

Neuro-Symbolic AI for Alzheimer's Disease: Physics-Informed Biomarker Prediction and Verifiable Intervention Planning

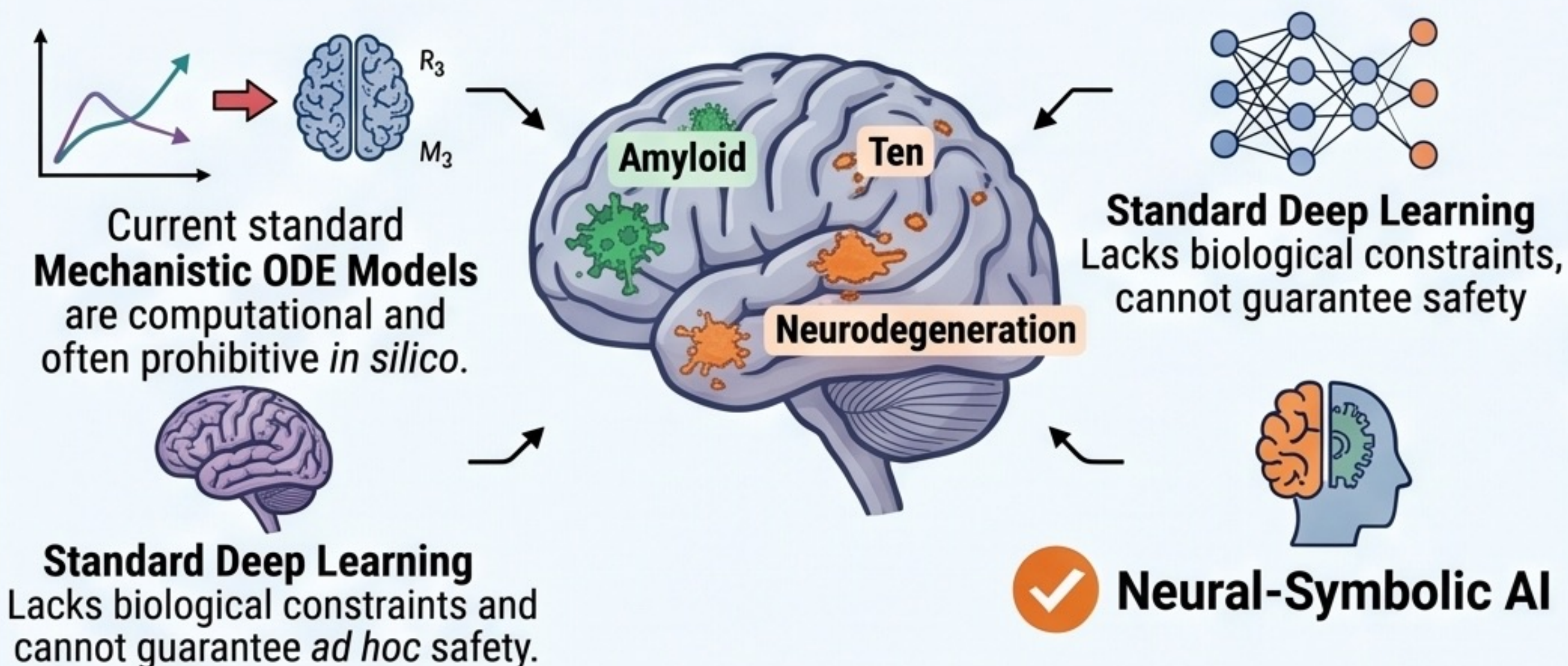
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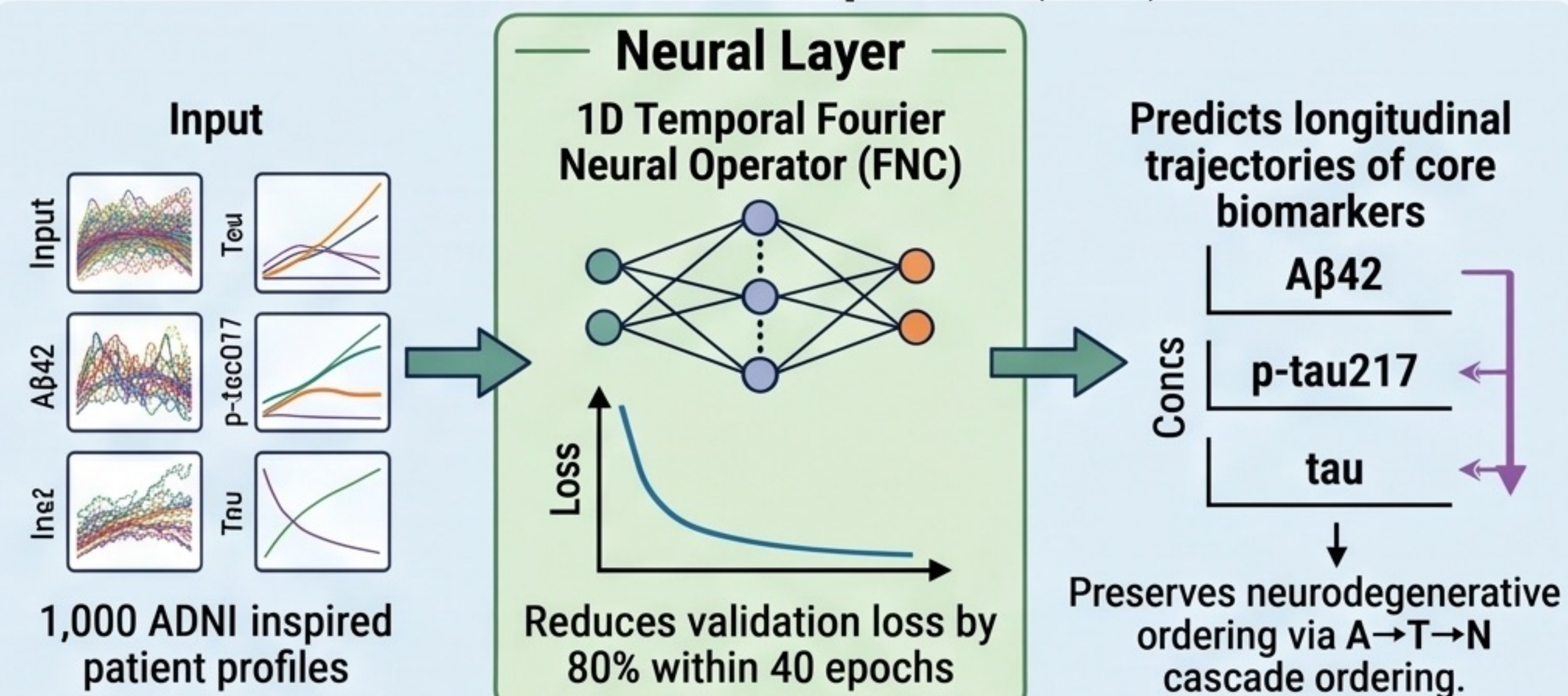
INTRODUCTION

