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HIV dynamics and natural history studies: Joint modeling with doubly interval-censored event time and infrequent longitudinal data

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(Submitted on 3 May 2011)

Hepatitis C virus (HCV) coinfection has become one of the most challenging clinical situations to manage in HIV-infected patients. Recently the effect of HCV coinfection on HIV dynamics following initiation of highly active antiretroviral therapy (HAART) has drawn considerable attention. Post-HAART HIV dynamics are commonly studied in short-term clinical trials with frequent data collection design. For example, the elimination process of plasma virus during treatment is closely monitored with daily assessments in viral dynamics studies of AIDS clinical trials. In this article instead we use infrequent cohort data from long-term natural history studies and develop a model for characterizing post-HAART HIV dynamics and their associations with HCV coinfection. Specifically, we propose a joint model for doubly interval-censored data for the time between HAART initiation and viral suppression, and the longitudinal CD4 count measurements relative to the viral suppression. Inference is accomplished using a fully Bayesian approach. Doubly interval-censored data are modeled semiparametrically by Dirichlet process priors and Bayesian penalized splines are used for modeling population-level and individual-level mean CD4 count profiles. We use the proposed methods and data from the HIV Epidemiology Research Study (HERS) to investigate the effect of HCV coinfection on the response to HAART.

Submission history

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