

Systems Biology Research Symposium Oral Presentation Session

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A Comparative Study of Schizophrenia and Cancer Gene Network Properties

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Schizophrenia is a heritable complex disease whose pathogenesis likely involves multiple genes interacting themselves or with environment. In this study, we first collected five gene sets for comparison including schizophrenia candidate genes (SZGenes), general cancer genes, neurodevelopment related genes, essential genes and non-disease genes. We then analyzed their network properties in the whole human protein-protein interaction (PPI) network. Our analysis demonstrated that SZGenes tend to have intermediate connectivity and intermediate efficiency with which a perturbation can spread throughout the network relative to cancer genes, essential genes and non-essential genes. We compared schizophrenia-specific subnetworks and cancer-specific subnetworks, both of which were extracted from the human interactome, and found that schizophrenia genes do not have a strong trend on interacting with each other or clustering compared to cancer genes. This difference suggests that schizophrenia and cancer might have different pathological mechanisms even though both have been considered as complex disease. Our results are helpful for better understanding the genetic mechanisms of schizophrenia and cancer. The extracted disease-specific networks also provided an opportunity for identifying novel candidate genes, some of which have been successfully verified in our experiments.

Key words: gene network; cancer genes; schizophrenia candidate genes; disease genes; network property; subnetwork