Psychology Colloquium

Tuesday 3rd October 4:00-5:00pm in Bayliss MCS G.33, followed by post-talk drinks in the Psychology Courtyard (or, in bad weather, the Psychology Common Room, 2nd floor of main psychology building)

Presenter: E/Prof Pat Michie (University of Newcastle)

Title: From clinical to pre-clinical research – using animal models to understand the neurobiology of schizophrenia.

Abstract: In addition to a range of negative and positive clinical symptoms, patients with schizophrenia exhibit quite profound cognitive deficits that impinge on their capacity to engage in social, employment and educational opportunities. They also exhibit a range of electrophysiological and neurobiological abnormalities. Although the dominant model of schizophrenia is that it is a neurodevelopmental disorder that results in excessive dopaminergic activity as a core feature, there is increasing evidence that hypo-function of the glutamate NMDA receptor (NMDAR) system can account for a broader range of positive, negative and cognitive symptoms of the disorder. Our own research has confirmed the involvement of the NMDAR system from evidence that an electrophysiological measure that has been shown to be an index of the integrity of the NMDAR system, the mismatch negativity (MMN), is reduced in schizophrenia. Our current research is attempting a reverse translation of these well–established clinical findings to a neurodevelopmental animal model of schizophrenia in an attempt to understand the neurobiology of the disorder and potentially develop new treatments. Recent research using a mouse neurodevelopmental model of maternal immune activation either early or late in gestation seemed to offer an explanation of both the dopamine and NMDAR abnormalities with maternal immune activation (MIA) in early gestation resulting in greater dopamine disturbance (or a more positive-symptom type phenotype) but MIA late gestation indicated greater disturbance in the NMDAR system (and a more negative/ cognitive deficit phenotype). In the first series of studies we induced maternal immune activation in rat dams either early or late in gestation and examined the behavioural. cognitive and electrophysiological phenotypes in adult offspring as well as neurobiological changes, namely, in the density and expression of NMDAR subunits. The outcome of these studies suggest that MIA alone in the rat induces only subtle behavioural and cognitive abnormalities and unexpected NMDAR subunit changes that potentially have implications for treatment. In the second series of investigations currently underway, we are investigating a two-hit model of schizophrenia by combining MIA with chronic adolescent cannabis use based on the rationale that an early insult to the developing brain (MIA) makes it more vulnerable to a second insult (adolescent cannabis use) and may therefore yield a more complex schizophrenia-like phenotype in the offspring.

Speaker Bio: Dr. Pat Michie is currently Emeritus Professor of Psychology at the University of Newcastle, Australia. She previously held professorial positions at UWA and Macquarie University. She is an experimental psychologist whose research has focused on the neural basis of normal and abnormal cognition. She is a Fellow of the Academy of Social Sciences of Australia and is the 2016 recipient of the Australian Psychological Society's Distinguished Contribution to Psychological Science Award. Her research has been characterised by application of theories and methodologies from basic research in cognition and cognitive neuroscience to understand the nature of cognitive deficits and their neural basis in individuals diagnosed with schizophrenia and those at risk. Her research spans auditory processing deficits, impaired inhibitory control and cognitive control more generally and uses both psychophysical methods to assess performance as well as functional brain imaging methods such as event-related potentials (ERPs) of the brain. She was a key member of the Australian group who were the first to demonstrate that individuals with schizophrenia exhibit impaired automatic change detection in a background of auditory regularities, an ERP-derived observation replicated many times and one of the most robust findings in the schizophrenia literature. Her current research is focused on animal models of schizophrenia. Pat currently chairs the Research Committee of Orygen, the National Centre of Excellence in Youth Mental Health, and the National Committee of Brain and Mind (NCBM) of the Academy of Sciences of Australia. She is past chair of the Australian Brain Alliance, an initiative of the NCBM and the Academy. The Alliance, which is supported by the Australian Psychological Society, the Psychology Foundation and the Australasian Neuroscience Society and major research organisations, aims to secure investment in Australian brain research comparable to other international initiatives.