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P3. 307: Multicenter Validation of Explainable ML Models for Survival Prediction in ES-SCLC with Immunotherapy

BACKGROUND & OBJECTIVE

Clinical need

ES-SCLC lacks reliable prognostic tools in the immunotherapy era. TNM staging misses treatment exposure and patient heterogeneity.

Objective

Develop externally validated, explainable ML models for PFS and OS after first-line immunotherapy.

DISCUSSION AND CONCLUSION

Key findings

- StepCox[forward] + GBM (PFS) and StepCox[forward] + Ridge (OS) retained discrimination in the external cohort.
- Both models outperformed conventional TNM-only prediction.
- Clinical implications**
- Interpretable risk estimates can support personalized surveillance and treatment planning.
- Treatment exposure and radiotherapy timing are clinically actionable prognostic signals.

LIMITATIONS & THANKS

Limitations

- Retrospective design and a relatively small external cohort (n=31).
- Prospective, geographically broader validation is warranted before routine use.

Acknowledgements

We thank the patients, clinicians, and investigators across all six participating institutions.

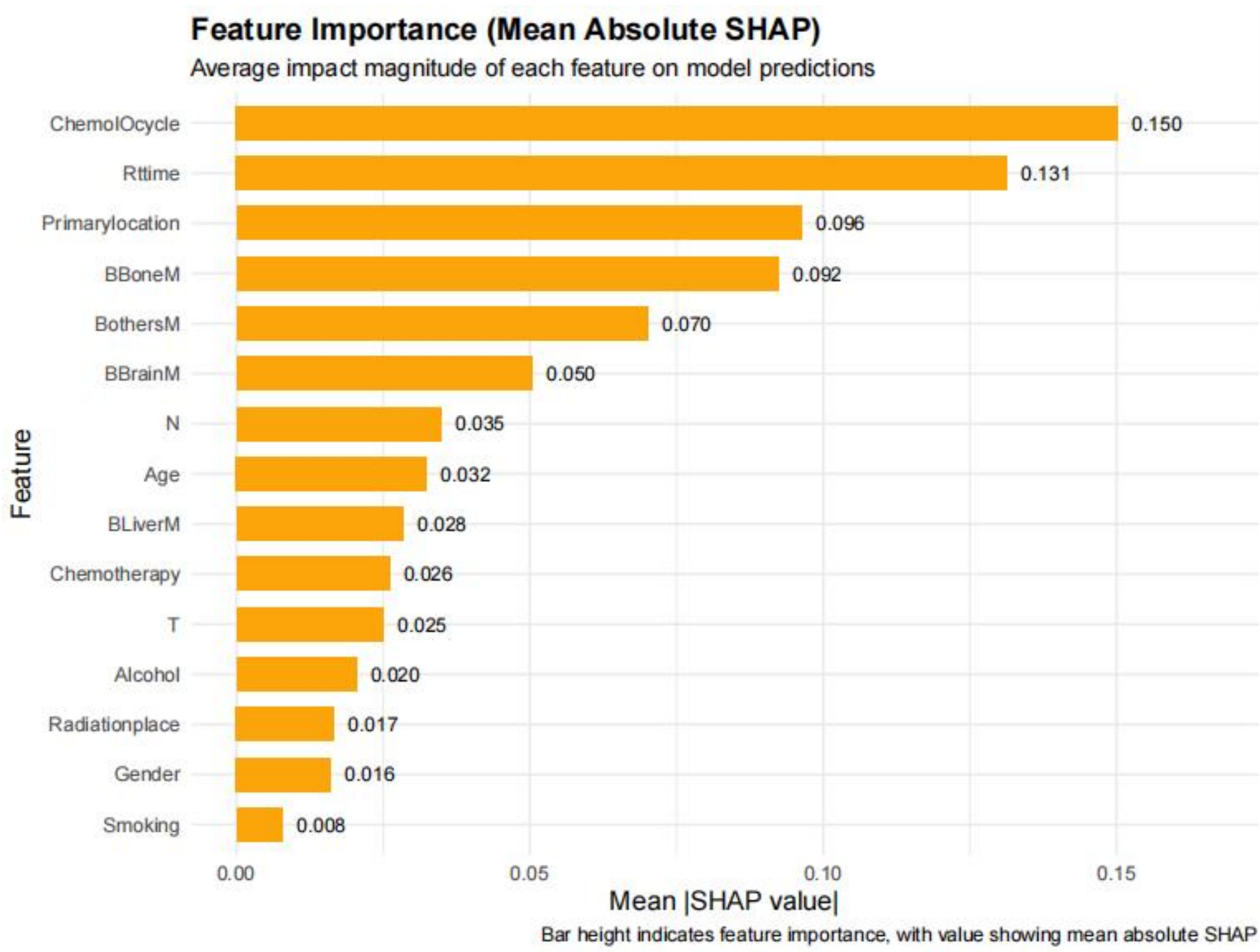
RESULTS

Explainable ML models generalized externally and consistently outperformed TNM-only prediction.

