



Predicting Pathological Complete Response to Neoadjuvant Chemoimmunotherapy in NSCLC Using Radiomics Features from Pre- and Post-Treatment CT Scans



S. Zheng¹, J. Wang², S. Liu³, Z. Ye¹, X. Cui¹

¹Tianjin Medical University Cancer Institute and Hospital, National Clinical Research Center for Cancer, Tianjin's Clinical Research Center for Cancer, State Key Laboratory of Druggability Evaluation and Systematic Translational Medicine, Tianjin Key Laboratory of Digestive Cancer, Key Laboratory of Cancer Prevention and Therapy, Department of Radiology, Tianjin, China; ²Tianjin University of Traditional Chinese Medicine, School of Public Health, Tianjin, China; ³Med Frontier Suppliers & Consultancy UK Limited; **Correspondence:** cuixiaonan@tjmuch.com

INTRODUCTION

Neoadjuvant chemoimmunotherapy (NCI) has improved pathological complete response (pCR) rates in patients with resectable non-small cell lung cancer (NSCLC). However, pCR outcomes vary widely among individuals. To enhance the accuracy of preoperative evaluation of NCI response, this study aimed to develop and validate a radiomics model for predicting pCR by leveraging features obtained from longitudinal CT scans.

METHODS

We retrospectively analyzed 263 patients with resectable NSCLC who received NCI followed by curative surgery and had both pre- and post-treatment CT scans. Patients from one center were randomly assigned to training and internal test sets in a 7:3 ratio, and patients from two additional centers were included as an external test set. Radiomics features were extracted from both imaging timepoints, and delta features reflecting interval changes were calculated. Radiomics models based on pre-treatment, post-treatment, and delta features were developed using least absolute shrinkage and selection operator for feature selection, followed by logistic regression. Model performance was assessed using the area under the curve (AUC).

RESULTS

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The model built on delta features achieved AUCs of 0.85, 0.76, and 0.72 in the training, internal test, and external test sets. These values were higher than those of models based solely on pre-treatment features (0.74, 0.66, 0.62) and were generally comparable or slightly higher than those based on post-treatment features (0.80, 0.76, 0.65). When features from all three sources were combined, the resulting model showed improved performance, with AUCs of 0.89, 0.85, and 0.78 across the three datasets.

