

CT-Radiomics Features Predict Recurrence After Surgery Alone in Early-Stage Resectable NSCLC

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INTRODUCTION

- Approximately 30% of patients with early-stage resectable NSCLC experience recurrence despite curative-intent surgery [1].
- Current neoadjuvant-treatment strategies may result in both under- and over-treatment [1,2].
- Improved risk stratification - identifying patients at high risk of recurrence who may benefit the most from systemic therapy in addition to surgery, is an unmet need.
- AIM:** To develop a comprehensive model for predicting recurrence after surgery alone in early-stage resectable NSCLC and evaluate the incremental value of preoperative CT-derived radiomic features.

METHODS

Patient Selection Criteria

- 78 cases retrospectively collected from local institution
- Follow-up: median 45 months (range, 4–74 months)
- Eligibility criteria: stage IA-IIIa resectable NSCLC; No additional treatment than surgery
- Outcome: Disease-free survival (DFS), time from surgery to recurrence or death

Demographic, Clinical and Conventional Imaging Variables

- Demographic, Clinical Variables: Age, Sex, Smoking Status, TNM stage, Histology, Surgical Procedure
- Conventional Pre-operative CT and PET/CT : Tumor Size, Nodule Type, Location, Multiplicity, SUV_{max}

Tumor Segmentation & CT-Radiomic Feature Extraction

- PyRadiomics

Data Analysis

- Univariate analysis (Demographic, Clinical and Conventional Imaging Variables)

Model Development and Evaluation

- Develop models using LASSO Cox Regression
- Basic and integrated models
- Evaluate Performance : C-index, AUC

DISCUSSION AND CONCLUSION

Actionable Take Away Message

- Integrated clinicopathological and CT radiomics models demonstrated promising performance for predicting 2-year DFS in resectable NSCLC.
- CT-radiomics provides substantial incremental value over conventional staging, significantly enhancing model performance (AUC 0.77 to 0.91).

Future Direction for Research

- This approach may support personalized risk stratification and guide future treatment decision-making, with further validation in larger cohorts.

REFERENCES & ACKNOWLEDGEMENTS

References

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Artificial Intelligence (AI) Use Disclaimer

- Artificial intelligence (ChatGPT, OpenAI) was used solely for language editing and improving clarity. The authors reviewed and approved all content and are responsible for its accuracy.

RESULTS

Table 1. Descriptive analysis of variables between patients with and without an event (recurrence or death).

Variables*	Event (N=24)	Non-event(N=54)	p-value
Age	71 (59, 77)	69 (64, 77)	0.995
Sex			0.862
Male	9 (37.5%)	23 (42.6%)	
Female	15 (62.5%)	31 (57.4%)	
Smoking status			
Non-smoker	6 (25.0%)	23 (42.6%)	0.2187
Ever smoker	18 (75.0%)	31 (57.4%)	
T stage			0.002
T1	16 (66.7%)	51 (94.4%)	
>T1	8 (33.3%)	3 (5.6%)	
Nodal station			
N0	13 (54.2%)	47 (87.0%)	0.003
N1	8 (33.3%)	4 (7.4%)	
N2	3 (12.5%)	3 (5.6%)	
Surgical procedure detail			0.039
Bilob+Pneumonectomy	3 (12.5%)	1 (1.9%)	
Lobectomy	19 (79.2%)	39 (72.2%)	
Wedge+Segmentectomy	2 (8.3%)	14 (25.9%)	
Pre-surgery CT tumor size (long axis, in mm)	34.0 (26.9, 51.7)	23.9 (19.3, 29.0)	0.0003
SUVmax	7.0 (4.2, 9.2)	4.3 (2.4, 5.3)	0.003

* Some variable including histology, nodule type, location and multiplicity were not significant, P<0.05

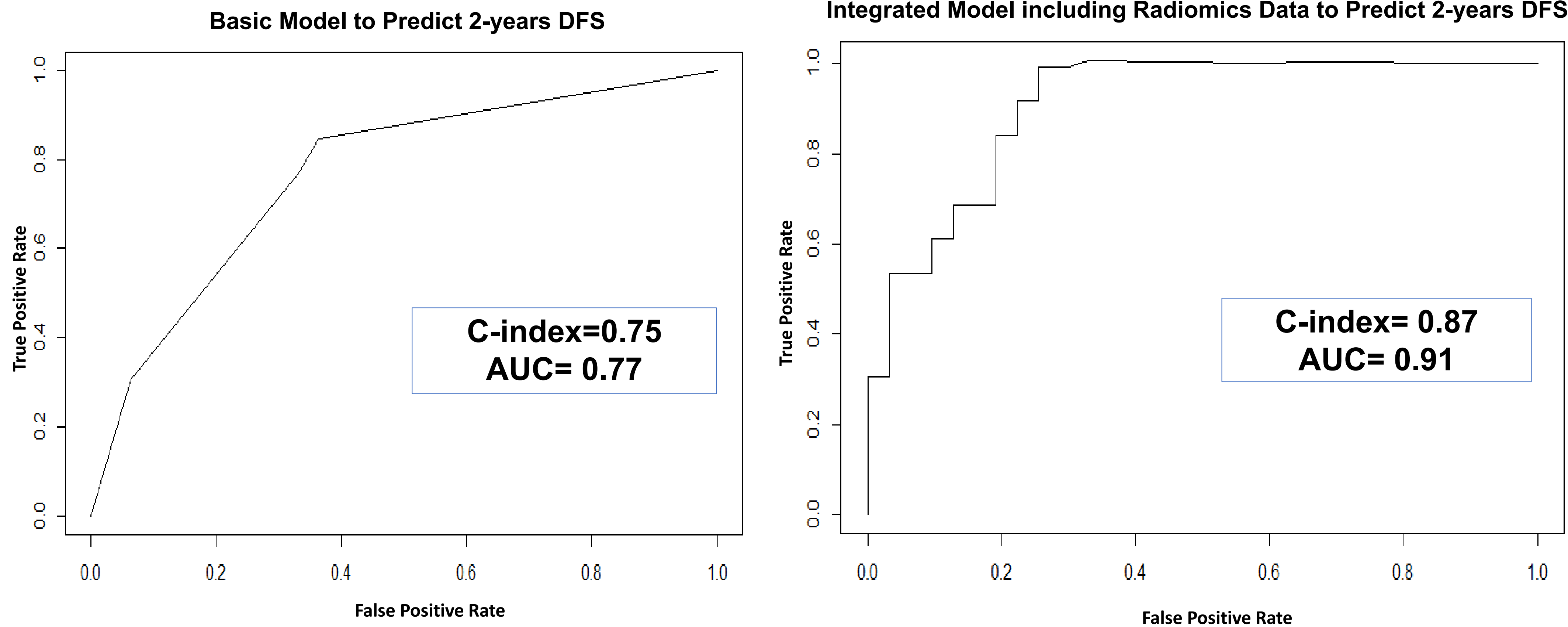


Figure 1. Model performance comparison. Performance of the basic model (left) and the integrated model incorporating radiomic features (right).