



Emerging Topics in Biological Networks and Systems Biology

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Network Medicine: From Cellular Networks to the Human Diseasome

Abstract:

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 emerging tools of network medicine 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 are 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.

About:

Albert-László Barabási is both the Robert Gray Dodge Professor of Network Science and a Distinguished University Professor at Northeastern University, where he directs the Center for Complex Network Research, and holds appointments in the Departments of Physics and Computer Science, as well as in the Department of Medicine, Harvard Medical School and Brigham and Women Hospital, and is a member of the Center for Cancer Systems Biology at Dana Farber Cancer Institute. A Hungarian born native of Transylvania, Romania, he received his Masters in Theoretical Physics at the Eötvös University in Budapest, Hungary and was awarded a Ph.D. three years later at Boston University. Barabási's latest book is "Bursts: The Hidden Pattern Behind Everything We Do" (Dutton, 2010) available in five languages. He has also authored "Linked: The New Science of Networks" (Perseus, 2002), currently available in eleven languages, and is the co-editor of "The Structure and Dynamics of Networks" (Princeton, 2005). His work led to the discovery of scale-free networks in 1999, and proposed the Barabási-Albert model to explain their widespread emergence in natural, technological and social systems, from the cellular telephone to the WWW or online communities.

Barabási is a Fellow of the American Physical Society. In 2005 he was awarded the FEBS Anniversary Prize for Systems Biology and in 2006 the John von Neumann Medal by the John von Neumann Computer Society from Hungary, for outstanding achievements in computer-related science and technology. In 2004 he was elected into the Hungarian Academy of Sciences and in 2007 into the Academia Europaea. He received the C&C Prize from the NEC C&C Foundation in 2008. In 2009 APS chose him Outstanding Referee and the US National Academies of Sciences awarded him the 2009 Cozzarelli Prize. In 2011 Barabási was awarded the Lagrange Prize-CRT Foundation for his contributions to complex systems, awarded Doctor Honoris Causa from Universidad Politécnica de Madrid, became an elected Fellow in AAAS (Physics) and is a 2013 Fellow of the Massachusetts Academy of Sciences.