1266 UTILIZING PREDICTIVE MODELING TO RISK STRATIFY PATIENTS TO LOW VERSUS HIGH GRADE IMMUNE CHECKPOINT INHIBITOR THERAPY-RELATED PNEUMONITIS

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Background Immune checkpoint inhibitor therapy-related (ICI) pneumonitis is a potential serious complication for patients with cancer. We have previously shown that modeling can be used to predict the risk of death from ICI pneumonitis.[1] Further predictive modeling to risk stratify patients with ICI pneumonitis is needed.

Methods A database of cancer patients diagnosed with ICI pneumonitis seen at Mayo Clinic from 2014–2022 was utilized for exploratory data analysis. Within this cohort, we isolated clinical variables from before ICI pneumonitis diagnoses to determine if we could model the propensity for developing low grade (1–2) versus high grade (3–4) pneumonitis at the time of immunotherapy initiation. Those clinical variables included age, sex, weight, common laboratory values, immunotherapy treatment, cancer type, and baseline pulmonary function tests (PFTs). We used a gradient boosting machine learning technology, Xgboost[2] to conduct binary classification. Given the relatively small cohort size for AI analysis (n = 170), modeling was conducted with 1,000-fold bootstrapping to minimize dependence on data arrangement and k-fold cross validation to minimize model overfitting. Model reverse engineering was done with Shapley statistics[3] to determine which features had the largest contribution. Once identified, only those highly weighted features were used for logistic regression analysis providing more reproducible predictions by decreasing model variance.

Results 170 patients with ICI pneumonitis were included (median age 67; range 25–87). The severity of ICI pneumonitis was as follows: grade 1 (n=16, 9%), grade 2 (n=86, 51%), grade 3 (n=57, 34%), and grade 4 (n=11, 6%). 47 patients (28%) had another ICI toxicity. Median overall survival was 2.5 years (95%, CI: 1.8-NR). A higher grade of ICI pneumonitis was associated with inferior survival (HR 2.0, 95% CI 1.5–2.8, p<0.001). Our approach resulted in a low versus high grade pneumonitis binary classification model with an area under the curve of the receiver operator characteristic of 0.74 (figure 1). The features most predictive of whether a patient would develop high grade pneumonitis were baseline DLCO obtained from PFTs, hemoglobin concentration, monocyte count, total white blood cell count, and immunotherapy choice.

Conclusions We demonstrate that commonly available clinical data can be used to risk stratify patients to low versus high grade ICI pneumonitis. Further effort is needed to produce clinical models able to provide clinician decision support when evaluating patients with ICI toxicities. Investigation is underway which uses a large cancer data set to independently validate this model and to predict who will develop immunotherapy toxicities.

REFERENCES

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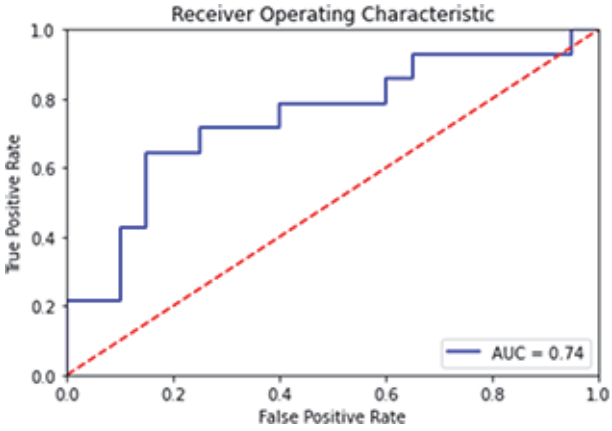
Ethics Approval This study was approved by the Mayo Clinic IRB.



Abstract 1266 Figure 1 Area under the curve of the receiver operator characteristic (AUC-ROC) from modeling propensity of low grade versus high grade immune checkpoint inhibitor therapy-related pneumonitis

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