Research Square

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Development and Validation of Nomograms for Predicting Survival of Elderly Patients With Stage I Small-cell Lung Cancer

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Abstract

Background

Predictive models to determine the prognosis of elderly patients with Stage I small-cell lung cancer (SCLC) are lacking. This study aimed to establish a useful nomogram for predicting the cancer-specific survival (CSS) of elderly patients with Stage I SCLC.

Methods

Using the Surveillance, Epidemiology, and End Results registry database, we identified patients aged ≥ 65 years with pathological AJCC (American Joint Committee on Cancer) Stage I SCLC from 2004 to 2014. The CSS was evaluated by the Kaplan-Meier method.

Patients were divided into training and validation cohorts. In the training cohort, univariate analysis and multivariate analysis by the Cox proportional hazards regression identified risk factors that predicted CSS and the results were used to formulate a nomogram for the 1-, 3-, and 5-year CSS rates of elderly patients with Stage I SCLC. The performance of the nomograms was internally and externally validated by the bootstrap resampling.

Results:

In total, we extracted 1,623 elderly patients with Stage I SCLC. The median CSS was 34 months, and the 5-year CSS was 41 months. Multivariate analysis revealed that age, histologic type, tumor size, and AJCC Stage were significant predictors of CSS. A nomogram was formulated based on the results of multivariate analysis. The C-indices of the nomogram for training and validation cohorts were 0.68 and 0.62, indicating that the nomogram exhibited a sufficient level of discrimination. The calibration curves demonstrated good agreement between the nomogram prediction and actual observation.

Conclusion:

A practical nomogram to predict the CSS of elderly patients with Stage I SCLC is constructed. The predictive tool is helpful for patient counseling and treatment decision making.

Background

As one of the most common malignancies, lung cancer is the leading cause of cancer mortality worldwide.[1] Small-cell lung cancer (SCLC) is the most aggressive form of lung cancer, characterized by high cellular proliferation, paraneoplastic endocrinopathy, and an early metastatic spread.[2] As the population continues to age, the number of elderly patients with lung cancer is expected to rise in the near future. Meanwhile, more patients are diagnosed at an earlier stage with the extensive use of low-dose and high-resolution spiral computed tomography (CT) screening.[3]

The National Comprehensive Cancer Network (NCCN) Guidelines indicate that for Stage I SCLC patients without mediastinal lymph node metastasis, lobectomy with mediastinal lymph node dissection followed by systemic therapy should be considered to offer a potential cure in clinical practice.[4, 5] However, surgery is accompanied with risks of postoperative morbidity and more commonly, high risk of recurrence of cancer. Postoperative complications following surgery for SCLC are not only associated with higher short-term mortality, but also with worse long-term survival.[6] Recurrence rates after surgical resection are as high as 21–56%.[7, 8] Thus, appropriate surgery candidate selection would result in lower morbidity rates and better quality of life, which are both of great clinical significance. Therefore, it would be desirable to develop a practical and easy-to-use scoring system to select patients with a better prognosis to undergo the surgery process. On the other hand, substantial heterogeneity exists among SCLC patients in terms of demographic and clinicopathological information, such as age, sex, pathological type, tumor size, tumor degree, and tumor grade. Thus, the prognosis of SCLC differs substantially among different cases. Therefore, stratifying stage I SCLC into different prognostic categories is essential to identify patients who may benefit from postoperative adjuvant therapy.

Nomograms, which create a visual representation of a statistical predictive model yielding a numerical probability of a clinical outcome, are widely used to predict prognosis in cancer patients.[9] Nomograms provide guidance in clinical decision making and add value for risk stratification, personalized treatment, and clinical trial design. A recent study has established a nomogram to investigate the mortality of stage I SCLC patients.[10] The nomogram used data on patient characteristics and treatments obtained from the Surveillance, Epidemiology, and End Results (SEER) database. The study included three age groups, 18.9% of the patients aged < 60 years, 54.2% aged 60–75 years, and 26.9% aged > 75 years. The nomogram had not undergone external validation, and a predictive model specifically for elderly patients with stage I SCLC still needs to be constructed. In this study, we aimed to develop and validate a nomogram to identify risk factors affecting cancer-specific survival (CSS) in elderly patients with Stage I SCLC using data derived from the SEER database.

Material And Methods

Data source

All patient data were extracted from the National Cancer Institute (NIH) SEER database using the SEER*stat software (version 8.3.5; http://seer.cancer.gov/seerstat/). The SEER database is sponsored by the NIH to collect information about cancer incidence and outcome. The database is updated annually and includes information on survival and follow-up.[11]

Patient selection and data collection

Histology and the site of disease are coded in SEER based on the International Classification of Diseases (ICD) for Oncology, Edition 3 (ICD-O-3).[12] Patients with SCLC (ICD-0-3 histology code 8041/3–8045/3) of the lung (ICD-0-3 site code c34.0-c34.9) treated from 2004 to 2014 were analyzed. Demographic and clinicopathologic variables were documented for all patients studied. The variables included sex, age at

diagnosis, race, laterality, primary site, histologic types, the American Joint Committee on Cancer (AJCC) stage, tumor size, survival data, and vital status. Because we narrowed our focus to surgery candidates first diagnosed with SCLC, not all treatment data were included in the study.

The patient inclusion criteria were (a) diagnosed as early-stage (AJCC stage I) SCLC; (b) at least 65 years of age at diagnosis; and (c) histologically confirmed malignancy. Exclusion criteria were (a) patients with missing data including unknown age of diagnosis; uncertain race; unknown tumor size; unknown cause of death; (b) survival was unknown or less than one month after diagnosis; and (c) patients with more than one primary cancer.

Endpoint Definition

Cancer-specific death was defined as “death from SCLC as the underlying cause”, according to the SEER database. The endpoint of the current study was CSS, the period between the SCLC diagnosis and death due to cancer-specific death, with deaths from other causes censored. Follow-up was concluded on 31 December 2014.

Construction and validation of the nomogram

The included patients were randomly divided into the training and validation cohorts. A training cohort was used to establish the nomogram. Survival curves for each variable were evaluated using the Kaplan–Meier method and were compared using the log-rank test. Variables with p-value < 0.05 in univariate analysis were included in the multivariate analysis performed using the Cox proportional hazards regression model. The nomogram was built with potential risk factors ($p < 0.05$) based on a multivariate Cox analysis.

The nomogram was subjected to 1,000 bootstrap resampling for internal validation in the training cohort and external validation in the validation cohort. The predictive performance of the nomogram was measured by the concordance index (C-index) and calibration plots. The C-index measures discrimination, from 0.5 to 1. The larger the C-index, the more accurate the prognostic prediction.[13] Nomogram plot calibration was used to estimate the overall agreement between the predicted and observed survival outcomes.

