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Systems Biology and Genomics

A Rational Approach towards a Holistic View

Systems biology is a new biological study field that focuses on the systematic study of complex interactions in biological systems, thus using a new perspective (integration instead of reduction) to study them. This approach applies information technology for genetic, pathway, functional analysis and intends to elucidate the operation of the entire living networks. Genomics is the study of an organism's entire genome. The field includes intensive efforts to determine the entire DNA sequence of organisms and fine-scale genetic mapping efforts. The field also includes expression studies (mRNA and microRNA) as well as epigenetic phenomena, such as genomic imprinting and histone modifications. Genomics is completed by proteomics (studies on proteins) and metabolomics (low molecular weight substances). This „omics” approach may provide both predictive (e.g. presymptomatic in disease) and more personalized view on living systems.

The systems biology searches networks, complex interactions and pathways in living organisms. The promising perspective of systems biology and genomics completed with proteomics is to establish a holistic view of complex biological processes in health and disease. Moreover, entirely new ideas are raised for drug and vaccine design.

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