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Metabolic disease network and its implication for disease comorbidity DEOK-SUN LEE, Northeastern University, ZOLTAN OLTVAI, University of Pittsburgh, NICHOLAS CHRISTAKIS, Harvard Medical School, ALBERT-LASZLO BARABASI, Northeastern University — Given that most diseases are the result of the breakdown of some cellular processes, a key aim of modern medicine is to establish the relationship between disease phenotypes and the various disruptions in the underlying cellular networks. Here we show that our current understanding of the structure of the human metabolic network can provide insight into potential relationships among often distinct disease phenotypes. Using the known enzyme-disease associations, we construct a human metabolic disease network in which nodes are diseases and two diseases are linked if the enzymes associated with them catalyze adjacent metabolic reactions. We find that the more connected a disease is, the higher is its prevalence and the chance that it is associated with a high mortality. The results indicate that the cellular network-level relationships between metabolic pathways and the associated disease provide insights into disease comorbidity, with potential important consequences on disease diagnosis and prevention.

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