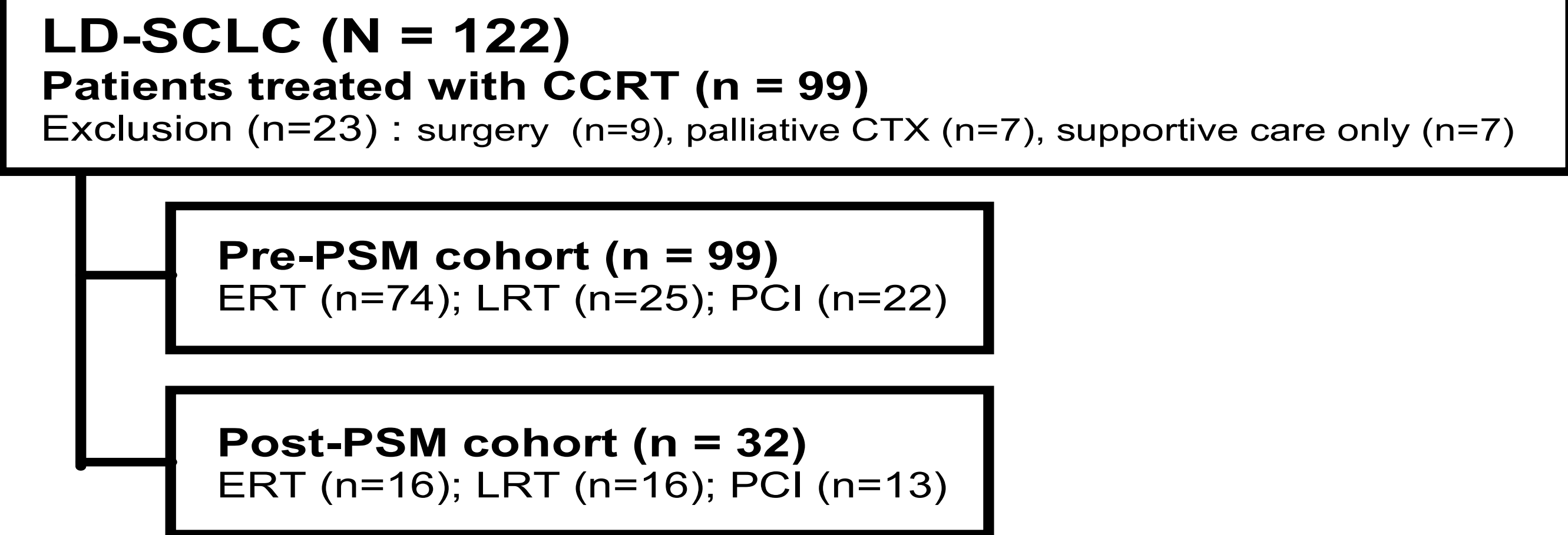
DISCUSSION AND CONCLUSION

- ❖ ERT was associated with significantly improved OS and PFS compared with LRT, and remained an independent favorable prognostic factor after multivariate analysis and propensity score matching.
- ❖ The favorable survival outcomes with ERT are consistent with previous studies and support the continued role of ERT in the contemporary management of LD-SCLC treated with CCRT.
- ❖ DLCO was not an independent prognostic factor after propensity score matching, although its potential prognostic value warrants further investigation.
- ❖ PCI improved BMFS but did not improve OS or PFS, reflecting the ongoing uncertainty regarding its survival benefit in the era of routine brain MRI surveillance.
- ❖ Treatment-related toxicity was comparable between the ERT and LRT groups, suggesting that earlier RT can be delivered without increasing severe adverse events.

