OPERA
OXFORD PSYCHOSIS
RESEARCH & APPLICATION

OPERA (www.oxfordpsychosis.com) undertakes translational research to understand the mechanisms underlying psychosis and develop more effective, personalised treatments. Our work spans multimodal neuroimaging, neurophysiology, experimental medicine, clinical trials and computational modelling.

We welcome enquiries from prospective DPhil students interested in the projects below. The precise questions and methods would be tailored to the student's interests and background.

Which animal models resemble which patients? Cross-species mapping of brain dysfunction in psychosis

Animal models allow causal investigation of neural mechanisms that cannot readily be manipulated in humans. However, translation to clinical psychiatry has often been disappointing, partly because we lack quantitative methods for determining which features of an animal model correspond to particular brain abnormalities—or particular patients—in humans.

This project will involve collaboration with Prof Rogier Mars to combine comparative neuroscience with human neuroimaging to develop a more precise approach to cross-species translation in psychosis. Mouse and human brains will be represented in a shared computational space using features such as gene expression, anatomical connectivity and functional organisation. Neural signatures arising from defined animal perturbations—for example, alterations in glutamatergic, dopaminergic or muscarinic systems—can then be translated into this common space and compared with patient-level human data.

Potential questions include:

- which human brain regions and networks have sufficiently conserved counterparts to support translation from mouse experiments;
- whether animal perturbations define distinct mechanistic signatures rather than a single generic model of psychosis;
- whether individual patients or patient subgroups preferentially resemble different perturbation-defined signatures; and
- whether these cross-species signatures help explain cognition, symptoms or response to mechanistically different treatments.

Human data could include multimodal imaging from FOCUS and PEACE alongside larger existing psychosis datasets. The project would shift the emphasis from asking whether one animal model represents an entire diagnosis to asking which model best captures the biology of which patients.

The student would gain experience in comparative neuroanatomy, neuroimaging, computational modelling and translational psychiatry. A strong quantitative or computational background would be advantageous.

All projects potentially suitable for both full or part-time study

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