Statistical analysis

Categorical variables were described as counts and percentages, while continuous variables were presented as medians and ranges. Statistical analyses to identify independent prognostic factors were performed using SPSS 24.0 (IBM Corp., NY, USA). The package of *rms* in R software was used to construct the nomogram.[14]

Results

A total of 1,623 patients from the SEER database were identified and included in the study (Table 1). The median age was 74 years (ranged 65 to 96), and 790 patients (48.8%) were men. The majority, 1,444

(89%), were Caucasian. The most common SCLC site was the upper lobe, 917 patients (56.5%), followed by the lower lobe, 494 (30.4%). The most frequent histologic type was “Small cell carcinoma, not otherwise specified (NOS)”. The AJCC stage included 53.9% IA and 46.1% grade IB.

Table 1
Patient characteristics and 1-, 3-, and 5-yr lung cancer-specific survival

	Characteristics	Number of patients	Months of survival (median)	1-year cumulative proportion of CSS (CI)	3-year cumulative proportion of CSS (CI)	5-year cumulative proportion of CSS (CI)
	Total cases	1623	34	76.7%(74.5–78.9%)	48.1%(45.2–51.0%)	41.0%(37.9–44.1%)
Gender						
	Male	790	62	76.2%(73.1–79.3%)	45.9%(41.6–50.2%)	37.5%(32.8–42.2%)
	Female	833	58	77.2%(74.3–80.1%)	50.0%(45.9–54.1%)	44.0%(39.7–48.3%)
Age						
	65-69y	446	50	83.6%(80.1–87.1%)	57.3%(52.0-62.6%)	48.8%(42.9–54.7%)
	70-74y	446	39	80.3%(76.4–84.2%)	51.4%(45.7–57.1%)	44.3%(37.5–51.1%)
	75-79y	388	30	75.6%(71.0-80.2%)	44.1%(37.3–50.9%)	36.6%(29.7–43.5%)
	≥ 80y	343	20	64.3%(58.8–69.8%)	35.5%(29.2–41.8%)	29.3%(22.6–36.0%)
Race						
	White	1444	34	76.5%(74.1–78.9%)	48.0%(44.9–51.1%)	41.3%(38.0-44.6%)
	Black	120	45	78.4%(70.8–86.0%)	53.1%(51.7–54.5%)	38.9%(26.9–50.9%)
	Asian or Pacific Islander	59	29	78.9%(67.7–90.1%)	37.0%(20.1–53.9%)	-
Primary tumor site						
	Main bronchus	55	20	58.4%(44.5–72.3%)	33.9%(17.2–50.6%)	-
	Upper lobe of lung	917	34	78.5%(75.8–81.2%)	48.7%(44.8–52.6%)	42.5%(38.4–46.6%)
	Middle lobe of lung	116	31	80.1%(72.3–87.9%)	63.0%(61.6–64.4%)	36.0%(21.5–50.5%)

Abbreviation: CSS, cancer-specific survival; CI, confidence interval; NOS, not otherwise specified; AJCC, American Joint Committee on Cancer;

	Characteristics	Number of patients	Months of survival (median)	1-year cumulative proportion of CSS (CI)	3-year cumulative proportion of CSS (CI)	5-year cumulative proportion of CSS (CI)
	Lower lobe of lung	494	35	76.5%(72.6–80.4%)	49.3%(43.3–55.3%)	40.1%(34.4–45.8%)
	Overlapping lesion of lung	5	107	-	-	-
	Lung, NOS	36	12	49.6%(32.1–67.1%)	28.8%(11.4–46.2%)	-
Histologic types						
	Small cell carcinoma, NOS	1429	33	76.2%(73.8–78.6%)	46.9%(43.8–50.0%)	39.8%(36.5–43.1%)
	Oat cell carcinoma	46	14	58.9%(44.2–73.6%)	25.0%(9.1–40.9%)	-
	Small cell carcinoma, fusiform cell	4	-	-	-	-
	Small cell carcinoma, intermediate cell	9	17	71.4%(37.9-104.9%)	-	-
	Combined small cell carcinoma	135	89	88.1%(82.4–93.8%)	66.4%(57.2–75.6%)	59.0%(57.2–60.8%)
Laterality						
	Left	711	34	77.4%(74.1–80.7%)	48.6%(44.0-53.2%)	41.8%(37.1–46.5%)
	Right	912	33	76.2%(73.3–79.1%)	47.7%(43.8–51.6%)	40.4%(36.1–44.7%)
AJCC stage						
	IA	875	59	82.3%(79.6–85.0%)	56.8%(52.7–60.9%)	49.9%(45.3–54.5%)
	IB	748	24	70.2%(66.7–73.7%)	38.2%(34.1–42.3%)	30.9%(26.6–35.2%)

Abbreviation: CSS, cancer-specific survival; CI, confidence interval; NOS, not otherwise specified; AJCC, American Joint Committee on Cancer;

	Characteristics	Number of patients	Months of survival (median)	1-year cumulative proportion of CSS (CI)	3-year cumulative proportion of CSS (CI)	5-year cumulative proportion of CSS (CI)
Tumor size						
	1–20 mm	565	93	84.0%(80.9–87.1%)	60.2%(54.2–66.2%)	54.1%(48.6–59.6%)
	21–50 mm	839	30	75.4%(72.3–78.5%)	44.3%(40.2–48.4%)	37.0%(32.7–41.3%)
	51–80 mm	171	20	66.2%(58.6–73.8%)	35.0%(26.4–43.6%)	26.5%(17.7–35.3%)
	> 81 mm	48	13	51.0%(35.7–66.3%)	20.5%(6.6–34.4%)	-

Abbreviation: CSS, cancer-specific survival; CI, confidence interval; NOS, not otherwise specified; AJCC, American Joint Committee on Cancer;

Survival analysis

The CSS curve is shown in Fig. 1. The median CSS was 34 months (range, 1–143 months). The postoperative 1-, 3-, and 5-year CSS rates were 76.7% (95% CI, 74.5% -78.9%), 48.1% (95% CI, 45.2% – 51.0%) and 41.0% (95% CI, 37.9% – 44.1%) respectively (Table 1).

Independent prognostic factors and nomogram development

The clinicopathologic characteristics of lung cancer patients, the training set (n = 1,082) and validation set (n = 541), are listed in Table 2, respectively. In the training cohort, univariate analyses demonstrated that age at diagnosis, primary site, histologic type, AJCC stage, and tumor size were associated with CSS (Table 3). All significant risk factors in the univariate analysis were applied to the multivariate analysis. The results of the Cox hazards regression analyses are listed in Table 3. Analysis indicated that age at diagnosis, histologic types, AJCC stage, and tumor size remained independent risk factors in the Cox model. The Kaplan-Meier survival curve for significant risk factors is presented in Fig. 2. A nomogram, including the variables independently related to survival, is shown in Fig. 3. The CSS rates of 1-, 3-, or 5-year can be estimated by adding the points corresponding to the patient’s characteristics.

