Professor Clea Warburton
B.Sc.(R'dg), Ph.D.(Lond.)

Professor of Cognitive Neuroscience

Area of research

Neural substrates of learning and memory

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Summary

My research interests are the neural and cellular substrates of learning and memory processes in animals. I am specifically interested in the distinct contributions the perirhinal and prefrontal cortices and the hippocampal formation make to recognition memory processing.

The work conducted by my research group has involved the use of a number of complementary behavioural, pharmacological and molecular techniques to examine the neural basis of recognition memory. In earlier experiments we revealed the differential roles played by the perirhinal cortex, hippocampus and prefrontal cortex in specific components of recognition memory, namely familiairity discrimination (our ability to tell if a stimulus such as an object, is familiar or novel); object-in-place associaitive recognition memory (our ability to tell if an object has changed its location); recency recognition memory (our ability to judge how recently an object has been encountered) .

The research uses a multidisciplinary approach incorporating molecular and cellular techniques with behavioural analysis of recognition memory. Most recently my lab have used pharmacogenetics and optogenetics to manipulate specific neural pathways between defined brain regions during specific phases of memory to uncover the nature of information processing across brain wide memory circuits.

Activities / Findings

- Demonstration of distinct information processing pathways between the hippocampus and medial prefrontal cortex
- The importance of the nucleus reuniens in associaitive recognition memory formation
- Interactions between the hippocampus, prefrontal cortex and perirhinal cortex are crucial for associative recognition memory formation
- Long and short term recognition memory depends on different receptor mechanisms (NMDAR and KAR, respectively). Read more >
- Both medial prefrontal and perirhinal cortical regions are required for spatial and temporal associational memory Read more >
- Phosphorylation of CREB is necessary for recognition memory and LTP in the perirhinal cortex

Teaching

- Director of Neuroscience Teaching
- Level 1: Techniques in Neuroscience Unit
- Level 2 : Lectures within the Central Nervous System Unit
- Level 3: Seminars within the Neural Bases of Learning and Memory Unit
- Seminars within the Brain Functions and Disorders Unit

Keywords

- memory
- behaviour
- prefrontal cortex
- hippocampus
- perirhinal
- nucleus reuniens
- glutamate receptor
- immunocytochemistry

Skills

- Amnesia
- Alzheimer's Disease

Processes and functions

- Learning
- memory

Methodologies

- Behavioural assessment of learning and memory
- immunocytochemistry
- psychopharmacology
- optogenetic and pharmacogenetic manipulations of neural circuitry

Memberships

Organisations

School of Physiology, Pharmacology & Neuroscience

MRC Centre for Synaptic Plasticity

Other sites

- Neuroscience
- Synaptic

Research Areas

- Learning and memory

Links

- home page

Selected publications

- Barker, GR & Warburton, EC, 2018, 'A critical role for the nucleus reuniens in long-term, but not short-term associative recognition memory formation'. *Journal of Neuroscience*, vol 38., pp. 3208-3217
- Barker, G, Banks, P, Scott, H, Wong, L-F, Bashir, Z, Uney, J & Warburton, C, 2017, 'Separate elements of episodic memory subserved by distinct hippocampal-prefrontal connections'. *Nature Neuroscience*, vol 20., pp. 242?250
- Barker, GRI & Warburton, EC, 2011, 'When is the hippocampus involved in recognition memory?'. *Journal of Neuroscience*, vol 31., pp. 10721 - 10731
- Warburton, EC & Barker, GRI, 2015, 'Object-in-place associative recognition memory depends on glutamate receptor neurotransmission within two defined hippocampal-cortical circuits: A critical role for AMPA and NMDA receptors in the hippocampus, perirhinal and prefrontal cortices.'. *Cerebral Cortex*.
- Warburton, C & Brown, MW, 2015, 'Neural circuitry for rat recognition memory'. *Behavioural Brain Research*, vol 285., pp. 131-139
- Barker, G, Bird, F, Alexander, V & Warburton, E, 2007, 'Recognition memory for objects, place, and temporal order: a disconnection analysis of the role of the medial prefrontal cortex and perirhinal cortex'. *Journal of Neuroscience*, vol 27 (11)., pp. 2948 - 2957

Read more >

Recent publications

- Scullion, SE, Barker, GR, Warburton, EC, Randall, AD & Brown, JT, 2019, 'Muscarinic Receptor-Dependent Long Term Depression in the Perirhinal Cortex and Recognition Memory are Impaired in the rTg4510 Mouse Model of Tauopathy'. *Neurochemical Research*, vol 44., pp. 617-626
- Sabec, MH, Wonnacott, S, Warburton, EC & Bashir, ZI, 2018, 'Nicotinic Acetylcholine Receptors Control Encoding and Retrieval of Associative Recognition Memory through Plasticity in the Medial Prefrontal Cortex'. *Cell Reports*, vol 22., pp. 3409-3415
- Scott, H, Rogers, MF, Scott, HL, Campbell, C, Warburton, EC & Uney, JB, 2017, 'Recognition memory-induced gene expression in the perirhinal cortex: A transcriptomic analysis'. *Behavioural Brain Research*, vol 328., pp. 1-12
- Scott, H, Smith, AE, Barker, GR, Uney, JB & Warburton, EC, 2017, 'Contrasting roles for DNA methyltransferases and histone deacetylases in single-item and associative recognition memory'. *Neuroepigenetics*, vol 9.

View complete publications list in the University of Bristol publications system

Networks & contacts

- Professor James Uney
- Professor Zafar Bashir