

DEPARTMENT OF STATISTICS COLLOQUIUM SERIES

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**POTENTIAL IMPACT OF POPULATION STRUCTURE ON
POPULATION-BASED CASE-CONTROL
ASSOCIATION STUDIES**

ABSTRACT:

Case-control association studies using unrelated cases and controls may suffer from potential confounding due to population stratification. Bias and variance distortion caused by population stratification in the commonly used allele-based tests can considerably inflate the Type I error rate. It is shown that the bias vanishes in the absence of disease rate heterogeneity. If only population stratification exists, a proper estimate of the variance of the allele based test statistic is developed. Using this estimated variance yields a valid Type I error. However, when the frequencies of the allele under study and the disease rates differ among the sub-populations, it is difficult to correct for this bias. Explicit expressions for the excess false positive rate (EFPR) of the test due to bias and variance distortion are derived. It turns out that the bias created when both population stratification and disease rate heterogeneity are present usually has a greater effect on the EFPR than variance distortion.

Comprehensive simulation studies strongly support these results.

DATE: Thursday, October 15, 2009

TIME: 11:10 a.m. – 12:10 p.m.

PLACE: Room 150, Blocker

Refreshments will be served in the Statistics Conference Room at 10:30 am for those attending the seminar.