Table 2
Characteristics of the training and validation cohorts

Characteristics		Training cohort (n = 1082)		Validation cohort (n = 541)	
		n	%	n	%
Age	Mean ± SD(Range)	74.1 ± 6.2(65–93)		74.1 ± 6.3(65–96)	
Gender					
	Male	527	49%	263	49%
	Female	555	51%	278	51%
Race					
	White	971	90%	473	87%
	Black	72	6%	48	9%
	Asian or Pacific Islander	39	4%	20	4%
Primary site					
	Main bronchus	42	4%	13	2%
	Upper lobe of lung	603	56%	314	58%
	Middle lobe of lung	75	7%	41	8%
	Lower lobe of lung	335	31%	159	29%
	Overlapping lesion of lung	1	0%	4	1%
	Lung, NOS	26	2%	10	2%
Histologic types					
	Small cell carcinoma, NOS	955	88%	474	88%
	Oat cell carcinoma	27	3%	19	3%
	Small cell carcinoma, fusiform cell	4	0%	0	0%
	Small cell carcinoma, intermediate cell	8	1%	1	0%
	Combined small cell carcinoma	88	8%	47	9%
Laterality					
	Left	462	43%	249	46%

Abbreviation: SD, standard deviation; NOS, not otherwise specified; AJCC, American Joint Committee on Cancer;

Characteristics		Training cohort (n = 1082)		Validation cohort (n = 541)	
	Right	620	57%	292	54%
AJCC stage					
	IA	586	54%	289	53%
	IB	496	46%	252	47%
Tumor size	Mean ± SD(Range)	31.9 ± 22.8(1-400)		31.6 ± 18.7(5-150)	
Survival months	Mean ± SD(Range)	26.7 ± 26.7(1-143)		26.5 ± 27.5(1-134)	

Abbreviation: SD, standard deviation; NOS, not otherwise specified; AJCC, American Joint Committee on Cancer;

Table 3
Univariate and multivariate Cox proportional hazards regression analyses for elderly patients with Stage I Small Cell Lung Cancer

		Univariate analysis			**Multivariate analysis**	
	Variable	Log-rank χ2	*p* value	Hazard ratio	95% CI	*p* value
Gender		4.230	**0.040**			0.201
	Male			Reference		
	Female			1.128	0.938–1.356	0.201
Age		35.620	**< 0.001**			**< 0.001**
	65-69y			Reference		
	70-74y			1.173	0.903–1.525	0.231
	75-79y			1.657	1.285–2.135	< 0.001
	≥ 80y			2.260	1.733–2.947	< 0.001
Race		0.761	0.683			
	White					
	Black					
	Asian or Pacific Islander					
Primary site		15.577	**0.008**			**0.065**
	Main bronchus			Reference		
	Upper lobe of lung			0.768	0.484–1.219	0.263
	Middle lobe of lung			0.700	0.392–1.250	0.228
	Lower lobe of lung			0.721	0.449–1.156	0.174
	Overlapping lesion of lung			1.373	0.507	3.717

Abbreviation: CI, confidence interval; NOS, not otherwise specified; AJCC, American Joint Committee on Cancer;

		Univariate analysis			Multivariate analysis	
	Lung, NOS			1.508	0.800-2.844	0.204
Histologic types		18.265	**0.001**			**0.005**
	Small cell carcinoma, NOS			Reference		
	Oat cell carcinoma			1.615	1.001–2.608	0.050
	Small cell carcinoma, fusiform cell			0.323	0.045–2.318	0.261
	Small cell carcinoma, intermediate cell			1.373	0.507–3.717	0.533
	Combined small cell carcinoma			0.570	0.389–0.834	0.004
Laterality		0.292	0.589			
	Left					
	Right					
AJCC stage		43.682	**< 0.001**			**< 0.001**
	IA			Reference		
	IB			1.482	1.183–1.855	< 0.001
Tumor size		48.794	**< 0.001**			**0.005**
	1–20 mm			Reference		
	21–50 mm			1.426	1.120–1.815	0.004
	51–80 mm			1.540	1.072–2.210	0.019
	> 81 mm			2.208	1.347–3.620	0.002

Abbreviation: CI, confidence interval; NOS, not otherwise specified; AJCC, American Joint Committee on Cancer;

Validation of the nomogram

Internal validation of the nomogram was performed using internal bootstrap analyses with 1,000 resamplings. The C-index of the prognostic nomogram for CSS prediction was 0.68 (95% CI, 0.66–0.70). Similarly, in the external validation cohort, the C-index value for predicting CSS was 0.62 (95% CI, 0.60–0.64). These findings reflected the good discrimination ability of the model in both the training and validation cohorts. The internal and external calibration curves are shown in Fig. 4. The diagonal gray line represents the actual CSS probability, while the solid black line represents the performance of the nomogram model in predicting the CSS probability. The two lines overlap closely, indicating that the nomogram model provides reasonable estimations in both patient cohorts.

Discussion

In this study, we established and validated a nomogram based on 1,623 elderly Stage I SCLC cases from the SEER database. The nomogram was used to predict the 1-, 3- and 5-year CSS rates of elderly patients with early-stage SCLC based on four significant factors: age at diagnosis, histologic type, AJCC stage, and tumor size. The nomogram is a reliable and straightforward predictive tool to estimate prognosis and make appropriate therapy recommendations.

As the population is aging and lung cancer affects many older people, efforts should be made, and additional resources should be given to choosing optimal treatments for this patient population. The current model in the study includes only the critical clinically available variables and is cheaper than performing molecular tests, making it a more economical and practical option. The C-index implied that the model is satisfactory, and the internal calibration curves show good agreement between the nomogram prediction and actual observation. Thus, the repeatability and reliability of the nomogram can be guaranteed.[15] The predictive ability of our nomogram is consistent compared to the previous study (C-index, 0.68 vs. C-index, 0.68).[16] These predictive tools could help clinicians identify high-risk patients, obtain more precise patient survival evaluations, and prescribe the best treatment options.

