A flexible joint modeling framework for longitudinal and time-to-event data with overdispersion.

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We combine conjugate and normal random effects in a joint model for outcomes, at least one of which is non-Gaussian, with particular emphasis on cases in which one of the outcomes is of survival type. Conjugate random effects are used to relax the often-restrictive mean-variance prescription in the non-Gaussian outcome, while normal random effects account for not only the correlation induced by repeated measurements from the same subject but also the association between the different outcomes. Using a case study in chronic heart failure, we show that model fit can be improved, even resulting in impact on significance tests, by switching to our extended framework. By first taking advantage of the ease of analytical integration over conjugate random effects, we easily estimate our framework, by maximum likelihood, in standard software.