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Network Medicine: From Cellular Networks to the Human Diseasome ALBERT-LASZLO BARABASI, Northeastern Univ and Harvard Medical School

Given the functional interdependencies between the molecular components in a human cell, a disease is rarely a consequence of an abnormality in a single gene, but reflects the perturbations of the complex intracellular network. The tools of network science offer a platform to explore systematically not only the molecular complexity of a particular disease, leading to the identification of disease modules and pathways, but also the molecular relationships between apparently distinct (patho)phenotypes. Advances in this direction not only enrich our understanding of complex systems, but are also essential to identify new disease genes, to uncover the biological significance of disease-associated mutations identified by genome-wide association studies and full genome sequencing, and to identify drug targets and biomarkers for complex diseases.