

Predicting methotrexate discontinuation and stratifying specific failure trajectories in psoriasis within a real-life setting using explainable machine learning

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KEY TAKEAWAY

MTX discontinuation is heterogeneous. Ineffectiveness-related discontinuation showed the strongest and most reproducible predictive signal, whereas adverse-event-related discontinuation was weaker and more heterogeneous, with different clinical features contributing to each pathway.

“Machine learning provides individual risk estimates, but current performance does not support deterministic prediction of individual outcomes”.

1. Background & Objective

2. Study overview

Background

- Methotrexate (MTX) is a key systemic therapy for psoriasis, but discontinuation due to ineffectiveness or adverse events (AEs) is common.

Objective

- To develop and validate explainable machine-learning models that identify baseline profiles at higher risk of MTX discontinuation, to support future treatment selection and monitoring in routine psoriasis care.

- Data Source:** BADBIR (British Association of Dermatologists Biologics and Immunomodulators Register).
- Study period:** 2007-2024.
- Population:** Adults with psoriasis initiating MTX.
- Outcome:** Composite, ineffectiveness-related or adverse-events-related discontinuation.
- Predictors:** Baseline demographic, disease, treatment and laboratory features.
- Models:** XGBoost survival with competing risks.
- Validation:** Temporal, geographical, random.
- Interpretation:** SHAP values for explainable risk drivers.
- Clinical utility:** Calibration and decision curve analysis.

3. Cohort flow diagram

4. Model discrimination (AUC)

5. Key finding: Ineffectiveness is the strongest predictive pathway

6. Different predictive drivers for different discontinuation pathways (SHAP)

7. Clinical Utility: DCA & calibration

8. Failure pathway over time

How to interpret section 6-8

9. Summary

10. Acknowledgements & Disclosures

- ☑ Routinely collected baseline data achieved modest but reproducible discrimination for methotrexate discontinuation.
- ☑ Ineffectiveness-related discontinuation showed the strongest predictive signal across validation strategies.
- ☑ Models provided probabilistic risk stratification, but clinical utility was limited across decision thresholds and validation settings.
- ☑ BMI emerged as an important predictive feature for AE-related discontinuation, consistent with previous clinical observations.

Data source: British Association of Dermatologists Biologics and Immunomodulators Register (BADBIR).
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