Lung cancer is a disease of the elderly with a median age of 71 years at diagnosis. Approximately 13% of all lung cancer diagnoses are SCLC. Of those, 30% are defined as a limited-stage disease (characterized as disease confined to one hemithorax that can be compassed in a tolerable radiation field) or stage I-III according to the TNM classification.[17] Compared to extensive-stage disease (defined as disease beyond that included in the limited-stage disease), the 5-year survival rate of limited-stage I SCLC is much higher (1.6% vs. 12.1%).[18, 19] Combs *et al.* indicated that the 5-year overall survival for stage I of resectable SCLC patients treated with surgery and chemotherapy even reached 49%.[20] Both the American College of Chest Physicians (ACCP) and NCCN recommend surgery with adjuvant chemotherapy for stage I disease.[21, 22] Li and his colleagues recently constructed a nomogram for predicting CSS in patients with stage I SCLC. Their results show that surgery, chemotherapy, and radiotherapy could improve the one-year survival rate. Surgery effectively reduces the cancer-specific death, with the one-year cumulative incidence drops from 34.5 to 11.2%.[10]

Overall, in clinical practice, the use of surgery and optimal treatment with chemotherapy in the elderly population remains low, leading to under-treatment and undesirable survival rates.[23, 24] Most elderly stage I SCLC patients are concerned about whether to undergo surgery, chemotherapy, and thoracic radiation, knowing the undesirable risk and side effects of these treatment options. Therefore, there is an urgent need to build a scoring system to guide patients. Besides, our study was aimed to assess the prognosis at the onset of diagnosis in the elderly SCLC patients. The nomogram helps select appropriate candidates for surgery and optimize the allocation of medical resources and establish effective communication between patients and physicians.

By performing a comparison among four age cohorts (65–70 years, 70–75 years, 75–80 years, and > 80 years), we found that the 5-year CSS of the > 80-years group was the lowest (29.3% compared with 36.6%, 44.3%, 48.8%). Similar to previous studies, the current analysis confirms that age is an independent prognostic factor.[25–27] Similarly, a study of 1,303 patients enrolled in 11 trials show that elderly patients, compared with younger patients, have worse overall survival (OS) and progression-free survival (PFS), higher comorbidity score, poor performance, and difficulty in tolerating and completing therapy. All these factors probably contribute to lower survival.[28] Older age is directly linked with an unfavorable prognosis, and this variable is recommended to be considered in selecting treatment strategies.[29]

The different histological types of SCLC are significantly associated with biological characteristics and prognosis. As shown in the nomogram, the histological type is an important predictive factor of CSS. From the data on the cumulative incidence of death, the combined small-cell lung cancer has a smaller percentage of dying than other types of SCLC. Since 1981, the World Health Organization divided SCLC into three subtypes: oat cell, intermediate cell, and combined cell. Combined cell indicates combinations of malignant squamous and glandular elements.[30] Several retrospective studies have reported that combined SCLC has notable characteristic clinical features, frequently presenting with early-stage disease and potentially curable. This explains the possible benefit of multimodality therapies, including surgery, in patients with combined SCLC.[31, 32]

Growing studies reveal that tumor size is an independent prognostic factor of survival in many cancers, including SCLC.[33–35] According to our research, tumor size exerts a significant effect on the survival rate. In patients with tumor size > 2 cm, CSS is significantly higher than in patients with a tumor size ≤ 2 cm. Previous studies show that tumor size is positively correlated with the deficiency of immune ability of patients, which is associated with cancer survival.[36, 37] Therefore, the positive correlation between tumor size and immunity deficiency might be why tumor size is a prognostic factor in SCLC.

Our study has several limitations. First, this study was limited by the retrospective nature of data collection, which represents an inevitable bias. Second, the SEER program lacks data on therapy and comorbidity, which may influence the prognosis. Third, the predictive model was developed based on data obtained from the SEER database, which does not represent the global population. Further, multi-center studies using larger sample sizes are necessary to externally validate the predictive model to verify

whether our findings are universally applicable. Despite these limitations, the nomogram is developed using a large population data from the SEER database, providing unique opportunities to predict CSS for patients with Stage I SCLC.

Conclusion

Nomograms are constructed to estimate the probability of CSS of elderly patients with Stage I SCLC based on cohorts from the SEER database. Model validation proves its excellent performance, being highly accurate in predicting the prognosis of elderly patients with Stage I SCLC. The nomogram help clinicians selecting individuals who can benefit the most from surgery, thus providing more individualized treatment strategies.

Abbreviations

SCLC
small cell lung cancer; C-index, concordance index; CSS, cancer-specific survival; AJCC, American Joint Committee on Cancer; SEER, Surveillance, Epidemiology, and End Results; NCCN, National Comprehensive Cancer Network; ICD, International Classification of Diseases;

Declarations

Ethics approval and consent to participate

Our study did not require an ethical board approval because it did not contain human or animal trials.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the present study are available from the corresponding author upon reasonable request.

Competing Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Authors' contributions

Conception and design: Shusen Sun, Jing Huang; Administrative support: Feng Xiong, Yin Xiao; Provision of study materials or patients: All authors; Collection and assembly of data: All authors; Data analysis and interpretation: All authors; Manuscript writing: Yaji Yang, Jing Huang; Final approval of manuscript: All authors.

