

## **Kolloquium „Statistische Methoden in der empirischen Forschung“**

Wann: 13. November 2018, 17:00 – 18:30 Uhr

Wo: Robert Koch-Institut | Nordufer 20 | 13353 Berlin (Wedding),  
S41, S42, U9 Westhafen | U9, Bus 142 Amrumer Str

Gastgeber: Pfizer

### **Jan Beyersmann (Universität Ulm)**

#### **A joint survival model for time-to-event and a categorical quality-of-life indicator in oncology**

This talk will start with some time-to-event basics: Why is survival analysis special? Roughly two thirds of all primary medical outcomes are time-to-event outcomes, but how come that about half of all published Kaplan-Meier curves are meaningless? And finally: Does life after death make any sense beyond 1980s heavy metal antics?

We will then turn to a (not overly used) early 1990s proposal of jointly modelling quality of life categories and death in a multistate model. 25 years fast forward, we will suggest two novel resampling techniques on the hazard scale which will be translated onto probabilities using the lesser known theory of product integration. Comparison of treatment groups will be based on time-simultaneous confidence bands. Unlike the standard bootstrap which draws with replacement from the data, we will not require an i.i.d. data structure; this makes our approach particularly attractive for event driven studies which are analyzed after a given number of events have been observed. We will also outline how one of our resampling approaches can be used for planning, e.g., of sample size based on published data only.

We will consider two RCT examples. In a study on stem cell transplanted leukemia patients, we will aim at demonstrating superiority w.r.t the outcome probability "alive w/o immunosuppressive therapy". In a treatment trial for severe infectious diseases, we will aim at demonstrating non-inferiority w.r.t the outcome probability "cured and alive" on the entire follow-up period. Both of these outcome probabilities are non-monotone, and the first outcome is complicated by immunosuppressive therapy being switched on and off a random number of times.

And if time permits a digression, we can discuss whether or not a hazard ratio has a causal interpretation in a perfect RCT, maybe even in the absence of time-to-event.