

Bioinformatics in Environmental Health Science Research

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Bioinformatics is an integral part of environmental health science research. My main research focus is the development and application of computational/statistical methods for identifying functional elements in DNA sequences. I will give an example of how a computational analysis facilitates new discovery and hypothesis generation.

We are also developing methods and tools for the analysis of next-generation sequencing (NGS) data. DIR and DNTP scientists are generating increasingly large amounts NGS data in their efforts to understand fundamental biological processes and to elucidate how biological systems (e.g., cells or tissues) respond to environmental toxicants. One area of great interest to us is the development of statistical/ computational methods that detect differential changes not only in gene expression but also in splicing patterns from mRNA-seq data. Tools for detecting differential splicing could have a major impact in toxicogenomics, as examples exist where changes or imbalances in isoforms have been implicated in tumor development.