

A Powerful Parent-of-origin Effects Test for Qualitative Traits Incorporating Unaffected Children in Nuclear Families

Wing Kam Fung

wingfung@hku.hk

Department of Statistics and Actuarial Science, The University of Hong Kong, Hong Kong, Hong
Kong

Genomic imprinting is an important epigenetic phenomenon in studying complex traits and has generally been examined by detecting parent-of-origin effects of alleles. The parental-asymmetry test based on nuclear families with both parents and its extensions to deal with missing parental genotypes are simple and powerful for such a task. However, these methods only use case (affected) children in nuclear families and thus do not make full use of information on control (unaffected) children, if available, in these families. In this talk, we propose a novel parent-of-origin effects test C-PATu by using both the control and case children in nuclear families with one or both parents. C-PATu is essentially constructed under a weighted framework, in which the test based on all the unaffected children and their parents and that based on all the affected children and their parents are weighted according to the population disease prevalence. Simulation results demonstrate that the proposed tests control the size well under no parent-of-origin effects and using additional information from unaffected children improves the power of the tests under the imprinting alternative. Application of C-PATu to a Framingham Heart Study dataset further shows the advantage of the proposed method.