

**Quantifying indirect evidence in network meta-analysis  
via composite likelihood methods:**

**Evaluation of inconsistency and contribution rates of direct and indirect evidence**

Hisashi Noma

*Department of Data Science, The Institute of Statistical Mathematics, Tokyo, Japan*

The establishment of network meta-analysis has enabled a comprehensive synthesis for evidence of multiple treatments and their simultaneous comparisons based on direct and indirect evidence (Caldwell *et al.*, 2005; Salanti, 2012). A fundamental component of the network meta-analysis is an assessment for consistency of evidence which is obtained from different sources (Dias *et al.*, 2013); in particular, assessing whether direct and indirect evidence agree or not, and how they contribute to the final estimates. In this talk, I review the developments of statistical methods in network meta-analyses and recent developed methods for decomposing the direct and indirect comparison estimates on the entire network evidence. The synthesized estimator based on indirect evidence is obtained by the composite likelihood method based on a partial likelihood that excludes the conventional direct comparison likelihood from the total likelihood. In addition, I show the composite likelihood estimator has complete information for the indirect evidence. It is also possible to assess the degree of consistency and contribution of direct and indirect evidence to the final estimate, and thus to construct a formal statistical test for evaluating their inconsistency. These developed methods enable intrinsic and quantitative interpretations of the direct and indirect evidence from the entire network. Applications to network meta-analyses in psychiatry medicine are also discussed.

**References**

- Caldwell, D. M., Ades, A. E., and Higgins, J. P. (2005). Simultaneous comparison of multiple treatments: combining direct and indirect evidence. *British Medical Journal* **331**, 897-900.
- Dias, S., Welton, N. J., Sutton, A. J., Caldwell, D. M., Lu, G., and Ades, A. E. (2013). Evidence synthesis for decision making 4: inconsistency in networks of evidence based on randomized controlled trials. *Medical Decision Making* **33**, 641-656.
- Salanti, G. (2012). Indirect and mixed-treatment comparison, network, or multiple-treatments meta-analysis: many names, many benefits, many concerns for the next generation evidence synthesis tool. *Research Synthesis Methods* **3**: 80-97.