Inter-University Neuroscience & Mental Health Conference 2017
The Inter-University conference for Neuroscience and Mental Health is sponsored by:
<table>
<thead>
<tr>
<th>Start</th>
<th>End</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:15</td>
<td>9:00</td>
</tr>
<tr>
<td><strong>Registration</strong> <em>(Foyer, School of Medicine)</em></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>9:00</th>
<th>9:10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Welcome</strong> <em>(Lecture theatre 206)</em></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>9:10</th>
<th>10:00</th>
</tr>
</thead>
</table>
| **Plenary: Prof Andrew Nierenberg** *(Lecture theatre 206)*  
Bipolar Disorder: Targeting Brain Energy Metabolism and Peroxisome Proliferator Activated Receptors/Coactivators  
*Chair: A/Prof Anthony Harris* |

<table>
<thead>
<tr>
<th>10:00</th>
<th>10:30</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data Blitz – 8 x 3 min talks by poster presenters</strong> <em>(Lecture theatre 206)</em></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10:30</th>
<th>11:00</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Morning Tea</strong></td>
<td></td>
</tr>
</tbody>
</table>

| Session 1: New treatment approaches for depression, PTSD and schizophrenia  
*(Lecture theatre 206)*  
*Chair: Dr Natalie Morrison* |
| 11:00  | 11:15 |
| Nicola Ball  
Pilot trial of home-administered transcranial direct current stimulation for depression  
University of New South Wales |
| 11:15  | 11:30 |
| Milena Gandy  
Harnessing internet-delivered and transdiagnostic treatment approaches to enhance the mental health and cognitive functioning of Australians with neurological conditions.  
Macquarie University |
| 11:30  | 11:45 |
| Zachias Hopkins  
Cardiovascular and Autonomic Associations to Post-Traumatic Stress Disorder Symptomatology  
University of Technology Sydney |
| 11:45  | 12:00 |
| Gabriela Uribe  
Improving the capacity of Australian based community-based workers to provide assistance to Iraqi refugees with mental health problems: an uncontrolled evaluation of a mental health literacy training course  
Western Sydney University |

