

Poisson Nonlinear Mixed Models for Dose-Response Curve Data

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Abstract

There is vast literature on Cytogenetic Dose-Response Curve studies where the number of genetic damages has been repeatedly measured in human lymphocytes exposed to radiation over subjects with varying dose levels and dose rates. The goal is to link genetic damages with both dose levels and dose rates. A linear-quadratic mean function of dose has been traditionally fitted with Poisson models for such data; however, this linear-quadratic mean function has been found inadequate except for very low doses. In addition, this approach does not account for overdispersion in Cytogenetic Dose-Response data appropriately. In this paper, we consider Poisson nonlinear mixed models for Dose-Response data. These models allow us to characterize the effects of both dose level and dose rate on genetic damages at the same time while accounting for overdispersion in the data.

Keywords: Nonlinear Mixed Models, Dose-response Curve, MCMC.