Genetic 'atlas' of cells will pinpoint causes of disease

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While the genetic makeup of humans has been determined, the purpose and interactions of those genes have not been well-understood. An international study led by Professor Brenda Andrews, director of the Terrence Donnelly Centre for Cellular and Biomolecular Research, and Professor Charles Boone, a principal investigator at the Donnelly Centre, found a way to decipher the networks derived from natural genetic variation. The results of the study were published in today's issue of the prestigious journal *Science*.

"No one has made a map of these genetic interactions," said Andrews. "This research has provided us with a functional view of the cell."

Working with cells from simple yeasts, the researchers developed a method to map the interactions within these cells, the first time this has been done for any organism. Because yeast cells are remarkably similar genetically to human cells, this mapping process has important

implications for improving research into human health, such as better understanding the genetic basis of disease.

The mapping process will enable scientists to develop a complete atlas of genetic interactions, thereby making it possible to decode the functions of all of the thousands of genes in a cell. Such an atlas will provide valuable information about the link between an individual's genotype (a person's unique genetic makeup) and phenotype (the behaviours of that individual's genes). This information will build understanding of what genetic interactions are going wrong when a disease happens in a body.

The U of T researchers were also able to map interactions between genes and chemicals, which allows researchers to see more precisely what happens to a cell when a particular drug is introduced.

"These types of maps will allow us to be much smarter in the use of drugs in the future," said Andrews. "By knowing the interactions of genes, we will be able to better predict the effect of a drug on a cell."

Provided by University of Toronto