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TITLE: Making the Most of Indirect Evidence: IPD Network Meta Analysis for Sparse Preclinical Networks

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ABSTRACT: Individual participant data (IPD) network meta analysis (NMA), widely used in clinical research, provides a coherent framework for indirect treatment comparisons (ITCs) while enabling flexible modelling of heterogeneity and treatment–covariate interactions across complex evidence networks. Despite this, its application in nonclinical drug discovery remains limited, where data are typically sparse, heterogeneous, and generated under non standardised experimental designs.

We propose an extension of IPD based NMA for preclinical settings, motivated by ex vivo pharmacology studies in which indirect evidence often dominates due to incomplete treatment overlap across experiments. The proposed framework explicitly reflects features common in nonclinical datasets, including donor level biological variability, small and unbalanced treatment networks, and variability in experimental protocols.

A simulation based evaluation is developed to mimic realistic preclinical data generating mechanisms and decision contexts. We compare IPD based NMA with aggregate data NMA and conventional pairwise approaches, including standard ITC methods, using estimation focused metrics.

Particular attention is given to ITCs in sparse nonclinical networks, including how core assumptions from clinical IPD NMA translate to preclinical contexts, and how model specification and sensitivity analyses can be structured to quantify the impact of network connectivity, heterogeneity, and design variability.

This work aims to provide a practical and methodological foundation for using IPD NMA to strengthen indirect comparisons in nonclinical research, supporting improved data integration and more robust, evidence based decision making in early drug development.

BRIEF SPEAKER BIO: Ezgi Tanriver-Ayder is a Principal Statistician at GSK, supporting preclinical study design and analysis across multiple disease areas, currently focused on oncology. She earned her PhD in Statistics at the University of Edinburgh through a collaboration with Hasselt University and Johnson & Johnson, developing advanced meta-analysis methods for preclinical neurological drug discovery. She also holds an MSc in Biostatistics from Hasselt University. Previously, she worked as a Senior Biostatistician at AstraZeneca (2020–2022), providing statistical support for in vivo and in vitro studies and assay development.