Bridging Brain Imaging and Gene Expression

Organizer:
Michael Hawrylycz, Allen Institute for Brain Science, Seattle, UA
Marcus Raichle, Mallinckrodt Institute of Radiology, Washington University School of Medicine, St. Louis, MO, USA

Imaging genetics studies have focused on exploring or discovering genes involved in imaging endophenotypes for function or disease states in genome-wide association studies or correlating the specific genotypes for a candidate gene or set of candidate genes with imaging-based measures. Methods and resources for large-scale gene expression or transcriptomics studies have recently become more widely available and more sophisticated in terms of quantitative readouts and ability to correlate gene expression with underlying genetic architecture. These advances open the possibilities for further connections among imaging, imaging genetics and gene expression datasets to formulate and validate hypotheses regarding biological mechanisms in both normal functioning and disease states. We will present studies from diverse areas of research to demonstrate how researchers are currently integrating gene expression and imaging research to understand: structural and functional brain networks in adult and developing brain, continuities and discontinuities of genetic effects during development in light of changes in control networks and environmental influences, validation of imaging and other biomarkers for major neuropsychiatric disorders, and relationships of gene expression with structural and cellular architecture of the human brain.

Learning Objectives: Having completed this workshop, participants will be able to:
1. Understand cutting-edge approaches for integrating gene expression and imaging datasets; and
2. Understand how assessing gene expression can advance the study of brain structure and function in normal and disease states

Aerobic Glycolysis Identifies Neotenous Regions of the Human Brain
Manu Goyal, Washington University School of Medicine, St. Louis, MO, USA

Genes and Developing Brain Networks
Michael I. Posner, Department of Psychology, University of Oregon, Eugene, OR, USA

Validating MRI Imaging Data with Serum Biomarkers and the Whole Genome Gene Expression Data Base of the Allen Human Brain Atlas
Matthias Schroeter, Max Planck Institute for Human Cognitive and Brain Sciences & Clinic of Cognitive Neurology, University of Leipzig, Leipzig, Germany

An Anatomically Comprehensive Atlas of Gene Expression in Adult Human Brain
Ed Lein, Allen Institute for Brain Science, Seattle, WA, USA