| Session 2: Neurodegeneration  
*(Lecture theatre 213)*  
*Chair: Prof Gerald Münch* |
| 11:00  | 11:15 |
| Stephanie Wong  
Strategic value-directed learning and memory in Alzheimer’s disease and behavioural-variant frontotemporal dementia  
University of Sydney |
| 11:15  | 11:30 |
| Rosalind Hutchings  
Beyond language: Facial identity and affect processing in progressive nonfluent aphasia  
University of Sydney |
| 11:30  | 11:45 |
| Claudia Kielkopf  
Characterisation of a novel apolipoprotein-D tetramer  
University of Wollongong |
| 11:45  | 12:00 |
| Georgia Watt  
Effect of CBD on transgenic mouse models of Alzheimer’s disease  
Western Sydney University |
<table>
<thead>
<tr>
<th>Time</th>
<th>Session 1</th>
<th>Session 2</th>
<th>Session 3</th>
<th>Session 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00</td>
<td>Shameran Slewa-Younan</td>
<td>Mental health and help-seeking behaviour in resettled Afghan refugees in Australia.</td>
<td>Joseph Firth</td>
<td>B-vitamins as an adjunctive treatment for schizophrenia: findings from a meta-analysis of RCTs</td>
</tr>
<tr>
<td>12:15</td>
<td></td>
<td></td>
<td></td>
<td>Tara Roberts</td>
</tr>
<tr>
<td>12:30</td>
<td></td>
<td></td>
<td></td>
<td>University of Sydney</td>
</tr>
<tr>
<td>12:15</td>
<td></td>
<td></td>
<td></td>
<td>University of Sydney</td>
</tr>
<tr>
<td>12:30</td>
<td></td>
<td></td>
<td></td>
<td>Western Sydney University</td>
</tr>
<tr>
<td>12:30</td>
<td></td>
<td></td>
<td></td>
<td>Western Sydney University &amp; University of Queensland</td>
</tr>
<tr>
<td>12:30</td>
<td></td>
<td></td>
<td></td>
<td>Western Sydney University</td>
</tr>
<tr>
<td>14:30</td>
<td></td>
<td></td>
<td></td>
<td>Western Sydney University</td>
</tr>
<tr>
<td>14:30</td>
<td></td>
<td></td>
<td></td>
<td>Western Sydney University</td>
</tr>
<tr>
<td>15:30</td>
<td>Sian Genoud</td>
<td>Alterations in biometals and metalloproteins in the soluble fraction of the Parkinson’s disease brain</td>
<td>Benjamin Trist</td>
<td>Metal dyshomeostasis, oxidative stress and protein aggregation: a toxic triad underlying neuronal loss in Parkinson’s disease?</td>
</tr>
<tr>
<td>15:45</td>
<td></td>
<td></td>
<td></td>
<td>University of Sydney</td>
</tr>
<tr>
<td>15:45</td>
<td></td>
<td></td>
<td></td>
<td>Western Sydney University</td>
</tr>
<tr>
<td>16:00</td>
<td></td>
<td></td>
<td></td>
<td>Alex Burton</td>
</tr>
<tr>
<td>16:45</td>
<td></td>
<td></td>
<td></td>
<td>Alex Burton</td>
</tr>
<tr>
<td>16:45</td>
<td></td>
<td></td>
<td></td>
<td>University of Sydney</td>
</tr>
<tr>
<td>16:45</td>
<td></td>
<td></td>
<td></td>
<td>Western Sydney University</td>
</tr>
<tr>
<td>16:00</td>
<td></td>
<td></td>
<td></td>
<td>University of Sydney</td>
</tr>
<tr>
<td>16:15</td>
<td>Gilles Guillemain</td>
<td>Neurotoxicity of the cyanotoxin bmaa through axonal degeneration and intercellular spreading</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16:15</td>
<td></td>
<td></td>
<td></td>
<td>Macquarie University</td>
</tr>
<tr>
<td>16:15</td>
<td></td>
<td></td>
<td></td>
<td>University of Technology Sydney</td>
</tr>
<tr>
<td>16:45</td>
<td>Andy Hall</td>
<td>Self-reflection and emotional distress</td>
<td>Thomas Burton</td>
<td></td>
</tr>
<tr>
<td>16:45</td>
<td></td>
<td></td>
<td></td>
<td>Macquarie University</td>
</tr>
<tr>
<td>16:45</td>
<td></td>
<td></td>
<td></td>
<td>University of Sydney</td>
</tr>
</tbody>
</table>
### Session 1:

**17:00 - 17:15**

<table>
<thead>
<tr>
<th>Jessica Hazelton</th>
<th>Tara Nguyen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing yourself: The effect of interoception on emotion recognition in ageing</td>
<td>Electronic cigarette use during maternal pregnancy showed behavioural and epigenetic changes in the adult male offspring</td>
</tr>
<tr>
<td>The University of Sydney</td>
<td>University of Technology Sydney</td>
</tr>
</tbody>
</table>

**17:15 - 17:30**

<table>
<thead>
<tr>
<th>Janette Smith</th>
<th>Hong Nguyen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Towards equivalent inhibitory tasks in ERP and fMRI contexts</td>
<td>Deferoxamine reduces brain injury and improves functional outcomes in a rat model of endothelin-1 induced focal stroke</td>
</tr>
<tr>
<td>University of New South Wales</td>
<td>University of New South Wales</td>
</tr>
</tbody>
</table>

