



Cardiff University  
School of Psychology

<b>Studentship Title:</b>	GW4 DTP
<b>Research Area/ Project Title:</b>	Overnight therapy: treating PTSD through sleep engineering
<b>Location:</b>	Cardiff and Bristol
<b>Expected Start Date:</b>	1 October 2017
<b>Duration:</b>	3.5 years
<b>Deadline for Application:</b>	8 <sup>th</sup> June 2017

#### **Description of Research Opportunity:**

Project Summary:

Recollection of traumatic memories in PTSD is highly distressing and linked to suicide risk and depression. We aim to develop a non-invasive treatment for PTSD through manipulation of sleep. Negative memories can become less distressing if they are neurally reactivated during sleep. We will explore reactivation at both systems and cellular levels.

Project Details:

We will define the neurobiology underpinning a potential non-invasive, precise treatment for Post Traumatic Stress Disorder (PTSD). PTSD is characterised by the re-living of highly traumatic events through vivid negative memories which retain their original emotional salience. PTSD is associated with multiple adverse outcomes, including suicide. Drug and psychological treatments are often ineffective[1].

Memories are spontaneously replayed during sleep, an “off-line” consolidation mechanism that integrates past events into ongoing experience[2]. Memory replay can be triggered by a technique called ‘targeted memory replay’(TMR) in which sounds associated with the memories during wakefulness are re-played to participants during slow wave sleep (SWS)[3,4]. We recently found that TMR of negative memories leads them to be judged less arousing the next day. This suggests that TMR during sleep could potentially be used to disarm emotional memories.

This PhD will quantify how TMR in sleep acts at the neural circuit level using experiments in humans (fMRI, autonomic measures, and behaviour) and rats (electrophysiology and behaviour). The human experiments (months 1-18) will extend our existing work on declarative memory to fear conditioning to determine how broadly a potential therapy could be applied. We will apply TMR in SWS and rapid eye movement sleep (REM) on separate nights to determine the sleep stage when this is most effective.

After each sleep manipulation, we will monitor brain activity with fMRI during presentation of both TMR cued and non-cued conditioned stimuli to determine how TMR alters neural responses and network dynamics. Our human work will inform electrode placement and paradigm design in the subsequent rat work (months 19-36), where high-resolution, long-term electrophysiological recordings will allow comparison of cell-level neural activity during wakeful perception of a stimulus, TMR cued replay in sleep, and post-sleep perception of the same stimulus.

We will initially focus on hippocampus-amygdala interactions since we have evidence that cell activity patterns in hippocampus coordinate with neural population activity in the amygdala following aversive learning. This cellular work will inform interpretation of our human fMRI data, by telling us whether TMR induces genuine replay (involving the same neurones as wakeful perception). Clinical input will bridge this work to directly relevant, on-going studies of links between trauma, sleep and psychosis in the ALSPAC cohort[5].

**Award:**

This studentship is funded through GW4 BioMed MRC Doctoral Training Partnership (DTP, [www.gw4biomed.ac.uk](http://www.gw4biomed.ac.uk)) for 3.5 years. It consists of full UK/EU tuition fees, as well as a Doctoral Stipend matching UK Research Council National Minimum. In 2016-17 the doctoral stipend for full-time students is £14,296 per annum.

Additional research and training funding is available over the course of the programme. This will covers costs such as research consumables, courses, conferences and travel. Additional competitive funds are available for high-cost training/research.

This research project is in competition with 40 other studentship projects available across the GW4 BioMed MRC DTP. Up to 20 studentships will be awarded to the best applicants.

**Eligibility:**

Full awards (fees plus maintenance stipend) are open to UK Nationals, and EU students who can satisfy UK residency requirements. To be eligible for the full award, EU Nationals must have been in the UK for at least 3 years prior to the start of the course for which they are seeking funding, including for the purposes of full-time education.

As only one studentship is available and a very high standard of applications is typically received, the successful applicant is likely to have a very good first degree (a First or Upper Second class BSc Honours or equivalent) and/or be distinguished by having relevant research experience.

**How to apply:**

This project is part of a larger group of projects that have been jointly advertised. You can apply online or download the application form [here](#) (please also see full instructions on that website)

Please specify that you are applying for this particular project.

Note that you will also have to apply the University of Cardiff for a place.

- **Application deadline:** arrange a meeting with their chosen supervisor(s) (in person or via phone/video call) to discuss the project and their application between 9<sup>th</sup> and 16<sup>th</sup> of June;
- submit two references and a copy of their academic transcript(s) by 28<sup>th</sup> of June; Supervisors will need to complete a report of the applicant;
- attend an interview in Cardiff on the 30<sup>th</sup> of June.

**General Information:**

The School of Psychology is one of the largest and most successful in the UK (<http://www.cf.ac.uk/psych/>). The School's excellent standard of research and teaching has been recognised in every Research Assessment Exercise. It has its own brain-imaging centre (<http://www.cf.ac.uk/psych/cubric/>), enhancing the international-leading research in behavioural neuroscience, cognitive ergonomics, forensic, social and developmental psychology.

Cardiff is the youngest capital city in Europe and the fastest growing in the UK. It plays host to many national and international sporting events at the Millennium Stadium (<http://www.millenniumstadium.com/>). Culturally, the city is thriving, with the Wales Millennium Centre (<http://www.wmc.org.uk/>) in Cardiff Bay. Cardiff is in very close proximity to the beautiful Welsh countryside (<http://www.breconbeacons.org/>), has a two hour rail link to London and a (cheap) one hour air link to Paris and Amsterdam (<http://www.cardiffairportonline.com/>)

Please address any informal enquiries to:

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**For further information please contact:**

**Postgraduate Research Enquires**

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