PRECLINICAL BRAIN IMAGING IN NEUROSCIENCE AND TRANSLATIONAL DRUG DISCOVERY

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The BRAIN (Biomarkers Research and Imaging for Neuroscience) Centre at King's College London is a preclinical neuroimaging facility dedicated to collaborative research with both academic and industry partners. Researchers at the BRAIN Centre are committed to advancing forward- and back-translational studies by applying advanced brain imaging techniques to investigate the mechanisms and treatments of various neurological and psychiatric conditions, including dementia, schizophrenia, unhealthy ageing, autism, Parkinson's disease, stroke, and more.

Dr Cash lecture will provide an overview of the Centre's core activities and highlight selected examples from their work in experimental neuroscience. Using a mouse model of inflammatory demyelination, we demonstrate how multimodal in vivo MR imaging and spectroscopy can deliver detailed pathological characterization, complementing neurochemical and histological findings. This approach also enables the assessment of treatment efficacy and contributes toward elucidation of mechanisms of action—key factors in clinical translation.

Another case study will illustrate the monitoring of anti-Alzheimer's drug efficacy in rodent models through integrated MR imaging, histology, and behavioural analyses. Employing a transgenic rat model, we have developed a sensitive method to detect amyloid plaques in vivo, allowing for longitudinal measurement of drug effects in the same animal.

Many brain disorders manifest subtle structural abnormalities detectable even post-mortem. Dr Cash will present examples from psychiatric and neurological disease models in which ex vivo, non-destructive brain imaging has guided subsequent histological and molecular analyses.

Finally, a pipeline for assessing the functional impact of CNS-active compounds will be introduced. This method involves quantifying brain blood flow and resting-state functional connectivity to generate pharmacological "fingerprints" of compounds such as ketamine, clozapine, and psilocybin, against which novel therapeutics can be compared.