**Evening Drinks**

---

### Session 2:

**9:00 - 9:15**

**Registration** *(Foyer, School of Medicine)*

**9:15 - 10:00**

**Plenary:** Prof Erica Fletcher *(Lecture theatre 206)*

**The role of microglia in regulation of retinal integrity**

*Chair: Prof John Morley*

**Morning Tea**

**10:00 - 10:30**

**Session 7: Metabolism, binge eating and addiction** *(Lecture theatre 206)*

*Chair: A/Prof Jennifer Cornish*

<table>
<thead>
<tr>
<th>Sarah-Jane Leigh</th>
<th>John Carmody</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral minocycline hydrochloride prevents cafeteria diet-induced cognitive impairment in male rats</td>
<td>Two great and influential papers in modern neuroscience: both seemingly unaware of their historical genesis and counterpoised philosophical character</td>
</tr>
<tr>
<td>University of New South Wales</td>
<td>University of Sydney</td>
</tr>
</tbody>
</table>

**10:30 - 10:45**

<table>
<thead>
<tr>
<th>Natalie Li</th>
<th>Mac Shine</th>
</tr>
</thead>
<tbody>
<tr>
<td>An investigation of objective and subjective types of binge eating episodes in general population community sample</td>
<td>The modulation of neural gain facilitates a transition between functional segregation and integration in the brain</td>
</tr>
<tr>
<td>Western Sydney University</td>
<td>University of Sydney</td>
</tr>
</tbody>
</table>

**10:45 - 11:00**

<table>
<thead>
<tr>
<th>Henry Lu</th>
<th>Alba Bellot-Saez</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploring relationships between recurrent binge eating and illicit substance use</td>
<td>Astrocytic modulation of neuronal network oscillations</td>
</tr>
<tr>
<td>Western Sydney University</td>
<td>Western Sydney University</td>
</tr>
</tbody>
</table>

