



# **Computational Toxicology: Chapter 11. Omics Biomarkers in Risk Assessment: A Bioinformatics Perspective**

*Hong Fang, Huixiao Hong, Zhichao Liu, Roger Perkins, Reagan Kelly, John Beresney, Weida Tong, Bruce A. Fowler*

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Current advances in genomics, proteomics, and metabolomics are widely anticipated to translate in the future to a constellation of benefits in human health. However, few biomarkers for risk assessment using “omics” technologies have been reported in the last decade. Nevertheless, the potential application for omics technologies is tremendous. The use of biomarker-based monitoring approaches as a tool for environmental risk assessment is often critically limited by a lack of integrated bioinformatics approaches, statistical analyses, and predictive models. In this chapter we discuss the key steps for omics biomarker discovery and also present the use of the decision forest (DF) classification method as an example with specific application to microarray gene expression data, proteomics, and SNP genotypic data. An integrated bioinformatics approach with the correct choice of samples, omics technologies, and statistical techniques will allow the development of powerful new biomarkers for safety assessment.



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