



P1.109: Prediction of Neoadjuvant Immunotherapy Efficacy for NSCLC Based on Digital Pathology Fusion of Multimodal Features

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INTRODUCTION

- Neoadjuvant immunotherapy has expanded treatment options for patients with resectable NSCLC, but pathological responses remain highly heterogeneous.
- Existing predictive biomarkers have limited accuracy and robustness. Digital pathology and AI may improve pretreatment prediction by integrating complementary histomorphological and molecular information.
- We developed a biopsy-based AI model to predict pathological complete response (pCR) and identify associated factors.

METHODS

- We retrospectively enrolled 364 patients with NSCLC treated with neoadjuvant immunotherapy followed by surgery at two centers (January 2019–May 2025).
- Clinicopathological data and pretreatment biopsy whole-slide images stained with H&E or PD-L1 IHC were collected.
- The primary endpoint was pCR. H&E, PD-L1 IHC, and multimodal fusion models were developed.
- Models were evaluated in internal and external test sets using AUC, calibration, clinical utility, and interpretability.

DISCUSSION AND CONCLUSION

- Integrating H&E and PD-L1 IHC features yielded higher observed AUCs than either unimodal model in both test sets.
- This multimodal approach may capture complementary tumor information and support pretreatment response assessment and individualized treatment planning in NSCLC.
- Further validation in larger prospective cohorts is warranted before clinical implementation.

RESULTS

- A total of 364 patients from two centers were included in the study, among whom 149 achieved pCR and 215 did not.
- Compared with the unimodal models, the multimodal fusion model exhibited superior comprehensive predictive ability in both the internal and external test sets, while also showed good performance in terms of calibration, clinical net benefit and interpretability.

RESULTS

- Performance analysis of our AI pathological models revealed that in the internal test set, the area under the curve (AUC) values of the H&E unimodal model, IHC unimodal model and multimodal fusion model were 0.774, 0.806 and 0.822, respectively; in the external test set, the AUC values were 0.641, 0.610 and 0.673, respectively(Figure 1).

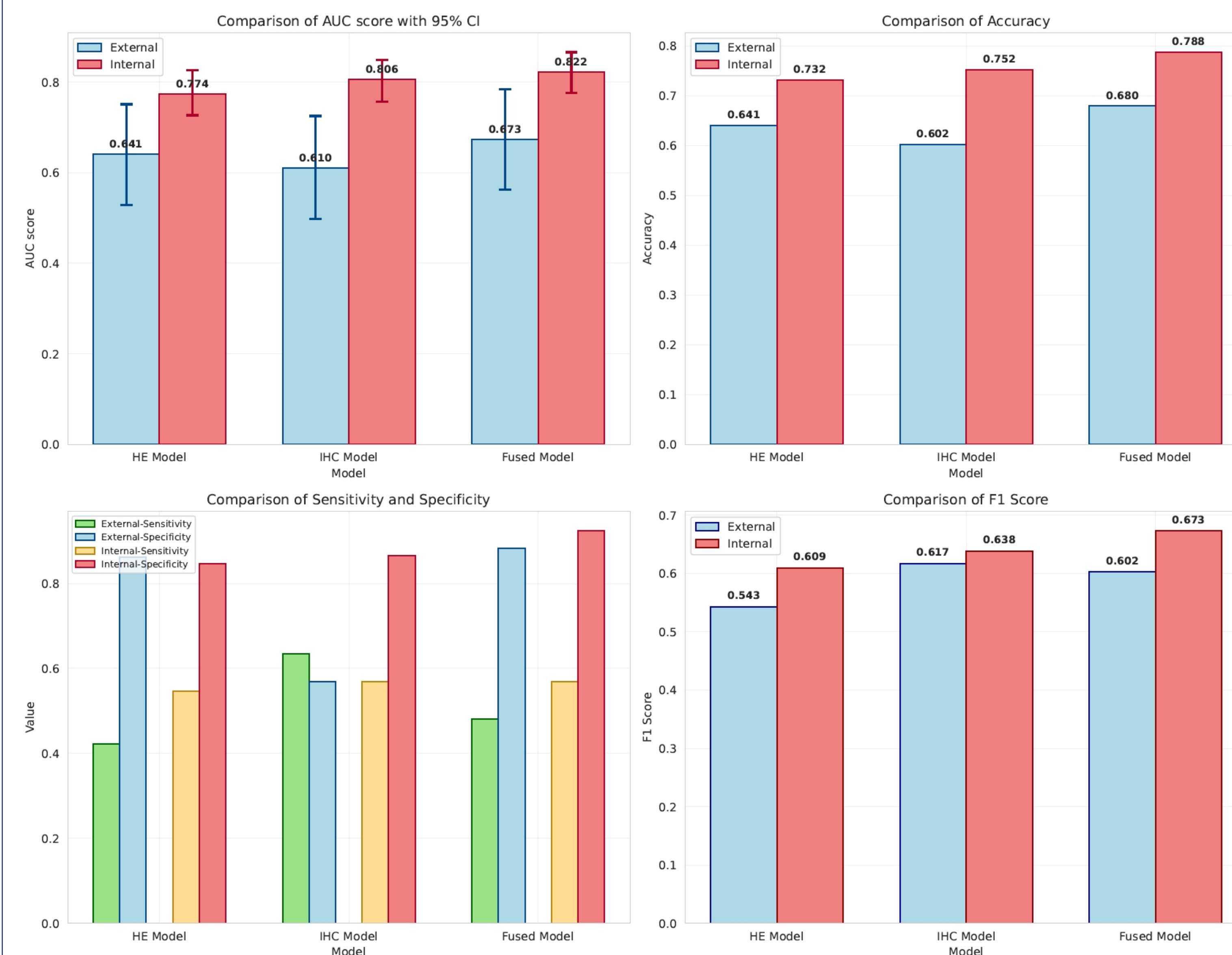


Figure 1. Comparison of models performance on internal and external datasets.