---
<table>
<thead>
<tr>
<th>Time</th>
<th>Presenter</th>
<th>Title</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:15</td>
<td>Nicholas Everett</td>
<td>Oxytocin treatment during abstinence from methamphetamine self-administration in male and female rats: effects on relapse to drug-seeking, social and anxiety-like behaviours</td>
<td>Macquarie University</td>
</tr>
<tr>
<td>11:30</td>
<td>Victor Perez-Fernandez</td>
<td>Pathways leading to dopamine release in the mammalian retina</td>
<td>Western Sydney University</td>
</tr>
<tr>
<td>11:30</td>
<td>Warren Logge</td>
<td>Neural Correlates of Alcohol Cue-Induced Brain Activation and Neuropsychological Executive Functioning Measures in Patients with Alcohol Dependence</td>
<td>Macquarie University</td>
</tr>
<tr>
<td>11:45</td>
<td>Sam Merlin</td>
<td>The role of top-down modulation on early visual processing</td>
<td>Western Sydney University</td>
</tr>
<tr>
<td>11:45</td>
<td>Lisa Hu &amp; Qizhang Liu</td>
<td>Determining the efficacy and longevity of inhibitory control training relative to current psychological interventions for the reduction of risky alcohol consumption.</td>
<td>University of New South Wales</td>
</tr>
<tr>
<td>12:00</td>
<td>Saarin Pearson</td>
<td>Synthetic Cannabinoid Activation of hTRPA1 and Naturally Occurring Channel Variants</td>
<td>Macquarie University</td>
</tr>
<tr>
<td>12:00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13:30</td>
<td></td>
<td>Lunch and Posters</td>
<td></td>
</tr>
<tr>
<td>13:30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:30</td>
<td>Wei He</td>
<td>Altered amygdala-cortical connectivity in anxious children: magnetoencephalographic evidence</td>
<td>Macquarie University</td>
</tr>
<tr>
<td>14:45</td>
<td>Conor Underwood</td>
<td>Increased excitatory regulation of the hypothalamic PVN and circulating vasopressin underlie the high blood pressure observed in polycystic kidney disease</td>
<td>Macquarie University</td>
</tr>
<tr>
<td>14:45</td>
<td>Lauren Rice</td>
<td>Reduced gamma-aminobutyric acid is associated with emotional and behavioral problems in Prader Willi syndrome</td>
<td>University of Sydney</td>
</tr>
<tr>
<td>15:00</td>
<td>Marina Ulanova</td>
<td>The role of neuropeptide Y in the coordination of energy balance and physical activity</td>
<td>University of New South Wales/Garvan Institute of Medical Research</td>
</tr>
<tr>
<td>15:00</td>
<td>Iain Perkes</td>
<td>Pavlovian-to-instrumental transfer impairment in people with obsessive-compulsive disorder: Compulsion-correlated orbitofrontal cortex hyperactivity and cortical disconnection</td>
<td>University of Sydney, University of New South Wales</td>
</tr>
<tr>
<td>15:15</td>
<td>Elisabeth Goodman</td>
<td>The role of insulin signalling in neuropeptide Y neurons in hippocampal dependent cognitive functioning</td>
<td>University of New South Wales</td>
</tr>
<tr>
<td>Time</td>
<td>Session 11: Autism</td>
<td>Session 12: Stem cells</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>--------------------</td>
<td>-----------------------</td>
<td></td>
</tr>
<tr>
<td>15:15</td>
<td>Taylor Braund</td>
<td>Juan Olaya</td>
<td></td>
</tr>
<tr>
<td>15:30</td>
<td>Defining anxious depression: An iSPOT-D report</td>
<td>Neuregulin 1 type III overexpressing mice possess an altered hippocampal transcriptome that implicates the Igf and PI3K pathways: A microarray study</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Westmead Institute for Medical Research/University of Sydney</td>
<td>Neuroscience Research Australia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:30</td>
<td>Amanda Mazzoni</td>
<td>Rachelle Balez</td>
<td></td>
</tr>
<tr>
<td>16:00</td>
<td>Session 11: Autism (Lecture theatre 206)</td>
<td>Session 12: Stem cells (Lecture theatre 213)</td>
<td></td>
</tr>
<tr>
<td>16:15</td>
<td>An fNIRS investigation into the brain activity of young children on the Autism Spectrum during social experiences</td>
<td>Altered distribution and neuroprotective effect of alpha-tocopherol in sporadic Alzheimer’s disease induced pluripotent stem cell derived neurons</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of New South Wales</td>
<td>University of Wollongong</td>
<td></td>
</tr>
<tr>
<td>16:15</td>
<td>Fabian Kreilaus</td>
<td>Monique Bax</td>
<td></td>
</tr>
<tr>
<td>16:30</td>
<td>Baseline phenotype of Immp2l knock-out mice: A model for Tourette Syndrome disorder</td>
<td>The ubiquitin signalling plays an essential role in the generation of induced pluripotent stem cells and iPSC-derived motor neurons</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Western Sydney University</td>
<td>University of Wollongong</td>
<td></td>
</tr>
<tr>
<td>16:30</td>
<td>Robert Seymour</td>
<td>Dzung Do-Ha</td>
<td></td>
</tr>
<tr>
<td>16:45</td>
<td>Dysregulated Oscillatory Activity During Visual Processing in Autism Spectrum Disorder</td>
<td>Brainphys and small molecule inhibitors improve neuronal differentiation and maturation of induced pluripotent stem cells into motor neurons</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aston Brain Centre, UK &amp; Macquarie University</td>
<td>University of Wollongong</td>
<td></td>
</tr>
<tr>
<td>16:45</td>
<td></td>
<td>Hot Topic: Prof John Whitehall (Lecture theatre 206) Are puberty blockers as safe as claimed? Chair: Prof John Morley</td>
<td></td>
</tr>
<tr>
<td>17:00</td>
<td>Closing address and prizes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17:30</td>
<td>Evening Drinks</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Poster Summary

