Brain Mapping Center

SEMINAR SERIES

Sponsored by the UCLA Brain Mapping Center Faculty

The focus of these talks is on advancing the use of brain mapping methods in neuroscience with an emphasis on contemporary issues of neuroplasticity, neurodevelopment, and biomarker development in neuropsychiatric disease.

Hosted By: Shantanu Joshi, Ph.D., Neurology, UCLA

Big Data in Imaging Psychiatry

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Backgound. The Enhancing Neuro Imaging Genetics Through Meta-Analysis (ENIGMA) consortium includes method development and disorder working groups. This talk will focus on some of the main findings from the schizophrenia (SZ), bipolar disorder (BD), and major depressive disorder (MDD) working groups, which published some of the largest neuroimaging meta-analyses to date.

Methods. The ENIGMA SZ, BD, and MDD Working Groups analyzed T1-weighted magnetic resonance imaging (MRI) data, from more than 25,000 individuals, obtained at research centers around the world. These data were analyzed using ENIGMA's harmonized image processing (FreeSurfer), quality control, and statistical analysis protocols. Deep brain structure volumes, cortical thickness, and surface area measures were extracted and subjected to regression analyses comparing cases vs. controls and examining relationships with clinical variables (e.g., medications, age at onset, duration of illness, and symptom severity). Cohen's *d* effect sizes comparing groups of individuals and partial correlation effect sizes examining associations with clinical variables were computed through random-effects meta-analyses.

Results. Among the deep brain structures, the most robust finding from these studies were significantly lower hippocampal volumes in schizophrenia (d=-0.46), bipolar disorder (d=-0.23), and major depressive disorder (d=-0.14) when compared to controls. In addition, compared to controls, individuals with schizophrenia had widespread cortical thinning and smaller overall cortical surface area, with greatest effect sizes in frontal and temporal regions, individuals with bipolar disorder showed widespread thinner cortex, while adults with major depressive disorder showed regionally thinner cortex, and adolescents with major depressive disorder showed regionally smaller cortical surface area. In schizophrenia, cortical thickness was associated with antipsychotic medication treatment and in bipolar disorder cortical thickness was associated with lithium and anti-epileptic medication treatments.

Conclusion. Pooling data from more than 25,000 subjects worldwide, the ENIGMA SZ, BD, and MDD Working Groups have found significant deep brain structure and cortical abnormalities in these disorders and significant associations with clinical variables. The ENIGMA meta-analysis approach is able to achieve robust findings in clinical neuroscience studies and allows for comparisons of brain abnormalities between disorders.

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Neuroscience Research Building (NRB 132)
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