Basel Biometric Section of the Austro-Swiss Region of the International Biometric Society

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BBS Seminar on Statistical Challenges in Biomedical Research

Basel, 13 Jan 2011, 16:00 – 17:30

Auditorium of the Roche Learning Center, Aeschenvorstadt 56, Basel

PROGRAM

16:00 **Welcome** Juliane Schäfer, BBS

16:00 – 16:45 Markus Kalisch (ETH Zurich)

Can one extract causal information from high-dimensional observational data?

Abstract

Understanding cause-effect relationships between variables is of interest in many fields of science. It is a well-established scientific principle to determine the total causal effect of one variable on another via randomized controlled intervention experiments. Sometimes, however, experiments are too time consuming, expensive or unethical. We discuss an approach that aims at extracting bounds on causal effects by using observational data only. We outline the underlying theory and discuss strengths and limitations of the approach.

16:45 – 17:30 Willi Sauerbrei (Institute of Medical Biometry and Informatics, University Medical Center Freiburg)

Regression model-building with continuous variables – multivariable fractional polynomials, with extensions for interactions

Abstract

In the analysis of studies in clinical epidemiology, the number of candidate variables for a regression model is often too large and a more parsimonious model is sought. Another key issue is the determination of appropriate dose-response functions for continuous covariates. Often, continuous predictors are either categorized or linearity is assumed. However, both approaches can have major disadvantages and models incorporating non-linear functions may markedly improve the fit (1). The method of multivariable fractional polynomials (MFP) simultaneously determines suitable functional forms for continuous covariates and eliminates uninfluential covariates (2,3,4,5). The method also allows categorical and binary covariates.

By analysing data in the framework of linear, logistic and Cox regression models, we discuss model-building issues with an emphasis on MFP. Extensions of MFP have been developed to look for interactions between continuous covariates and treatment (MFPI), between two continuous covariates (MFPIgen) and for interactions with time (non-proportional hazards, MFPT) in a Cox model (5,6,7).

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Using data from a large cohort study, we show that mis-modelling non-linear main effects can introduce spurious interactions between two continuous covariates. In RCTs, we illustrate that our approach has power to identify differential treatment effects, and demonstrate how to estimate and plot a continuous treatment-effect function.

We conclude that MFP and its extensions for interactions are useful in multivariable model-building with continuous and categorical variables. MFP software for Stata, SAS and R is generally available (8). Further details and examples of MFPI, implemented in Stata software, are also available (9).

References

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17:30 End of Seminar