<table>
<thead>
<tr>
<th>Poster Board Number</th>
<th>Name</th>
<th>POSTER TITLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Anita Raposo</td>
<td>Regulation of the cell cycle by the protein arginine methyltransferase, prmt1 in glioblastoma cells</td>
</tr>
<tr>
<td>*2</td>
<td>Caitlin Finney</td>
<td>Laboratory diets high in soy lead to sex-specific changes in body weight and estrogen receptor gene expression</td>
</tr>
<tr>
<td>3</td>
<td>Chloe Taylor</td>
<td>Rate of rise in diastolic blood pressure influences vascular sympathetic response to mental stress</td>
</tr>
<tr>
<td>4</td>
<td>Cindy Sia</td>
<td>Cardiac perivascular and myocardial remodelling in animal model of chronic kidney disease</td>
</tr>
<tr>
<td>5</td>
<td>Clare Loudon</td>
<td>The Behavioural and Histological Effects of Repeated Hypertonic Saline Injections on Rat Muscle Tissue, Using Minocycline as a Neuroprotectant</td>
</tr>
<tr>
<td>*6</td>
<td>Daniel Boulton</td>
<td>Central command, but not the metaboreflex, is responsible for the increase in muscle sympathetic nerve activity to contracting muscle during static exercise in humans</td>
</tr>
<tr>
<td>7</td>
<td>Danilo Dias Santana</td>
<td>Disordered eating behaviors, weight adequacy and bmi trajectory in students from rio de janeiro: a longitudinal study in adolescents.</td>
</tr>
<tr>
<td>*8</td>
<td>Giulia del Rosso</td>
<td>Investigating cellular pathways triggering axonal degeneration in a conditional knock in mouse model for X-linked distal hereditary motor neuropathy (Atp7aT985I)</td>
</tr>
<tr>
<td>9</td>
<td>Huazheng Liang</td>
<td>Tenilsetam attenuates neuroinflammation in GFAP-IL6 mice</td>
</tr>
<tr>
<td>10</td>
<td>Iain Perkes</td>
<td>Impaired behavioural flexibility after reward devaluation in people with obsessive-compulsive disorder: ventromedial prefrontal cortex hypoactivity and corticostriatal disconnection</td>
</tr>
<tr>
<td>*11</td>
<td>Jacqueline Saad</td>
<td>Regional brain network organization distinguishes the combined and inattentive subtypes of Attention Deficit Hyperactivity Disorder</td>
</tr>
<tr>
<td>*12</td>
<td>Jun Hua Bowen Lim</td>
<td>Optogenetic dissection of a neural circuit linking the amygdala, nucleus accumbens shell and the lateral hypothalamus.</td>
</tr>
<tr>
<td>*13</td>
<td>Lea Abdulkhalek</td>
<td>A practical method for paraffin embedding of individual zebrafish larvae</td>
</tr>
<tr>
<td>No.</td>
<td>Name</td>
<td>Title</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>14</td>
<td>Michael Leitch</td>
<td>Comparison of the ballistic contractile responses generated during microstimulation of single human motor axons with brief irregular and regular stimuli</td>
</tr>
<tr>
<td>15</td>
<td>Michael Vine</td>
<td>Investigating the associations between ADHD symptomology and chronic illness: cardiovascular disease and diabetes mellitus</td>
</tr>
<tr>
<td>16</td>
<td>Mohammed Almuslehi</td>
<td>Identification of novel proteoforms candidates in cuprizone-induced demyelination in mice</td>
</tr>
<tr>
<td>17</td>
<td>Nasim Foroughi</td>
<td>Do emotional responses to food images differ between people with diverse eating disorders?</td>
</tr>
<tr>
<td>18</td>
<td>Natalie Morrison</td>
<td>Profiling PTSD: Using the MMPI-2-RF to detect PTSD feigning</td>
</tr>
<tr>
<td>19</td>
<td>Natasha Kumar</td>
<td>A potential role for galanin in the chemosensory response to chronic intermittent hypoxia</td>
</tr>
<tr>
<td>20</td>
<td>Nicholas Stacey</td>
<td>Which subjective assessment methods are sensitive indicators of reduced nerve conduction velocity?</td>
</tr>
<tr>
<td>21</td>
<td>Orsi Kekesi</td>
<td>The impact of acute and chronic neuroinflammation on the electrophysiological properties of cholinergic neurons</td>
</tr>
<tr>
<td>22</td>
<td>Paul Breen</td>
<td>Subsensory Electrical Nerve Stimulation for the Improvement of Vibration Perception in Patients with HIV Related Peripheral Neuropathy</td>
</tr>
<tr>
<td>23</td>
<td>Sarah Hissen</td>
<td>Muscle sympathetic nerve activity peaks in the first trimester in healthy pregnancy: A longitudinal case study</td>
</tr>
<tr>
<td>24</td>
<td>Shamona Majaraj</td>
<td>The prevalence of depression in a cohort of Australian nurses</td>
</tr>
<tr>
<td>25</td>
<td>Brooke Donnelly</td>
<td>The Neurobiology of Binge Eating: A Systematic Review</td>
</tr>
<tr>
<td>26</td>
<td>Merryn Brettle</td>
<td>Mouse model of an amyotrophic lateral sclerosis-associated profilin 1 mutation</td>
</tr>
<tr>
<td>27</td>
<td>Caroline Xie</td>
<td>Lighting the pathway for Parkinson’s disease</td>
</tr>
<tr>
<td>28</td>
<td>Tamara Tomanic</td>
<td>Functional characterisation of filamentous actin probe expression in neuronal cells</td>
</tr>
</tbody>
</table>

