

Powerful Tests for Parent-of-Origin Effects at Quantitative Trait Loci on the X Chromosome

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Abstract: Parent-of-origin effects, which describe an occurrence where the expression of a gene depends on its parental origin, are an important phenomenon in epigenetics. Statistical methods for detecting parent-of-origin effects on autosomes have been investigated for 20 years, but the development of statistical methods for detecting parent-of-origin effects on the X chromosome is relatively new. In the literature, a class of Q-XPAT-type tests are the only tests for the parent-of-origin effects for quantitative traits on the X chromosome. In this talk, we propose classes of tests to detect parent-of-origin effects for quantitative trait values on the X chromosome. The proposed tests can accommodate complete and incomplete nuclear families with any number of daughters. The simulation study shows that our proposed tests produce empirical type I error rates that are close to their respective nominal levels, as well as powers that are larger than those of the Q-XPAT-type tests. The proposed tests are applied to a real data set on Turner ' s syndrome, and the proposed tests give a more significant finding than the Q-C-XPAT test.