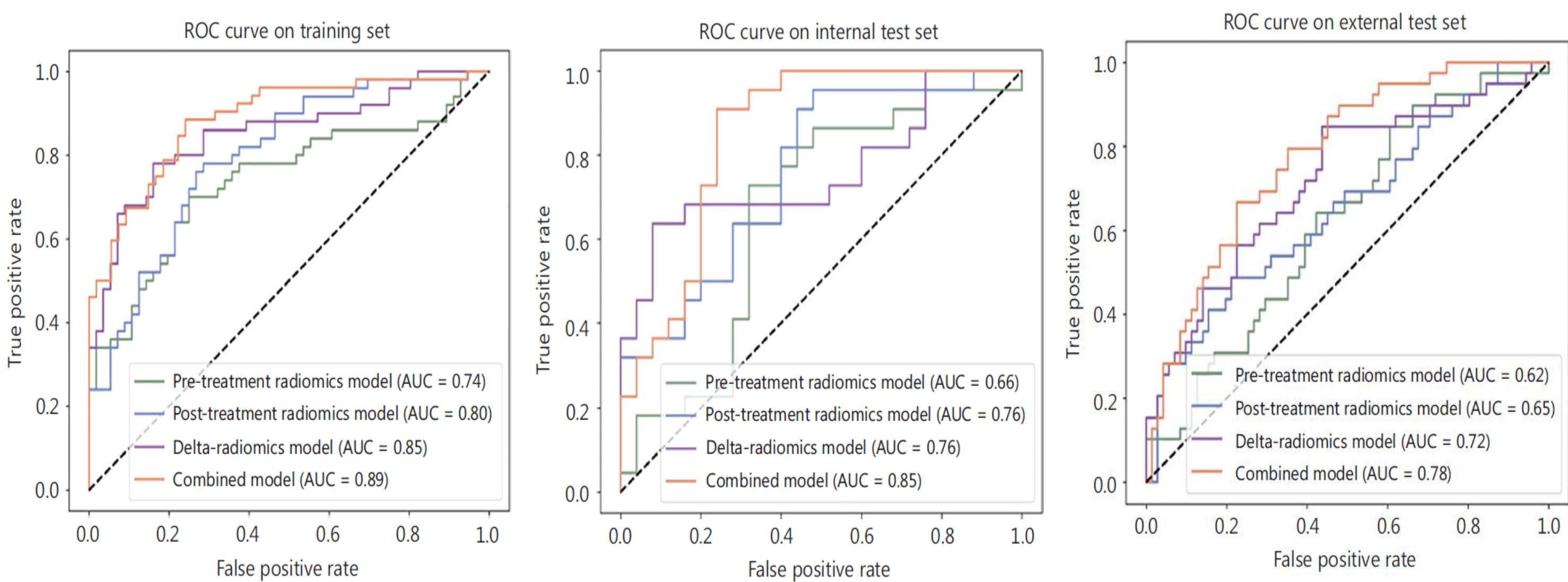


Fig.2 Model performance on different sets

DISCUSSION AND CONCLUSION

Actionable Take Away Message

- Longitudinal CT radiomics, particularly delta features, improves pCR prediction compared with single timepoint imaging.
- Integrating pre-, post-treatment, and dynamic changes provides complementary information for more accurate individualized response assessment.
- Future Direction for Research**
- Prospective multicenter validation and integration of multimodal data (e.g., ctDNA, pathology, genomics) are needed to enhance robustness and clinical applicability.
- Developing interpretable and clinically deployable models will be critical to facilitate real-world decision-making and treatment stratification.

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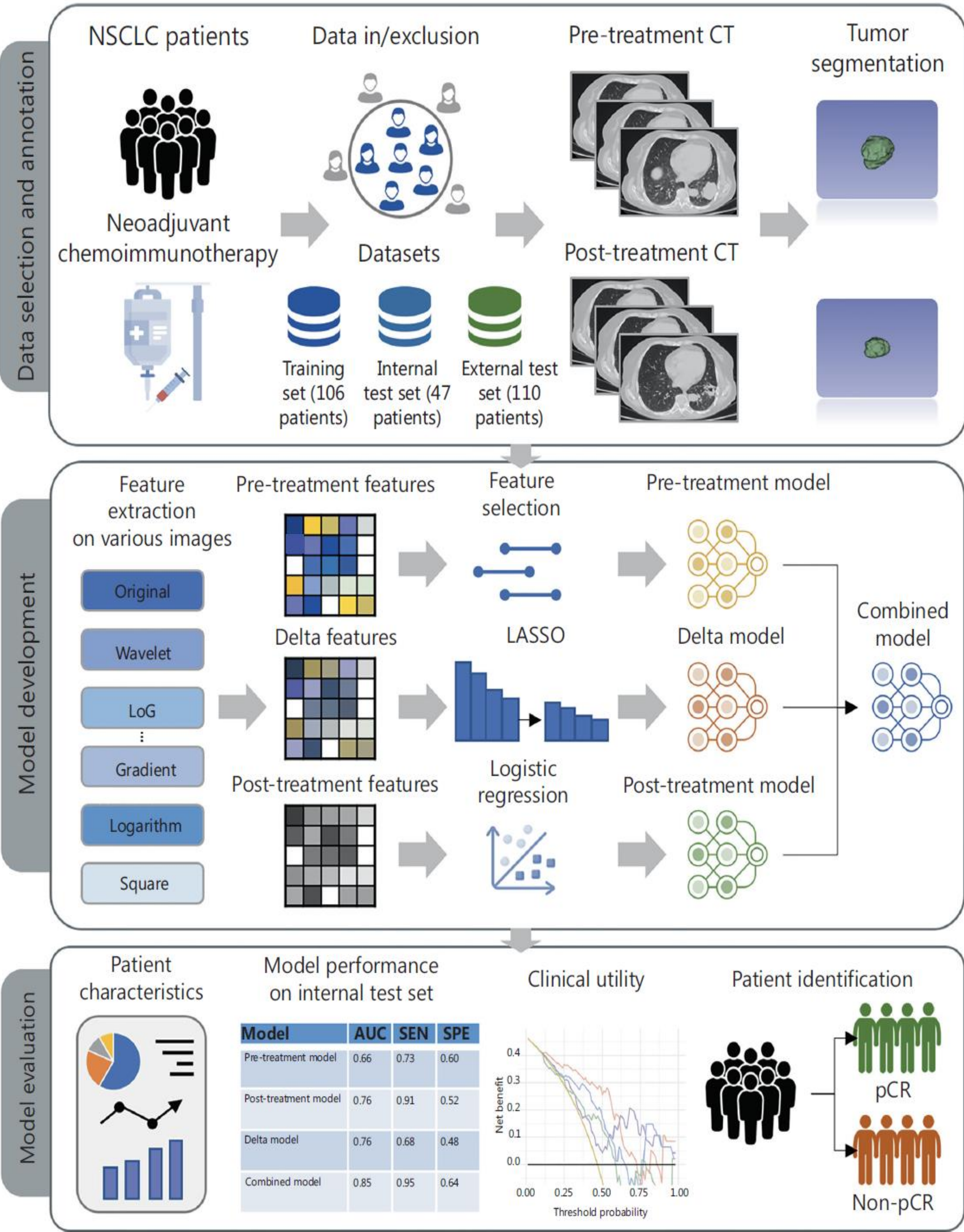


Fig.1 Study flowchart