© 2013 FIZ Karlsruhe

ZMATH 06130587

Shi, Haiwen; Cheng, Yu; Jeong, Jong-Hyeon

Constrained parametric model for simultaneous inference of two cumulative incidence functions.

Biom. J. 55, No. 1, 82-96 (2013).

Summary: We propose a parametric regression model for the cumulative incidence functions (CIFs) commonly used for competing risks data. The model adopts a modified logistic model as the baseline CIF and a generalized odds-rate model for covariate effects, and it explicitly takes into account the constraint that a subject with any given prognostic factors should eventually fail from one of the causes such that the asymptotes of the CIFs should add up to one. This constraint intrinsically holds in a nonparametric analysis without covariates, but is easily overlooked in a semiparametric or parametric regression setting. We hence model the CIF from the primary cause assuming the generalized odds-rate transformation and the modified logistic function as the baseline CIF. Under the additivity constraint, the covariate effects on the competing cause are modeled by a function of the asymptote of the baseline distribution and the covariate effects on the primary cause. The inference procedure is straightforward by using the standard maximum likelihood theory. We demonstrate desirable finite-sample performance of our model by simulation studies in comparison with existing methods. Its practical utility is illustrated in an analysis of a breast cancer dataset to assess the treatment effect of tamoxifen, adjusting for age and initial pathological tumor size, on breast cancer recurrence that is subject to dependent censoring by second primary cancers and deaths.

Classification: 62
Keywords: cause-specific hazard function; cumulative incidence function; long-term incidence; modified three-parameter logistic model; parametric modeling and odds rate
doi:10.1002/bimj.201200011