Owens Institute for Behavioral Research

Behavior, Cognition & Neuroscience Work Group

PRESENTS

Leveraging two-photon and optogenetic neurotechnologies in a translational neuropsychiatric framework

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Paul D. Coverdell Center | Room 175 | 1:15– 2:15pm

Presented by

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Animal research has enabled key advances in numerous biomedical fields. Psychiatry still has yet to fully benefit, perhaps because modelling complex diseases like schizophrenia and bipolar disorder in animals is fundamentally challenging. In psychiatric patient populations, non-invasive neuroimaging studies employing MRI, EEG, and/or MEG have been used to identify and study quantitative measures of brain function, or "biomarkers", which may relate more closely to biological causes than the symptomology by which psychiatric disorders are defined. Such biomarkers are an ideal target for translational research, where a fine-scale investigation only possible in animals can identify disease-relevant biological pathways underlying a *specific EEG measure* or simple *behavior*. Work presented here demonstrates such an approach. A visual oddball paradigm was adapted to awake mice in order to study "mismatch negativity", a classic EEG biomarker of schizophrenia. Fast two-photon calcium imaging enabled the recording of local neuronal population dynamics with single cell resolution, and opto/chemicogenetics were applied to selectively silence genetically and anatomically defined cell populations. Results suggest a link between the novelty-processing deficits marked by "mismatch negativity" and two pathophysiologically relevant circuit functions (inhibition from somatostatin interneurons and prefrontal inputs to sensory cortex). This approach demonstrates how clinically measurable biomarkers can be paired to specific biological aberrations, where cell and circuit-level interventions can be developed, tested, and applied. The need for further refinement of human biomarkers will be discussed.

For additional information, go to www.oibr.uga.edu or contact Andrea Horsman at ahorsman@uga.edu

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