Preinfusion Inflammatory and Hematologic Biomarkers as Predictors of CAR-T Outcomes in Non-Hodgkin Lymphoma: A Translational Evidence Synthesis

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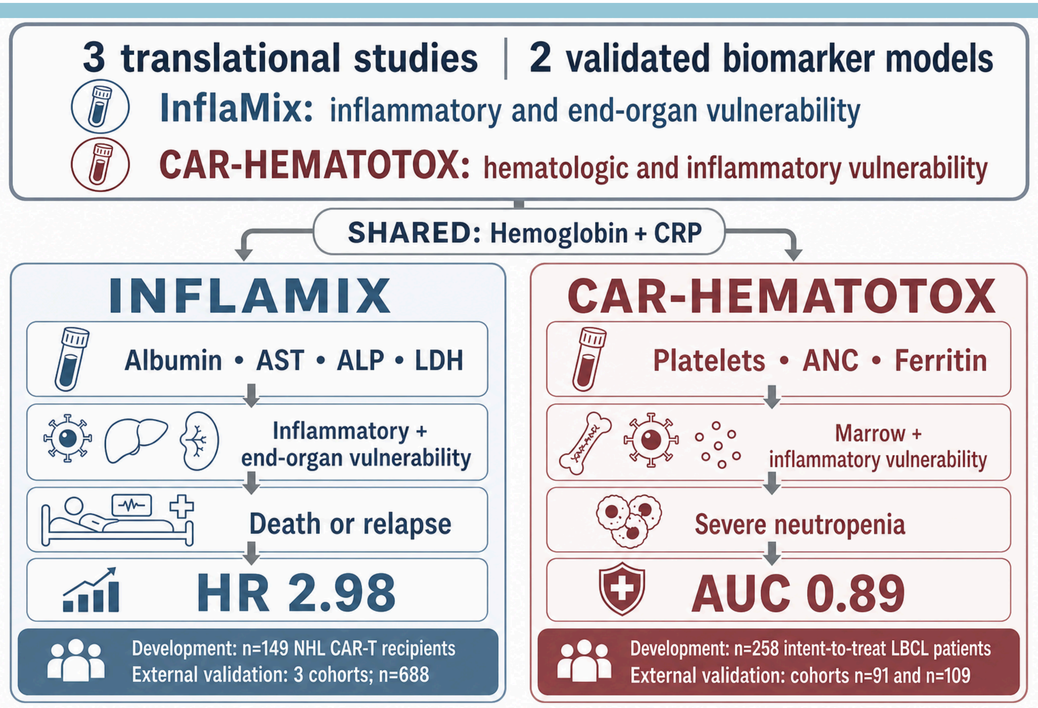
Introduction & Aim

Chimeric antigen receptor T-cell (CAR-T) therapy has improved outcomes in relapsed or refractory non-Hodgkin lymphoma, but treatment failure, prolonged cytopenias, infection, and mortality remain difficult to predict. Preinfusion inflammatory and hematologic biomarkers may capture host immune state, marrow reserve, and end-organ vulnerability before cellular therapy. This synthesis evaluates translational evidence linking preinfusion inflammatory and hematologic biomarker signatures with CAR-T efficacy, hematologic toxicity, infection risk, and survival in non-Hodgkin lymphoma.

Design & Methods

A focused translational evidence synthesis included three primary clinical biomarker studies evaluating pre-CAR-T inflammatory or hematologic risk models in non-Hodgkin lymphoma. Studies were identified through a literature search for preinfusion biomarker models in CAR-T recipients, with inclusion restricted to models reporting both development and external validation cohorts. Extracted data included biomarker panels, model performance, and clinical outcomes, including treatment failure, survival, and hematologic toxicity.



Results

- InflaMix identifies inflammatory and end-organ vulnerability associated with death or relapse (HR 2.98; 95% CI 1.60–4.91; p<0.001).
- CAR-HEMATOTOX identifies hematologic and inflammatory vulnerability associated with prolonged severe neutropenia (AUC 0.89; sensitivity 89%; specificity 68%).

Limitations

- Evidence was limited to three studies with heterogeneous patient populations and clinical endpoints.
- Differences in biomarker definitions and model application limited direct comparison.
- Further prospective, multicenter validation is needed before routine clinical use.

Conclusion

Preinfusion biomarker models may support individualized risk assessment for treatment failure and hematologic toxicity before CAR-T therapy.

References

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