A Correlated Frailty Model for Analyzing Risk Factors in Bilateral Corneal Graft Rejection for Keratoconus: A Bayesian Approach

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Abstract

Corneal graft is a surgical procedure to remove and replace the central portion of the diseased cornea by a match donor’s button of cornea. Common indication for a corneal graft is keratoconus, a noninflammatory and usually bilateral (both eyes) disease of cornea. The graft may fail for various reasons.

In this talk, the survival time of corneal grafts is statistically modeled, using Cox (standard) proportional hazard model in the context of Bayesian methods of analysis. The unknown causes may relate to recipient, donor, surgery, and environment. Some of these factors are considered as frailties, i.e. specific for each organ or each patient and some are shared by organs and patients. In a real data set pertaining to graft rejection outcomes, some risk factors are considered for a thorough analysis.

The data analysis concentrates on identifying the important and effective causes of graft rejection. Due to complicated nature of the problem, analytical solutions are not tractable. Employing MCMC algorithms, we identify the important risk factors and provide their relative importance.