

NONPARAMETRIC MULTIVARIATE TEST FOR GENETIC LINKAGE

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Linear regression proposed by Haseman and Elston (1972), for the detection of linkage to a quantitative trait of sib pairs, is a linkage testing method for a single trait. However, multivariate methods for detecting linkage are needed, when information from each of several traits that are affected by the same major gene are available on each individual. Amos et al. (1990) extended the regression method of Haseman-Elston (1972) to incorporate observations of two or more traits by estimating the principal component linear function that results in the strongest correlation between the squared pair differences in the trait measurements and identity by descent at a marker locus. But, it is impossible to control the probability of type I errors with this method at present, since the exact distribution of the statistic is yet unknown. In this paper, we propose a multivariate nonparametric trend test for detecting linkage to multiple traits. We compared with a simulation study the efficiencies of multivariate nonparametric trend test with those of the method developed by Amos et al. (1990) for quantitative traits. The results of the simulation study reveal that the multivariate nonparametric trend test have type I error rates close to the nominal significance levels and demonstrate high powers in general.