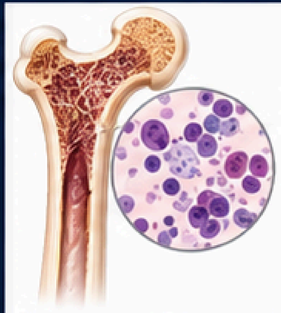

Artificial Intelligence Versus Conventional Prognostic Models for Survival Prediction in Myelofibrosis: A Systematic Review and Meta-analysis and External Validation Cohort

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INTRODUCTION / BACKGROUND

Risk stratification in myelofibrosis (MF) is essential for predicting survival and optimizing allogeneic hematopoietic cell transplantation (HCT) timing.

Conventional prognostic systems (DIPSS, MIPSS70) have limited adaptability to longitudinal and genomic complexity.

AI-based prognostic platforms may improve discrimination, calibration, and individualized prediction across heterogeneous MF populations.

OBJECTIVE

To systematically compare the performance of AI-based prognostic models versus conventional scoring systems for survival, leukemic transformation, and post-transplant mortality prediction in myelofibrosis.

KEYWORDS

Myelofibrosis, artificial intelligence, prognostic modeling, machine learning, allogeneic transplantation

METHODS

Systematic search of PubMed, Embase, Cochrane Library, and SOHO/ASH proceedings (2018–2025)

Studies evaluating machine learning or deep learning prognostic models in myelofibrosis were included

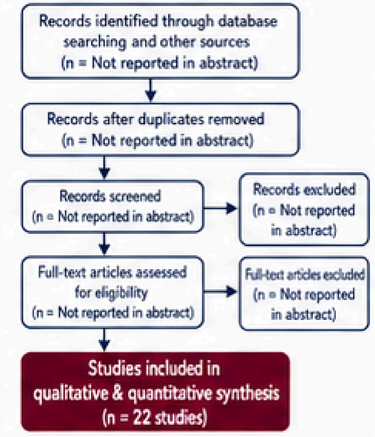
Meta-analysis performed using STATA 18

Risk of bias assessed using PROBAST-AI

External validation using independent multicenter cohorts: discrimination, calibration slope, and temporal reproducibility

RESULTS

STUDY SELECTION (PRISMA SUMMARY)

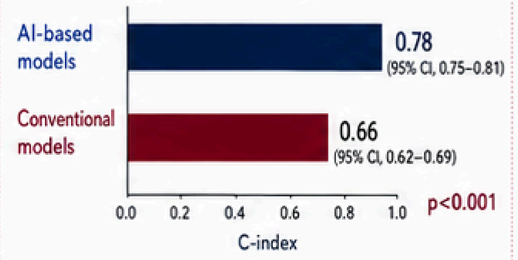


Total patients included: 14,527 with primary or secondary myelofibrosis

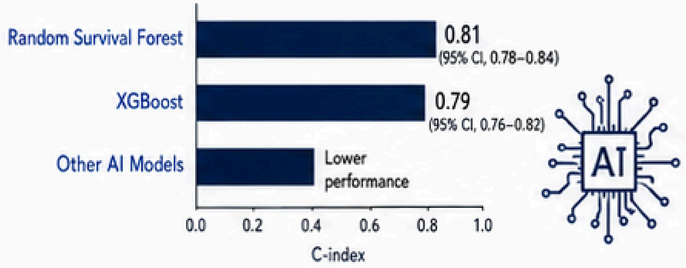
61.3% Male

54.8% Intermediate-2/ High-risk disease

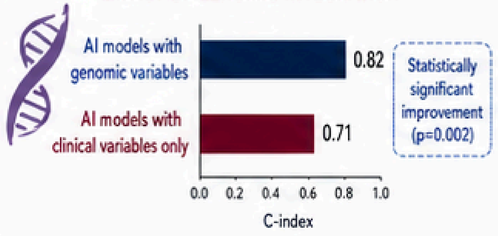
5-YEAR OVERALL SURVIVAL PREDICTION (C-INDEX COMPARISON)



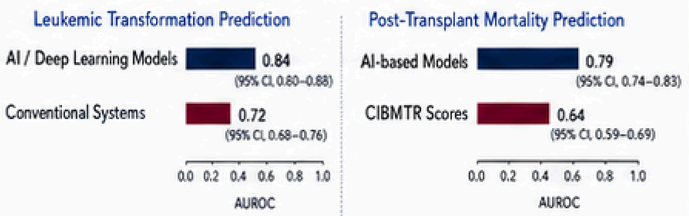
AI ALGORITHM PERFORMANCE (C-INDEX)



IMPACT OF GENOMIC INTEGRATION



OTHER CLINICALLY RELEVANT OUTCOMES (AUROC)



Significant heterogeneity observed across studies ($I^2 = 88\%$)

No implementation-related safety concerns identified

CONCLUSION

AI-based prognostic models significantly outperform conventional scoring systems for survival and post-transplant mortality prediction in myelofibrosis.

Integration of longitudinal hematologic, inflammatory, and genomic parameters enables superior discrimination and calibration.

Findings support implementation of externally validated, explainable AI-driven platforms for individualized transplant decision-making.

AI models can facilitate dynamic, risk-adapted therapeutic strategies and optimize timing of allogeneic transplantation.