Modeling biomarker ratios with gamma distributed components

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and online via Zoom (Link)
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The talk introduces a regression model termed "extended GB2 model", which is designed to analyze ratios of biomarkers in epidemiological and medical research. Typical examples of biomarker ratios are given by the LDL/HDL cholesterol ratio in cardiovascular research and the amyloid-ß 42/40 ratio in dementia research. Unlike regression modeling with a log-transformed response, which is often used to describe ratio outcomes in observational studies, the extended GB2 model directly links the expectation of the untransformed biomarker ratio to a set of covariates. This strategy allows for a simple interpretation of the predictor-response relationships in terms of multiplicative increases/decreases of the expected outcome, similar to Poisson and Cox regression. The first part of the talk deals with the derivation and the interpretation of the log-likelihood of the proposed model, and also provides details on confidence intervals and hypothesis testing. In the second part of the talk, the usefulness of the method is demonstrated by the results of a simulation study and an application on the aforementioned amyloid-ß 42/40 ratio.