*Data Blitz Thursday 10am Lecture theatre 206*
Plenary Speaker Biography

ANDREW A. NIERENBERG, MD

Dr. Andrew Nierenberg graduated from the Albert Einstein College of Medicine of Yeshiva University, Bronx, NY. After completing his residency in psychiatry at New York University/Bellevue Hospital, he studied clinical epidemiology at Yale University as a Robert Wood Johnson Clinical Scholar. Dr. Nierenberg then joined the faculty at Harvard Medical School, first at McLean Hospital in Belmont, Massachusetts and then at Massachusetts General Hospital, where he holds his current positions. He is also Honorary Professor in the School of Medicine, Faculty of Health at Deakin University, Geelong Australia.

Dr. Nierenberg has published over 450 papers and has been listed in The Best Doctors in America for the treatment of mood and anxiety disorders in every edition since 1994. In 2000, he was awarded the Gerald L. Klerman Young Investigator Award and in 2014 the Gerald L. Klerman Senior Investigator Award by the Depression Bipolar Support Alliance. In 2013, Dr. Nierenberg was awarded the prestigious Brain and Behavior Research Foundation Colvin Prize for outstanding achievement in mood disorders research. In 2014, he was awarded the Mentorship Award for Exceptional Mentorship in the Research Arena at MGH. In 2014 and 2015, he was listed among the World’s Most Influential Scientific Minds by Thompson Reuters in recognition of ranking among the top 1% of researchers for most cited papers in psychiatry worldwide.

Dr. Nierenberg’s primary interests are bipolar depression and novel treatments. He lectures extensively, both nationally and internationally, teaches, supervises, and mentors junior faculty, maintains an active clinical practice, consults to industry, and conducts clinical trials funded by federal, foundation, industry, and philanthropic sources. He serves as a peer reviewer for over 35 psychiatric journals. Dr. Nierenberg is a member of the editorial boards of over 15 journals including the Journal of Clinical Psychiatry, Journal of Clinical Psychopharmacology, Journal of Affective Disorders, Australian New Zealand Journal of Psychiatry, and Bipolar Disorders and is the associate editor of Psychiatric Annals and is a deputy editor of Depression and Anxiety.