Abbreviations: BMFS, brain metastasis-free survival; BMI, body mass index; CCRT, concurrent chemoradiotherapy; CI, confidence interval; COPD, chronic obstructive lung disease; DLCO, diffusing capacity of the lung for carbon monoxide; ECOG, Eastern Cooperative Oncology Group; ERT, early thoracic radiotherapy; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; ILD, interstitial lung disease; LD, limited disease; LRT, late thoracic radiotherapy; OS, overall survival; PCI, prophylactic cranial irradiation; PFS, progression-free survival; PSM, propensity score matching; RT, radiotherapy; SCLC, small cell lung cancer; TNM, tumor-node-metastasis.

RESULTS

Figure 1. Design of the study subjects



Propensity score matching (1:1 nearest-neighbor, caliper 0.2) was performed using age, ECOG performance status, DLCO, TNM stage, and smoking status to balance baseline characteristics between groups.

Table 1. Baseline characteristics of the LD-SCLC cohort

	Overall	Pre-PSM		P-value	Post-PSM		P-value
		ERT (n = 74)	LRT (n = 25)		ERT (n = 16)	LRT (n = 16)	
Age, years	66.0 ± 8.4	64.2 ± 8.2	71.3 ± 6.6	< 0.001	68.8 ± 6.9	69.0 ± 5.6	NS
Male, n (%)	87 (87.9)	64 (86.5)	23 (92.0)	NS	14 (87.5)	15 (93.8)	NS
BMI, kg/m ²	24.1 ± 3.2	24.5 ± 3.3	22.8 ± 2.7	0.022	23.5 ± 3.9	23.1 ± 2.6	NS
Smoking history, n (%)				NS			NS
Never smoker	9 (9.1)	7 (9.6)	2 (8.0)		0 (0)	1 (6.3)	
Current smoker	64 (64.6)	47 (64.4)	17 (68.0)		12 (75.0)	12 (75.0)	
Ex-smoker	25 (25.3)	19 (26.0)	6 (24.0)		4 (25.0)	3 (18.8)	
ECOG, n (%)				NS			NS
0–1	94 (94.9)	71 (95.9)	23 (92.0)		15 (93.8)	16 (100)	
2–4	5 (5.1)	3 (4.1)	2 (8.0)		1 (6.3)	0 (0)	
Comorbidities, n (%)							
COPD	11 (11.1)	9 (12.2)	2 (8.0)	NS	3 (18.8)	1 (6.3)	NS
Asthma	2 (2.0)	2 (2.7)	0 (0)	NS	1 (6.3)	0 (0)	NS
ILD	11 (11.1)	5 (6.8)	6 (24.0)	NS	1 (6.3)	5 (31.3)	NS
Diabetes mellitus	34 (34.3)	26 (35.1)	8 (32.0)	NS	5 (31.3)	5 (31.3)	NS
Cardiovascular	44 (44.4)	32 (43.2)	12 (48.0)	NS	6 (37.5)	7 (43.8)	NS
Lung function							
FVC (% predicted)	81.0 ± 13.7	82.7 ± 14.5	76.1 ± 9.4	0.012	83.8 ± 13.6	79.3 ± 9.4	NS
FEV ₁ (% predicted)	73.6 ± 16.5	75.3 ± 16.0	68.7 ± 17.2	0.084	73.7 ± 11.4	74.2 ± 7.2	NS
DLCO (% predicted)	67.6 ± 15.9	71.1 ± 15.1	57.5 ± 13.7	< 0.001	61.8 ± 12.2	60.0 ± 13.1	NS
TNM stage, n (%)				NS			NS
Stage I	6 (6.1)	5 (6.8)	1 (4.2)		0 (0)	1 (4.2)	
Stage II	27 (27.3)	23 (31.5)	4 (16.7)		4 (26.7)	4 (16.7)	
Stage III	64 (64.6)	45 (61.6)	19 (79.2)		11 (73.3)	10 (79.2)	
T stage, n (%)				NS			NS
T1	32 (32.3)	23 (31.1)	9 (39.1)		4 (25.0)	9 (56.3)	
T2	22 (22.2)	18 (24.3)	4 (17.4)		3 (18.8)	2 (12.5)	
T3	21 (21.2)	16 (21.6)	5 (21.7)		4 (25.0)	2 (12.5)	
T4	22 (22.2)	17 (23.0)	5 (21.7)		5 (31.3)	3 (18.8)	
N stage, n (%)				0.127			NS
N0	12 (12.1)	11 (14.9)	1 (4.0)		0 (0)	1 (6.3)	
N1	29 (29.3)	23 (31.1)	6 (24.0)		5 (31.3)	5 (31.3)	
N2	38 (38.4)	29 (39.2)	9 (36.0)		6 (37.5)	4 (25.0)	
N3	20 (20.2)	11 (14.9)	9 (36.0)		5 (31.3)	6 (37.5)	
PCI	22 (22.2)	21 (28.4)	1 (4.0)	0.011	1 (6.3)	1 (6.3)	NS

