

Computational Approaches and Tools for Infectious Disease Bioinformatics

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We report recent improvements to a collection of software tools that aid study of pathogens and their hosts. To facilitate systems-level analysis of the host response to infection, InnateDB (www.innatedb.com) is a database and analysis platform of all available human and mouse interactome data, integrated with additional manually-curated, experimentally-verified interactions involved in innate immunity (>14,000 interactions curated from >3,700 papers to date), plus tools to facilitate network or pathway-based analyses. For pathogen analysis we are expanding the www.pseudomonas.com database structure to facilitate viewing of RNA-seq/microarray experiments, SNP data, comparative genomics/ortholog analysis, plus incomplete genome data. We have also released new versions of PSORTb and PSORTdb software (www.psort.org/psortb/) for identifying bacterial cell surface and secreted proteins of interest as drug targets and for their potential role in pathogen-host interactions. We have coupled this with an analysis of pathogen-specific genes, to identify candidate anti-infective drug targets and drugs which we are studying further in the laboratory. By better understanding the complex interplay of factors that influence both pathogen and host during the infection process, plus identifying anti-infective drugs that disarm (vs kill), a pathogen (potentially having less selection for drug resistance), we hope to improve upon current approaches for infectious disease control.