



**Figure S1** Flowchart of patient inclusion. STAS, spread through air spaces.

**Table S1** Cox regression analysis for prognosis in patients with IASLC grade 2 tumors (N=385)

Characteristics	RFS				OS			
	Univariable analysis		Multivariable analysis		Univariable analysis		Multivariable analysis	
	Hazard ratio (95% CI)	P value	Hazard ratio (95% CI)	P value	Hazard ratio (95% CI)	P value	Hazard ratio (95% CI)	P value
Gender (male vs. female)	1.02 (0.55–1.90)	0.95	–	–	1.08 (0.53–2.21)	0.84	–	–
Age, years (>65 vs. ≤65 years)	1.42 (0.69–2.90)	0.34	–	–	1.30 (0.58–2.92)	0.53	–	–
Smoking status (ever vs. never)	1.45 (0.72–2.90)	0.30	–	–	1.35 (0.62–2.94)	0.46	–	–
Preoperative CEA (>5 vs. ≤5 ng/mL)	1.04 (0.46–2.36)	0.92	–	–	1.02 (0.39–2.65)	0.98	–	–
Nodule type (solid vs. subsolid)	1.35 (0.72–2.54)	0.35	–	–	1.58 (0.77–3.26)	0.21	–	–
Tumor location	–	0.09	–	–	–	0.68	–	–
Upper lobe	Reference	–	–	–	Reference	–	–	–
Middle lobe	1.02 (0.31–3.38)	0.97	–	–	1.50 (0.44–5.13)	0.52	–	–
Lower lobe	0.53 (0.26–1.10)	0.09	–	–	0.83 (0.38–1.82)	0.65	–	–
Type of resection (lobectomy vs. limited resection)	3.22 (1.26–8.21)	0.02	2.36 (0.90–6.19)	0.08	2.68 (0.93–7.69)	0.07	–	–
Pathological T stage	–	0.001	–	0.01	–	0.001	–	0.002
T1a	Reference	–	Reference	–	Reference	–	Reference	–
T1b	2.62 (0.61–11.24)	0.20	2.12 (0.49–9.25)	0.32	1.56 (0.35–6.98)	0.56	1.64 (0.37–7.35)	0.52
T1c	6.05 (1.41–25.97)	0.02	4.30 (1.07–19.08)	0.045	5.14 (1.18–22.35)	0.03	4.95 (1.14–21.54)	0.03
Lymphovascular invasion (present vs. absent)	2.85 (0.88–9.23)	0.08	–	–	2.46 (0.59–10.33)	0.22	–	–
STAS (present vs. absent)	1.80 (0.95–3.42)	0.07	–	–	2.26 (1.09–4.71)	0.03	2.02 (0.96–4.22)	0.06
Adjuvant therapy (present vs. absent)	2.18 (0.96–4.93)	0.06	–	–	2.33 (0.89–6.11)	0.09	–	–

CEA, carcinoembryonic antigen; CI, confidence interval; IASLC, International Association for the Study of Lung Cancer; OS, overall survival; RFS, recurrence-free survival; STAS, spread through air spaces.

**Table S2** Cox regression analysis for prognosis in patients with IASLC grade 3 tumors (N=239)

Characteristics	RFS				OS			
	Univariable analysis		Multivariable analysis		Univariable analysis		Multivariable analysis	
	Hazard ratio (95% CI)	P value	Hazard ratio (95% CI)	P value	Hazard Ratio (95% CI)	P value	Hazard ratio (95% CI)	P value
Gender (male vs. female)	1.21 (0.64–2.31)	0.56	–	–	1.31 (0.63–2.71)	0.47	–	–
Age, years (>65 vs. ≤65 years)	1.40 (0.64–3.06)	0.40	–	–	1.28 (0.55–2.99)	0.57	–	–
Smoking status (ever vs. never)	1.28 (0.67–2.44)	0.45	–	–	1.06 (0.51–2.22)	0.88	–	–
Preoperative CEA (>5 vs. ≤5 ng/mL)	1.98 (1.01–3.89)	0.048	1.97 (0.96–4.11)	0.06	2.21 (1.01–4.87)	0.049	2.21 (0.96–4.95)	0.06
Nodule type (solid vs. subsolid)	1.25 (0.60–2.57)	0.55	–	–	1.10 (0.52–2.33)	0.80	–	–
Tumor location	–	0.27	–	–	–	0.91	–	–
Upper lobe	Reference	–	–	–	Reference	–	–	–
Middle lobe	0.89 (0.21–3.82)	0.88	–	–	1.16 (0.27–5.07)	0.85	–	–
Lower lobe	0.66 (0.32–1.37)	0.27	–	–	1.04 (0.49–2.23)	0.92	–	–
Type of resection (lobectomy vs. limited resection)	1.22 (0.54–2.79)	0.63	–	–	1.16 (0.47–2.86)	0.74	–	–
Pathological T stage	–	0.45	–	–	–	0.38	–	–
T1a	Reference	–	–	–	Reference	–	–	–
T1b	1.41 (0.52–3.81)	0.50	–	–	1.38 (0.45–4.19)	0.57	–	–
T1c	1.65 (0.64–4.30)	0.30	–	–	1.84 (0.62–5.41)	0.27	–	–
Lymphovascular invasion (present vs. absent)	1.41 (0.68–2.92)	0.35	–	–	1.69 (0.75–3.83)	0.21	–	–
STAS (present vs. absent)	2.72 (1.28–5.77)	0.009	2.81 (1.32–5.97)	0.007	3.19 (1.36–7.50)	0.008	2.04 (1.40–7.75)	0.006
Adjuvant therapy (present vs. absent)	0.79 (0.41–1.52)	0.48	–	–	0.80 (0.38–1.68)	0.56	–	–

CEA, carcinoembryonic antigen; CI, confidence interval; IASLC, International Association for the Study of Lung Cancer; OS, overall survival; RFS, recurrence-free survival; STAS, spread through air spaces.