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*A Two-Step Method for Genetic Association Analysis with Multiple Longitudinal Traits of Samples of Related Subjects*

We propose a two-step procedure to identify pleiotropic effects on multiple longitudinal traits from a family-based data set. The first step analyzes each longitudinal trait via a three-level mixed-effects model. Random effects at the subject-level and at the family-level measure the subject-specific genetic effects and between-subjects intraclass correlations within families, respectively. The second step performs a simultaneous association test between a single nucleotide polymorphism (SNP) and all subject-specific effects for multiple longitudinal traits. This is performed using a quasi-likelihood scoring method, in which the correlations structure among related subjects is adjusted.