Dr. Nierenberg volunteers as a member or advisor of the nonprofit boards of the Depression Bipolar Support Alliance, International Bipolar Foundation, Brain and Behavior Research Foundation, American Foundation for Suicide Prevention, Ryan Licht Sang Bipolar Foundation, the Sean Costello Fund for Bipolar Disorder, and MitoAction.
Plenary Speaker Biography

JESS NITHIANANTHARAJAH

Dr Nithianantharajah is an ARC Future Fellow and heads the Synapse Biology and Cognition laboratory within the Division of Behavioural Neuroscience at the Florey Institute of Neuroscience and Mental Health, University of Melbourne. She completed her doctorate in behavioural neuroscience at the University of Melbourne and commenced postdoctoral training at the Howard Florey Institute investigating gene-environment interactions on neural plasticity.

In 2008, she was recruited as a postdoctoral fellow by Prof. Seth Grant at the Wellcome Trust Sanger Institute, Cambridge UK during which time she also held a joint appointment at the University of Cambridge working with Professors Tim Bussey and Lisa Saksida on the development of the novel rodent touchscreen cognitive tests. She relocated in 2011 to the University of Edinburgh and in 2014, came back to the Florey Institute as an independent group leader. Her research interests lie in understanding the role of synaptic genes in cognition and disease.
Plenary Speaker Biography

ERICA FLETCHER

Erica Fletcher is Professor in the Department of Anatomy and Neuroscience, at The University of Melbourne where she heads the Visual Neuroscience Laboratory. She is a clinically trained optometrist who holds both MSc and PhD degrees. She completed her PhD at The University of Melbourne and undertook postdoctoral training at the Max Planck Institute for Brain Research in Germany, funded by a CJ Martin Award from the NH&MRC.

Prof Fletcher was appointed to an academic position in 2000 at The University of Melbourne. Since 2000, Prof Fletcher has had been funded continuously by the NH&MRC. She was the 2016 recipient of the Glenn Fry Award from the American Academy of Optometry in recognition of her contribution to vision research. Prof Fletcher’s research interests remain primarily focussed on understanding the causes of retinal degenerations especially age related macular degeneration.

Professor Dept Anatomy and Neuroscience,
The University of Melbourne

Lab Head, Visual Neuroscience
Plenary Speaker Biography

BRETT GRAHAM

Brett Graham has been studying the spinal circuits regulating sensory processing, with a particular focus on pain, for the last 15 years. This research began in his honours year, continuing through his doctoral and post-doctoral work, before he established the Spinal Cord Connections Research Group within the School of Biomedical Sciences at the University of Newcastle in 2008. He is an experienced electrophysiologist using approaches spanning from single channel analysis through to in vivo patch clamping in the mouse spinal cord and has served on the faculty of the Australian Course in Advanced Neuroscience (ACAN) for several years.

A/Professor School of Biomedical Sciences and Pharmacy (Anatomy)
Lab Head, Spinal Cord Connections Group
Plenary Speaker

Professor Andrew A Nierenberg, MD

Chair: A/Prof Anthony Harris
9:10 – 10:00 am
Thursday 14 Sept 2017
Lecture theatre 206

BIPOLAR DISORDER: TARGETING BRAIN ENERGY METABOLISM AND PEROXISOME PROLIFERATOR ACTIVATED RECEPTORS/COACTIVATORS

Peroxisome proliferator activated receptor gamma coactivator-1 alpha (PGC-1 alpha) is a protein that regulates metabolism and inflammation by activating nuclear receptors, especially the family of peroxisome proliferator activated receptors (PPARs). PGC-1 alpha and PPARs also regulate mitochondrial biogenesis, cellular energy production, thermogenesis, and lipid metabolism. Brain energy metabolism may also be, in part, regulated by the interaction between PGC-1 alpha and PPARs. Because neurodegenerative diseases (Huntington’s Disease, Parkinson’s Disease, and amyotrophic lateral sclerosis), and bipolar disorder have been associated with dysregulated mitochondrial and brain energy metabolism, PGC-1 alpha may represent a druggable drug target for these conditions. The purpose of this presentation is to review brain energy metabolism, the physiology of PGC-1 alpha, PPARs, and the role of PPAR agonists to target PGC-1 alpha to treat neurodegenerative diseases and bipolar disorder. We also review clinical trials of repurposed anti-diabetic thiazolidines and anti-triglyceride fibrates (PPAR agonists) for neurodegenerative diseases and bipolar disorder. PGC-1 alpha and PPARs are innovative potential targets for bipolar disorder, and warrant future clinical trials.
Session 1: 11:00-11:15 am  
**New Treatment Approaches for Depression, PTSD and Schizophrenia**  
Lecture theatre 206  
**Chair: Dr Natalie Morrison**

