

Detection and characterization of gene-gene and gene-environment interactions in common human diseases and complex clinical endpoints

Biological organisms are complex systems that dynamically integrate inputs from a multitude of physiological and environmental factors. Therefore, in addressing questions concerning the etiology of complex health outcomes, it is essential that the systemic nature of biology be taken into account. Information from multiple sources—both extrinsic (*e.g.* ambient air quality and chemical exposure) and intrinsic (*e.g.* genetic variation and protein expression)—must be integrated to reliably assess cumulative risk. Novel analysis methods are needed to detect relevant non-additive interactions in the diverse types of high-dimensional data afforded by modern experimental technologies. Analytical approaches that can characterize the interactions both within and among numerous data types provide a more comprehensive portrayal of the mechanisms underlying complex health outcomes. Results from both clinical and exposure study settings will be presented, along with discussion of ongoing experiments that combine information of both types. (This abstract has been approved for presentation but does not necessarily reflect EPA policy)