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Figures

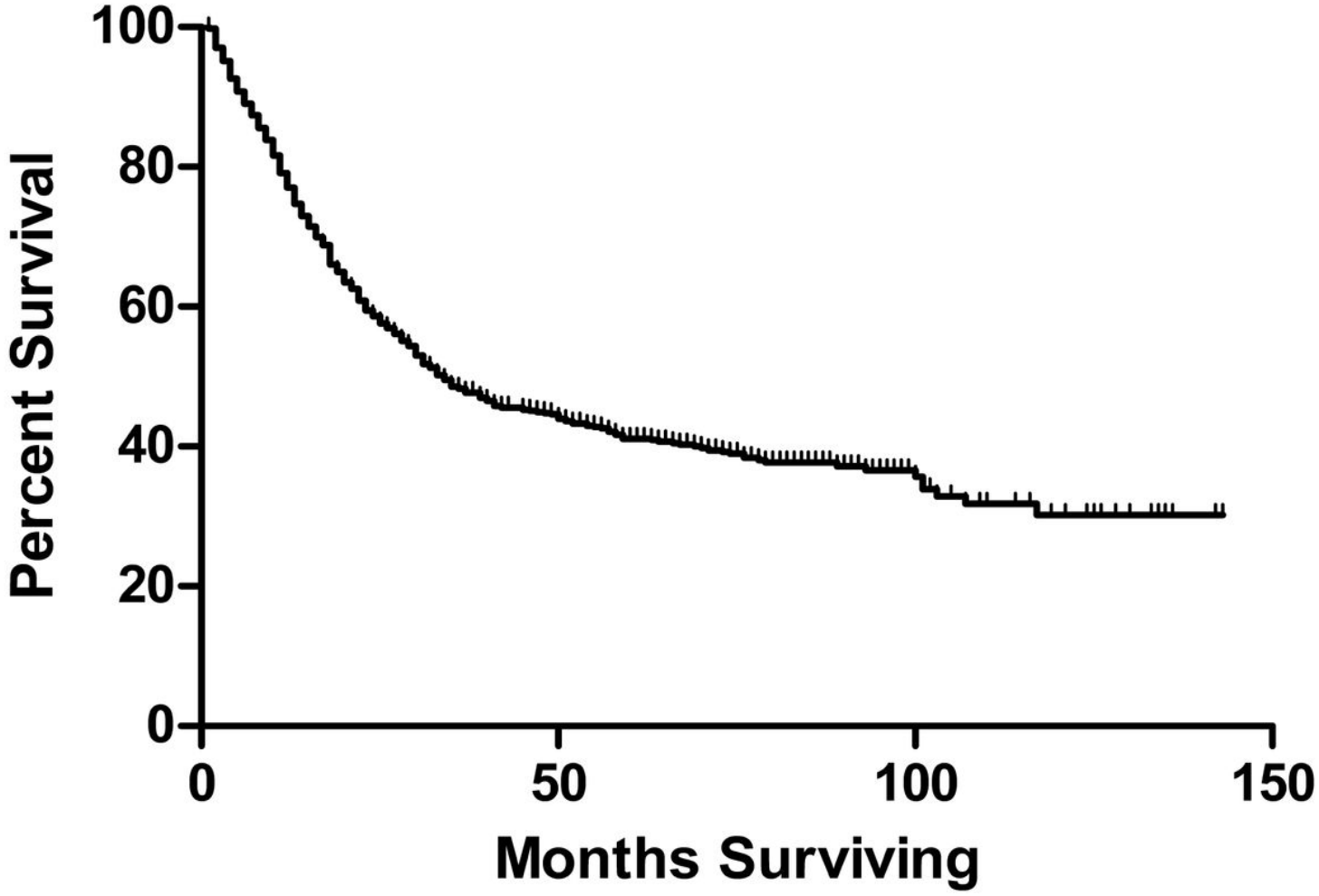
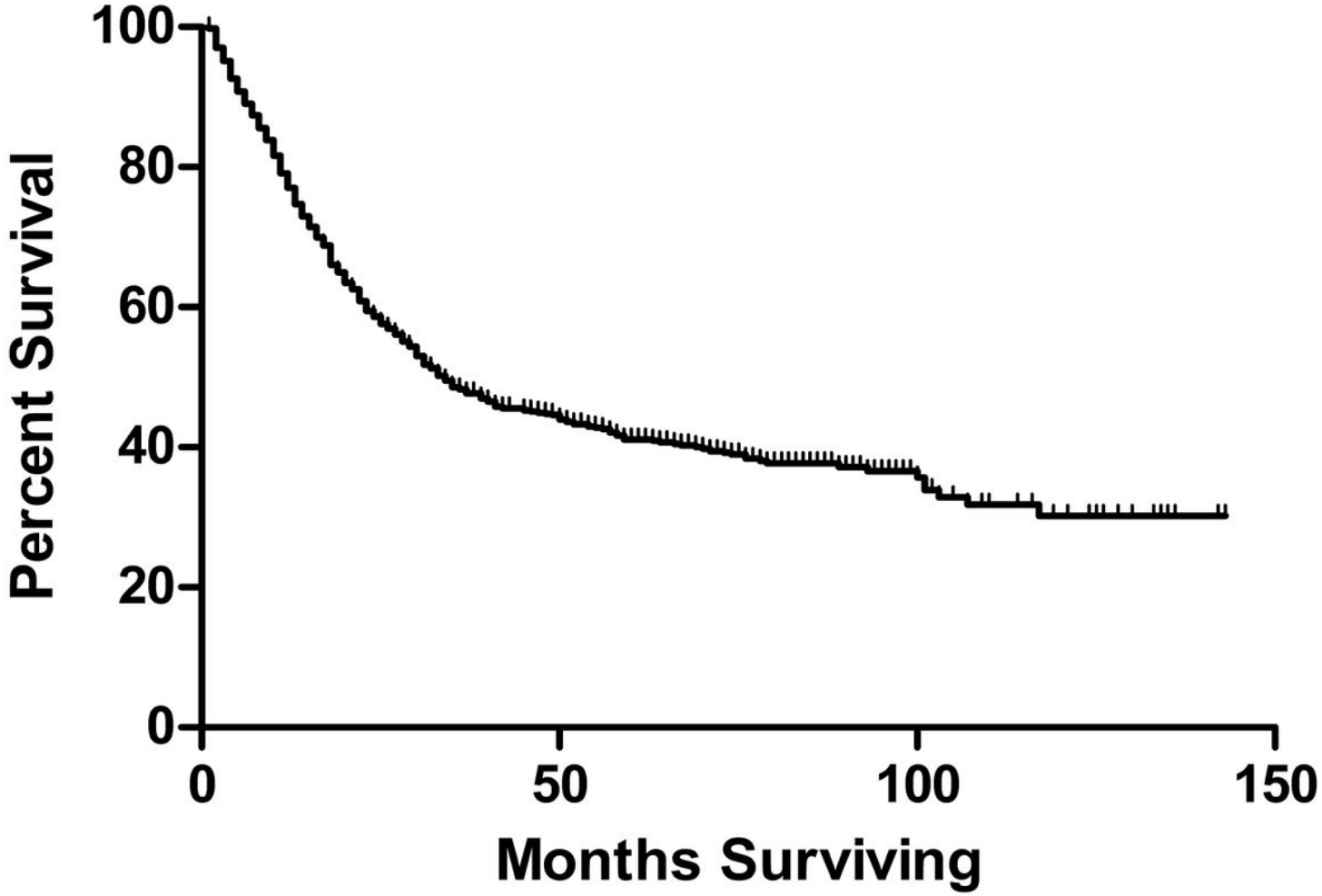


