

STATISTICS SEMINAR

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Thursday, February 11, 2016
Dickens Hall, Room 207, 4:00-5:00 pm
Refreshments: Dickens 108, 3:30-4:00 pm



A Sup-score Test for the Cure Fraction in Mixture Models for Long-term Survivors

The evaluation of cure fractions in oncology research under the well known cure rate model has attracted considerable attention in the literature, but most of the existing testing procedures have relied on restrictive assumptions. A common assumption has been to restrict the cure fraction to a constant under alternatives to homogeneity, thereby neglecting any information from covariates. This paper extends the literature by developing a score-based statistic that incorporates covariate information to detect cure fractions, with the existing testing procedure serving as a special case. A complication of this extension, however, is that the implied hypotheses are not typical and standard regularity conditions to conduct the test may not even hold. Using empirical processes arguments, we construct a score-based test statistic for cure fractions and establish its limiting null distribution as a functional of mixtures of chi-square processes. In practice, we suggest a simple resampling procedure to approximate this limiting distribution. Our simulation results show that the proposed test can greatly improve efficiency over tests that neglect the heterogeneity of the cure fraction under the alternative. The practical utility of the methodology is illustrated using ovarian cancer survival data with long-term follow-up from the surveillance, epidemiology and end results registry (SEER).

Joint work with Dr. David Todem of Michigan State University and Dr. KyungMann Kim of University of Wisconsin-Madison