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Iliana De La Cruz, Taylor Spino, Melissa Stadt* (stadt@u.washington.edu) and
Catherine Sullivan. *Detecting gene-gene interactions that underlie cancer using the R package*
algstat. Preliminary report.

Interactions between single nucleotide polymorphisms (SNPs) and complex diseases have been an important topic throughout epidemiological studies. Previous genome-wide-association studies have mostly focused on gene variables at a single locus. In our project, we perform a focused candidate gene study to test the interaction of multiple SNPs with the risk of different types of cancer. Using the R package *algstat*, developed by Kahle, Garcia-Puente, and Yoshida, we developed an algorithm which can test for independence between several variables and the disease. We applied our methods to the study of gene-gene interaction on cancer data obtained from the European case-control study Gen-Air.

We were able to find strong evidence to reject independence of many triplet combinations of SNPs with the disease. These results are relevant to the general field of epidemiology due to the strong association found between the variables and the disease. Outside of the study of SNP-cancer association, this algorithm can be easily adjusted to perform general gene interaction studies using arbitrary log-linear statistical models.

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