Figure 1

Kaplan-Meier survival curve of all included patients



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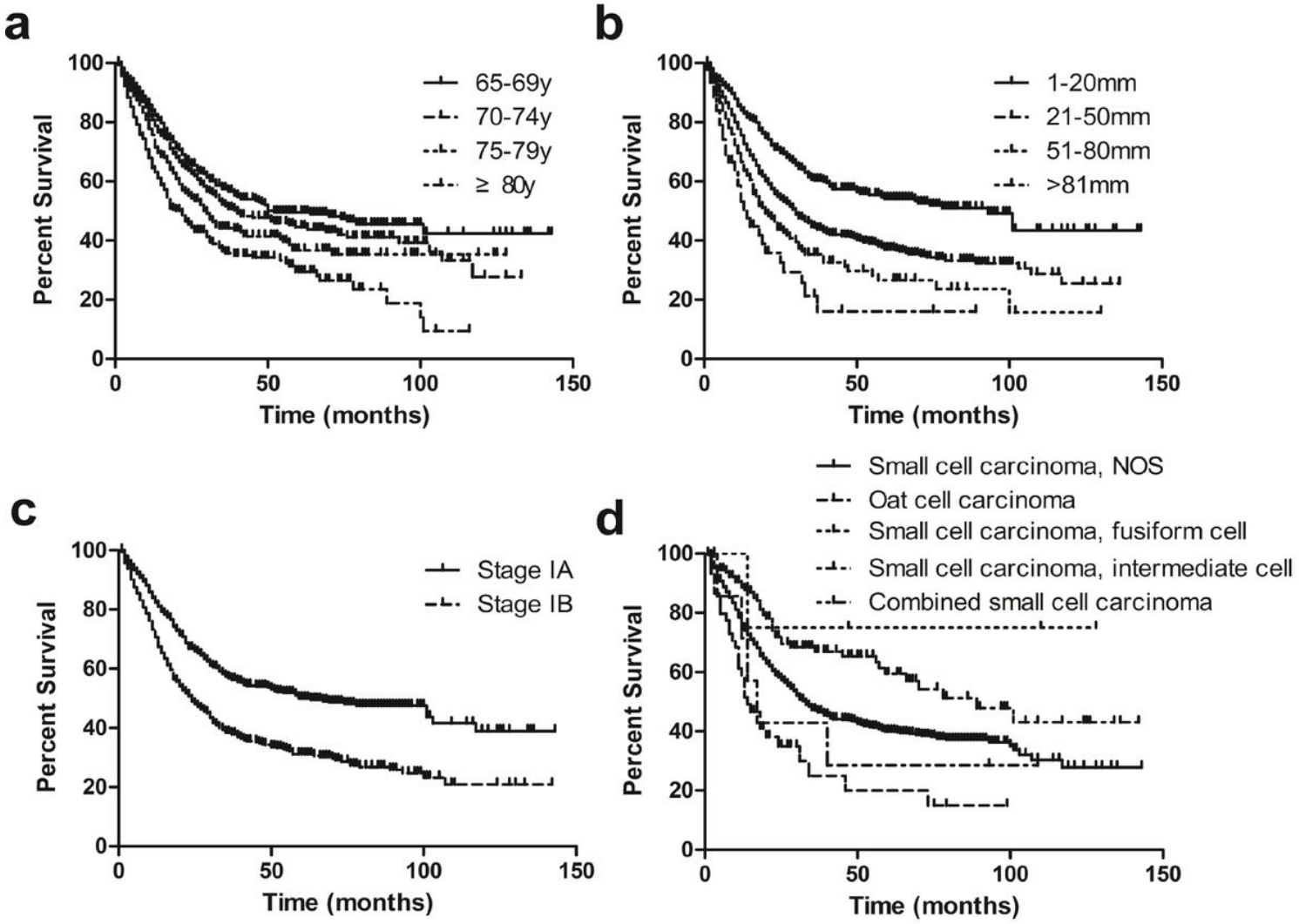
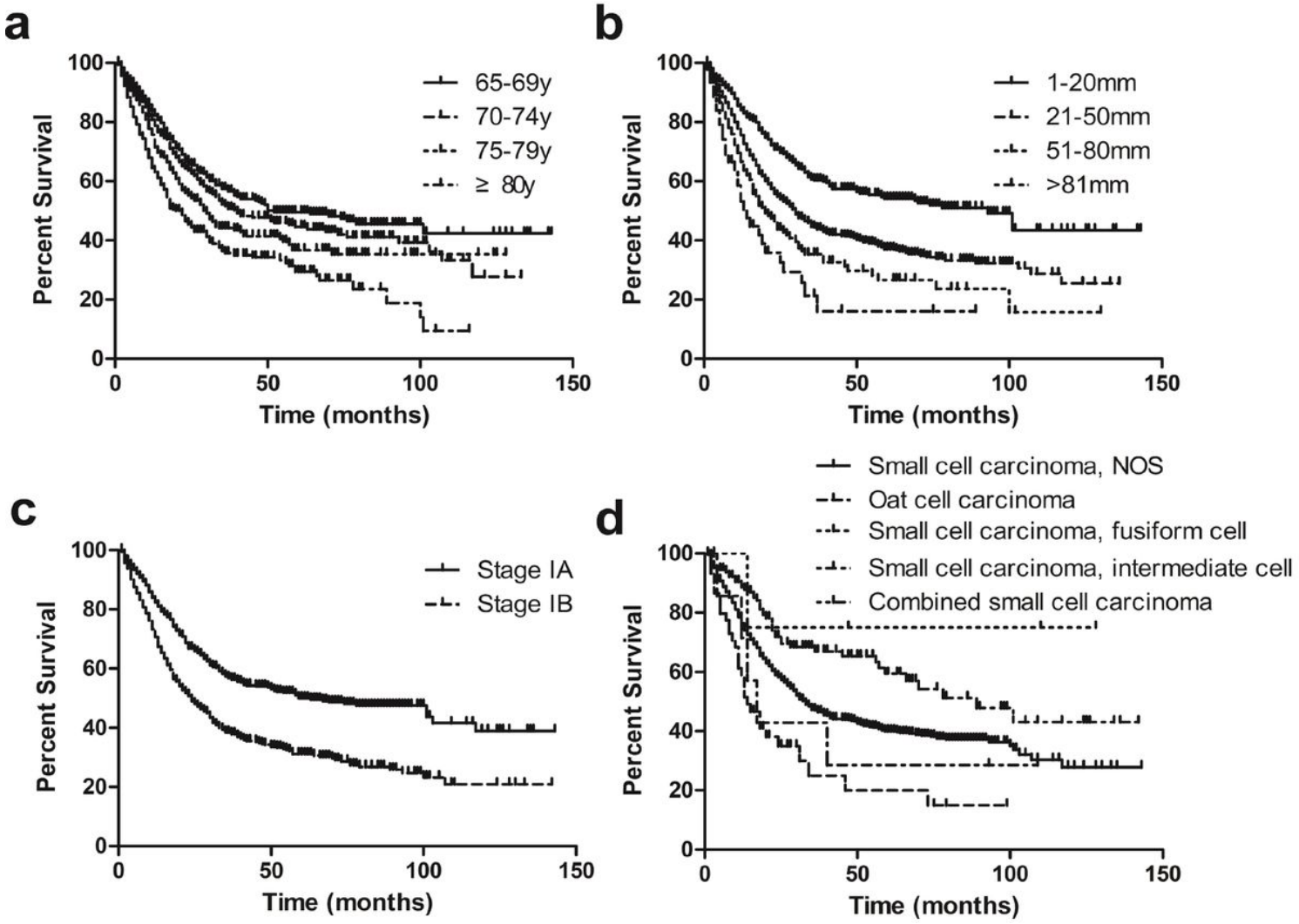