Figure 2. Survival outcomes according to ERT and LRT

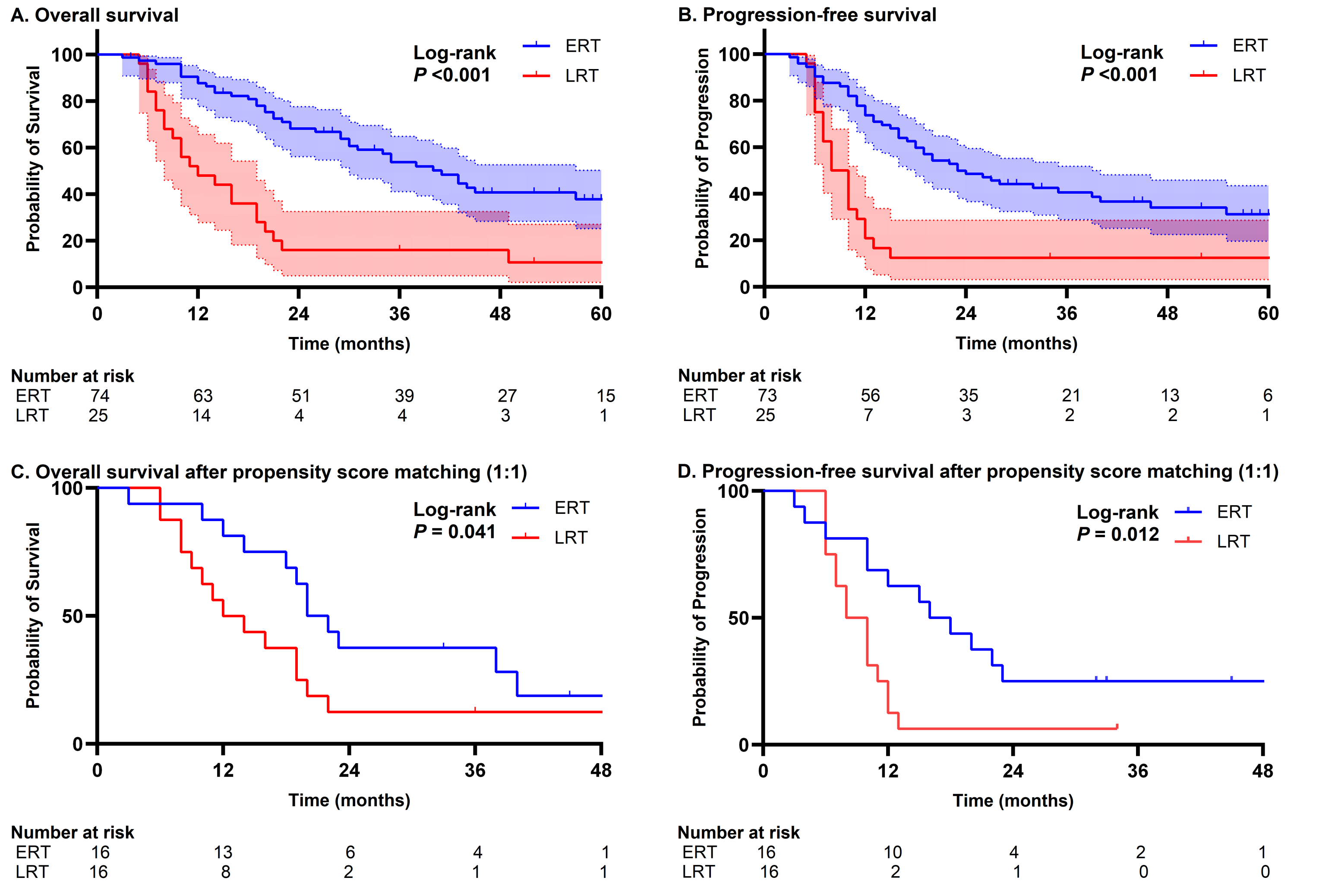


Figure 3. Survival outcomes according to PCI status

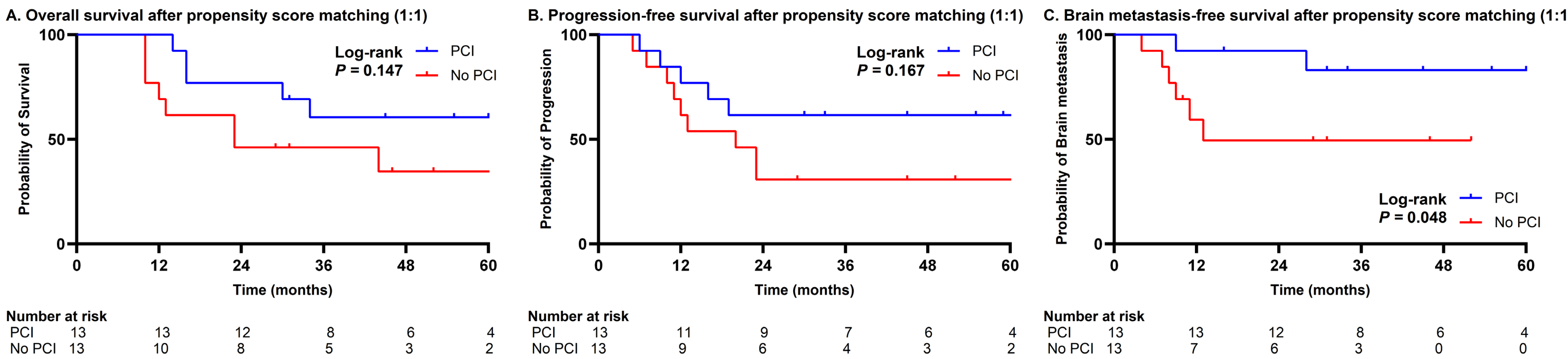


Table 2. Risk factors for mortality in patients with LD-SCLC after PSM

Variables	Unadjusted analysis		Multivariable analysis	
	HR (95% CI)	P-value	HR (95% CI)	P-value
Age	1.092 (1.043–1.143)	< 0.001	1.133 (1.078–1.191)	< 0.001
DLCO	0.982 (0.948–1.017)	0.313	0.971 (0.936–1.008)	0.120
Late RT	2.212 (1.162–4.209)	0.016	2.752 (1.268–5.972)	0.010

Table 3. Risk factors for progression in patients with LD-SCLC after PSM

Variables	Unadjusted analysis		Multivariable analysis	
	HR (95% CI)	P-value	HR (95% CI)	P-value
Age	1.055 (1.021–1.090)	0.001	1.079 (1.046–1.114)	< 0.001
DLCO	0.991 (0.969–1.014)	0.463	0.992 (0.936–1.008)	0.551
Late RT	2.793 (1.293–6.033)	0.009	3.062 (1.370–6.846)	0.006

* AI Use Disclosure : No AI tools were used in the development of this presentation