Optimizing Intervention Timing in AT(N) Cascade



METHODS (Part 1): Physics-Informed Biomarker Prediction

Fourier Neural Operator (FNO)

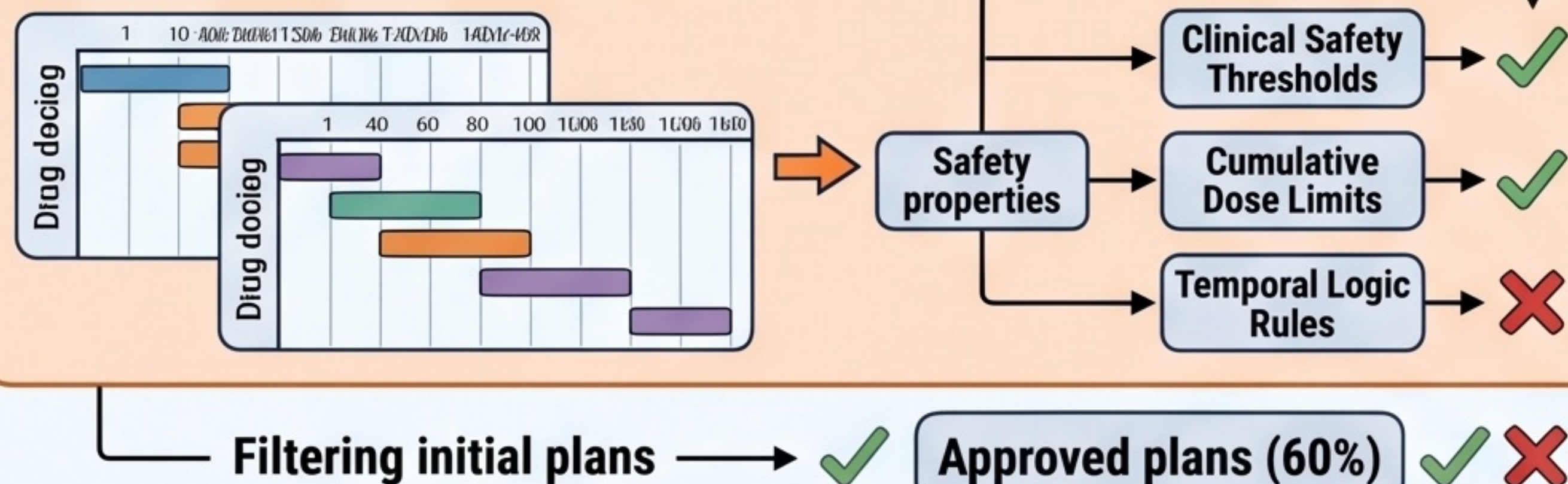


METHODS (Part 2): Formally Verified Intervention Planning

Symbolic Layer

Answer Set Programming (ASP) engine translates biomarker predictions into potential treatment schedules

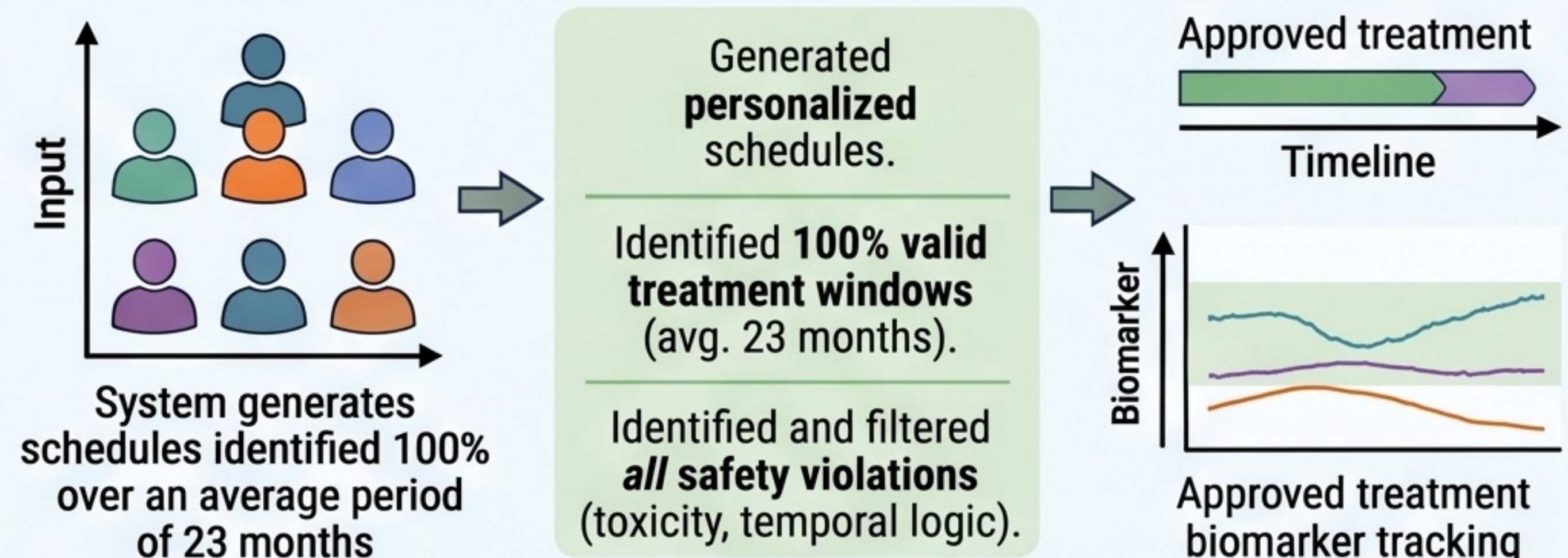
SMT-based Verification



RESULTS: Personalized, Safe Intervention Schedules

Test Cohort of 100 Diverse Profiles

System generates schedules, identified 100% valid treatment windows average period of 23 months.



CONCLUSIONS A Tool for Precision Alzheimer's Therapeutics

- Bridges the gap between predictive deep learning and safe clinical reasoning.
- Stratifies patients, ensures safety.
- Systematically verifies intervention safety.
- Provides rapid, interpretable, biologically plausible decision support for clinicians.

KEY TAKEAWAY:

A novel neuro-symbolic AI bridges rapid, physics-informed prediction with formally verified intervention planning, ensuring safe and personalized treatment timings for Alzheimer's patients.