Figure 2

Kaplan–Meier survival curves for patients according to (a) Age, (b) Tumor size, (c) AJCC stage, (d) Histologic types



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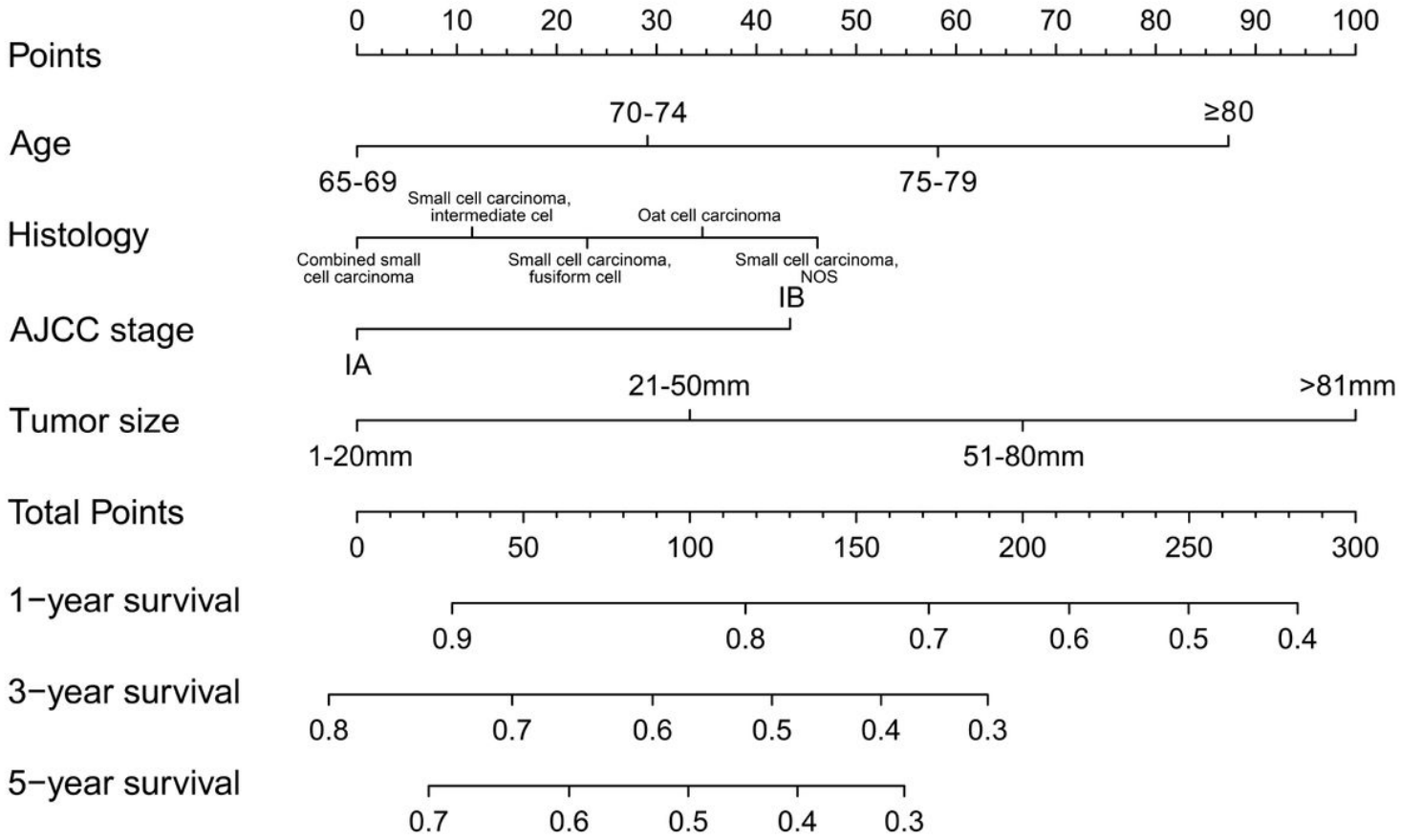
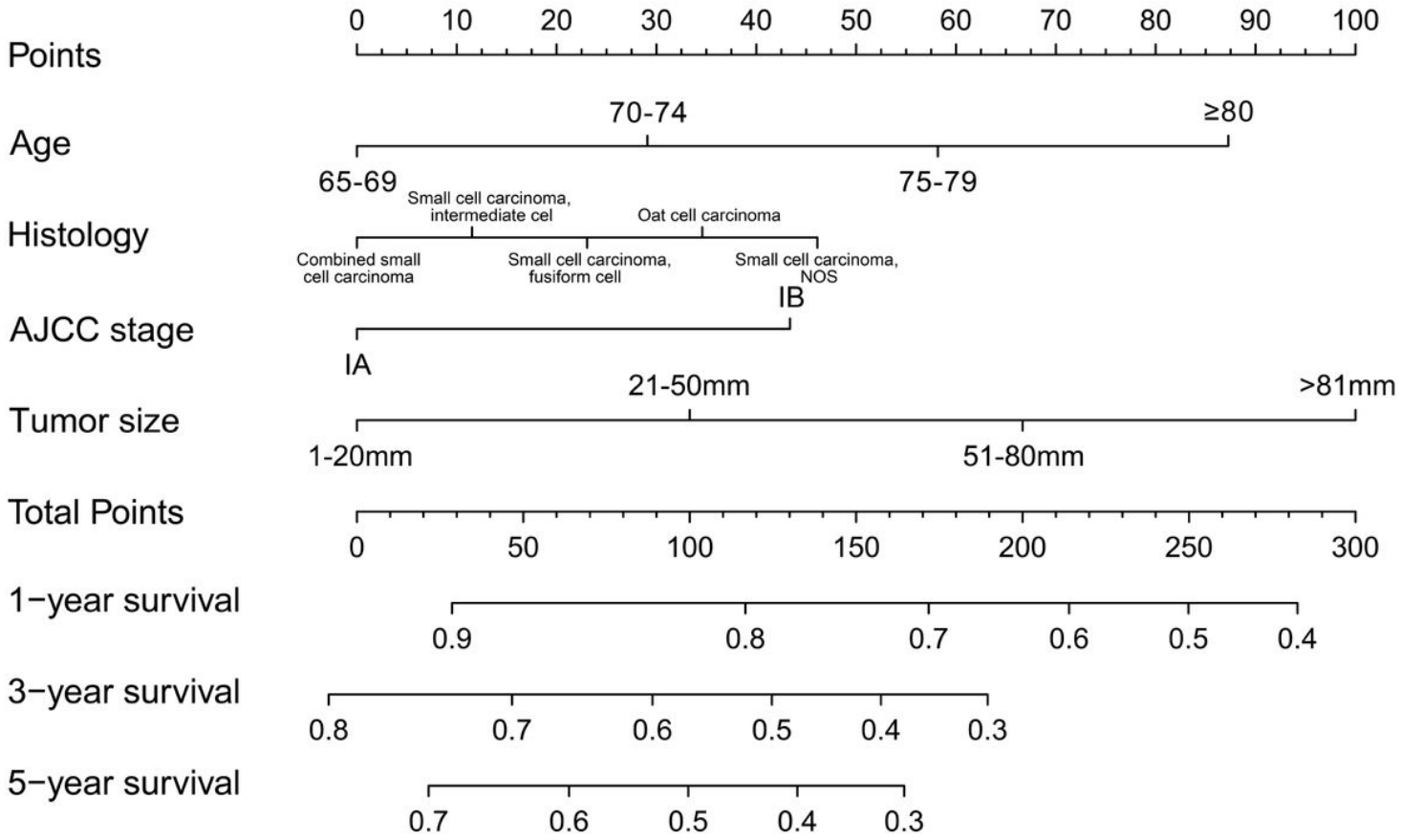


