

Title: Genetic underpinnings of human brain function and structure.

Synopsis:

Keywords. Genetics, neuroimaging, environment, verbal fluency, white matter, grey matter, brain connectivity, dopamine synthesis, fMRI, sMRI, DTI, PET, schizophrenia, bipolar disorder.

Context. Several aspects of brain function and structure are known to be highly heritable but little is known about what specific genes contribute to them. For example, while specific genetic variations have been associated with cognitive abilities and susceptibility to many psychiatric illnesses, we still do not know how they operate or increase risk. How do genetic variations modulate executive function such as verbal fluency and risk of bipolar disorder and schizophrenia? We will investigate their impact directly on brain activation, anatomy and dopamine synthesis.

Tools. We use an existing database of controls and bipolar disorder and schizophrenia patients, in whom MRI data (functional and structural MRI, Positron Emission Tomography (PET) and Diffusion Tensor Imaging –DTI) and genotyping (including genome-wide GWA) human data has been collected, to correlate genetic with neuroimaging measurements in healthy humans, and patients with schizophrenia and bipolar disorder. We mainly use MATLAB, SPM, FSL, free surfer and MIBCA software.

Collaborations. King's College London (UK) and Oxford University Hospitals (UK).

A specific MSc project will spin-off from the above larger project depending on MSc candidate's background and preferences.

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