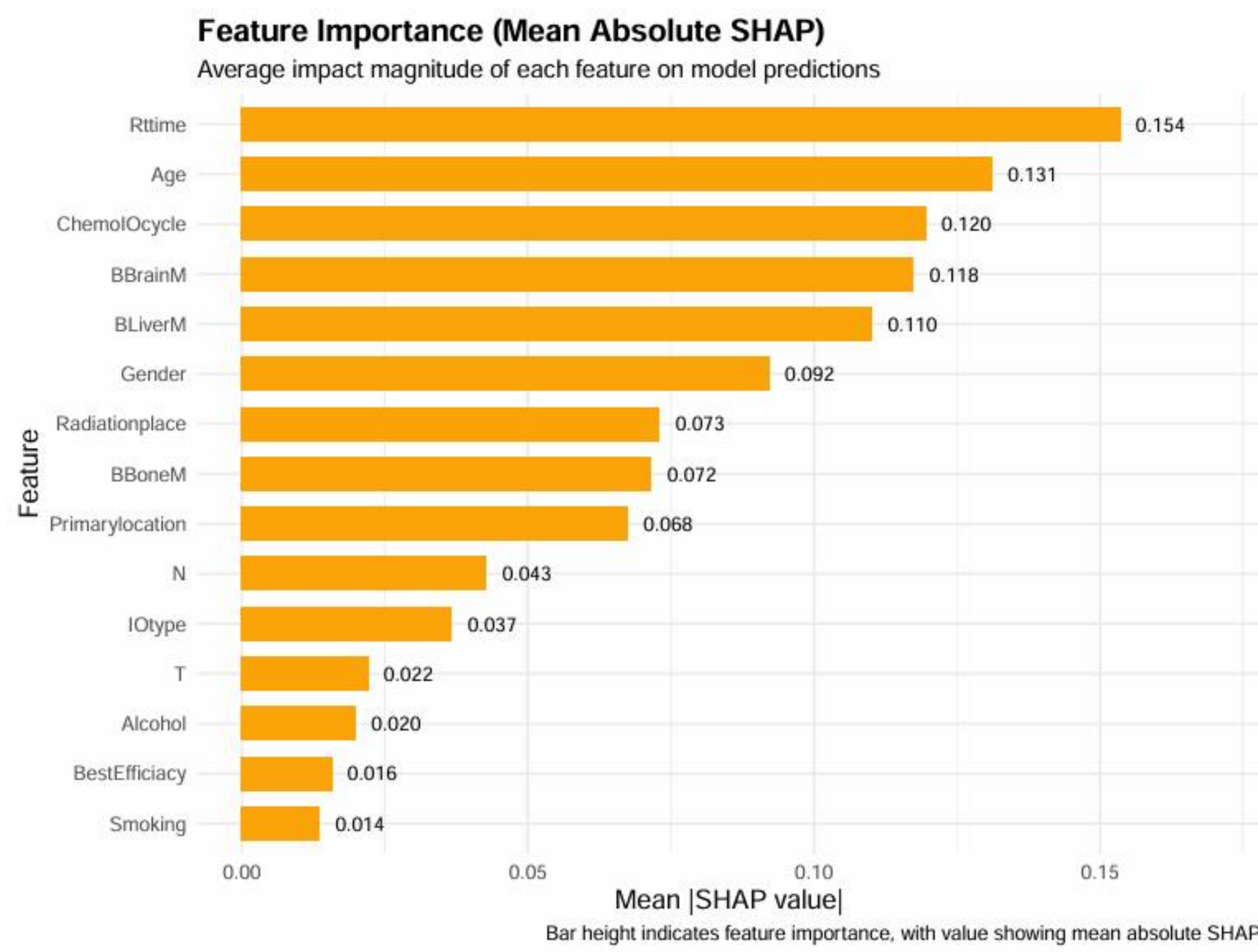
Outcome / metric	Selected model	Training	Internal	External
PFS · C-index	StepCox[forward] + GBM	0.73	0.69	0.66
PFS · 1-year AUC	StepCox[forward] + GBM	0.96	0.77	0.88
OS · C-index	StepCox[forward] + Ridge	0.69	0.69	0.66
OS · 1-year AUC	StepCox[forward] + Ridge	0.75	0.74	0.75
TNM-only Cox	Conventional benchmark	—	0.57 / 0.62*	—

* TNM benchmark in the validation set: C-index 0.57 / 1-year OS AUC 0.62. External validation cohort n=31.

PFS model · leading prognostic features



OS model · leading prognostic features



SHAP interpretation

PFS: chemotherapy cycles, radiotherapy timing, and primary tumor location were dominant. OS: radiotherapy timing, age, and chemotherapy cycles were most influential.

External validation: C-index 0.66 for both models; 1-year AUC 0.88 (PFS) and 0.75 (OS). These results support clinically relevant risk stratification beyond TNM staging.