Figure 3

A nomogram for prediction of 1-, 3- and 5-year lung cancer-specific rates in elderly patients with Stage I Small Cell Lung cancer



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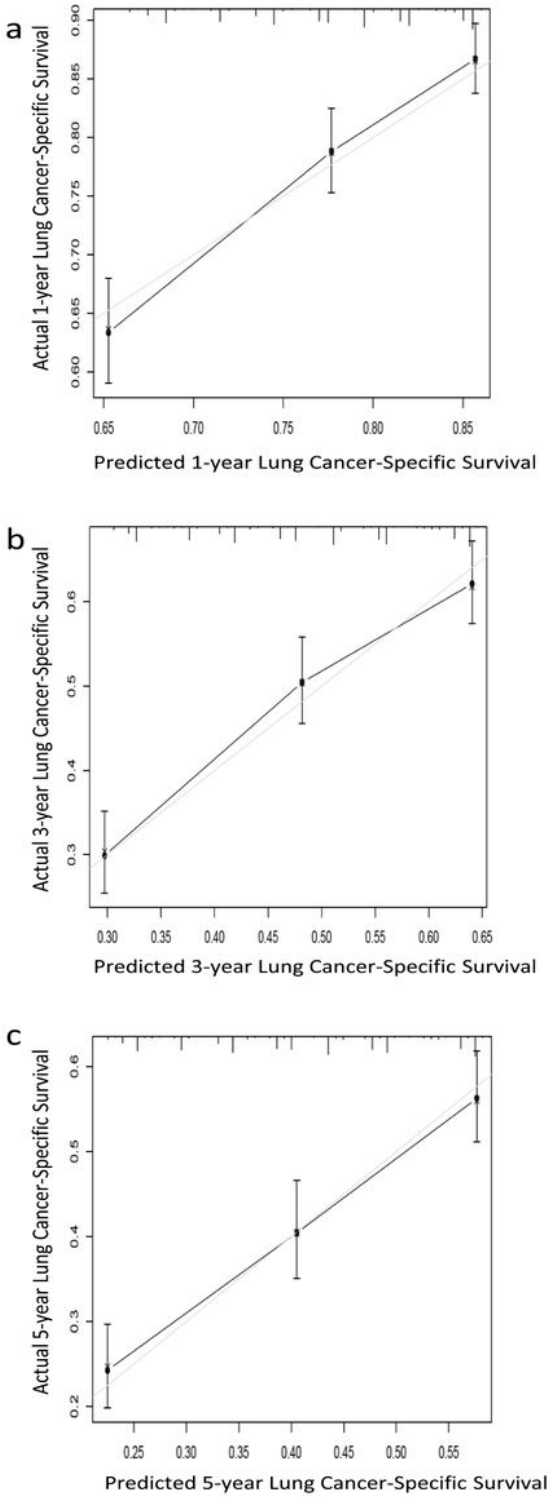
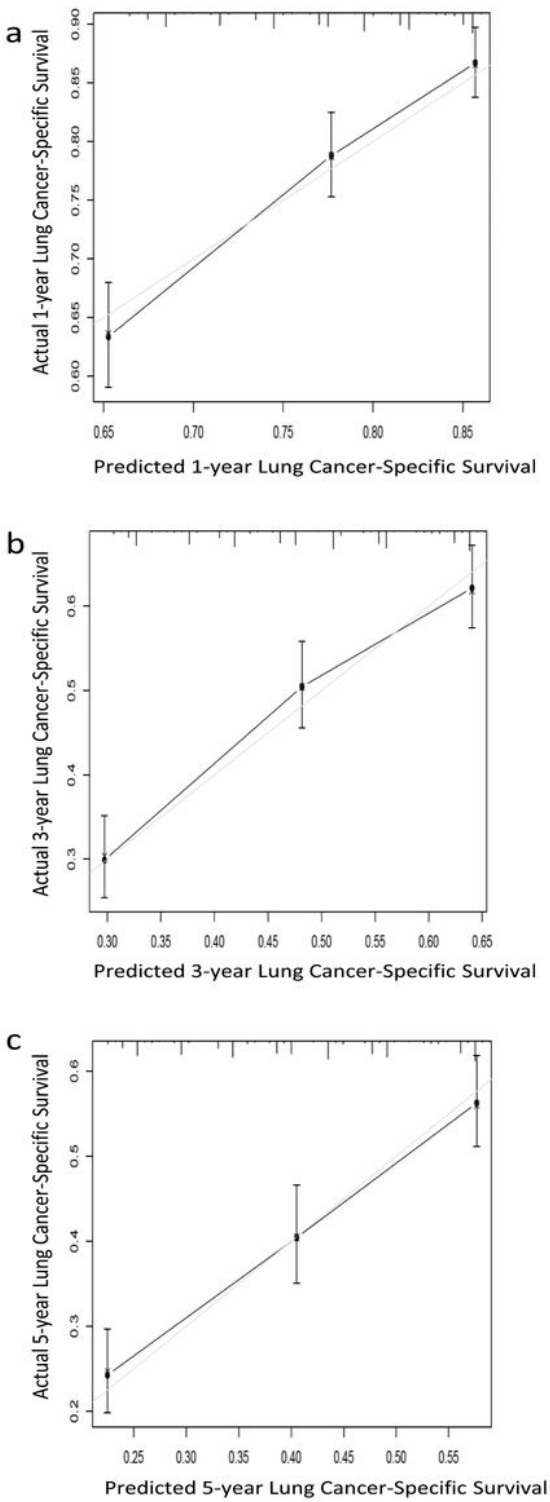


Figure 4

The calibration curves of 1-, 3- and 5-year lung cancer-specific survival rates of elderly patients with Stage I Small Cell Lung Cancer for training cohort (a, b, c) and for validation cohort (d, e, f)



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