**PILOT TRIAL OF HOME-ADMINISTERED TRANSCRANIAL DIRECT CURRENT STIMULATION FOR DEPRESSION**  
Nicola Ball  
University of New South Wales  
nicola.ball@student.unsw.edu.au

Nicola Ball ¹,², Joanna Fong ¹,², Colleen Loo ¹,³, Angelo Alonzo ¹,²  
¹- Black Dog Institute, Hospital Road, Randwick NSW. ²- School of Psychiatry, University of New South Wales, Hospital Road, Randwick NSW. ³- St George Hospital, Level 2, James Laws House, Gray St, Kogarah NSW

Background Depression is a debilitating and prevalent mood disorder. Current treatments including psychotherapy, pharmacotherapy and electroconvulsive therapy are not effective for all patients. Transcranial direct current stimulation (tDCS) is an emerging alternative treatment. tDCS increases the excitability of the left dorsolateral prefrontal cortex by transmitting a weak direct current into the brain via electrodes on the scalp. This pilot trial examines the feasibility, efficacy and safety of home-administered tDCS. Methods Participants must be experiencing a major depressive episode with a score >20 on the Montgomery–Åsberg Depression Rating Scale (MADRS). Participants self-administer 28 daily tDCS sessions at 2mA for 30 minutes, with the anode and cathode at F3 and F8 respectively (International 10-20 EEG system), followed by four weekly sessions. Responders to tDCS are offered maintenance treatment for up to six months. The study device and equipment has been designed for safe, consistent safe home-administered tDCS. Participants are remotely monitored via video link and an online treatment diary. Primary mood outcome is assessed at baseline, 2 weeks, and 4 weeks as well as at 1, 3, and 6-month follow-up. Preliminary results Of 19 participants who have completed the study to date, 16 have completed all tDCS sessions, indicating protocol feasibility. Preliminary efficacy data shows a significant reduction in MADRS scores from baseline to the end of the acute phase (t₁₈ = 3.305; p = 0.04). Side effects reported are comparable to clinic-based tDCS studies, with redness and a tingling sensation at the stimulation site most commonly reported. Conclusion This pilot trial presents a novel protocol for administration of tDCS for depression. Preliminary results indicate that home-administered tDCS is feasible, efficacious and safe.
Session 1: 11:15-11:30 am

HARNESSING INTERNET-DELIVERED AND TRANSDIAGNOSTIC TREATMENT APPROACHES TO ENHANCE THE MENTAL HEALTH AND COGNITIVE FUNCTIONING OF AUSTRALIANS WITH NEUROLOGICAL CONDITIONS.

Milena Gandy
Macquarie University
milena.gandy@mq.edu.au

Milena Gandy, Nick Titov, Sarah McDonald, Blake Dear eCentreClinic, Macquarie University.

Background: People with neurological conditions encounter significant practical barriers (cost, distance, stigma etc.) and significant service gaps (e.g., lack of services, trained clinicians) when trying to access treatment and support for their mental health and cognitive difficulties. Moreover, if they can access these treatments, most adults with neurological conditions only ever do so for either their mental health or cognitive functioning, potentially limiting the magnitude of benefit they receive. Methods: This study seeks to examine the acceptability, efficacy and feasibility of a new internet-delivered self-management program, the Wellbeing Neuro Course, to support the mental health and cognitive functioning of Australians with common neurological conditions (i.e., Multiple Sclerosis, Epilepsy, Parkinson’s Disease, Traumatic Brain Injury, Stroke) known to impact cognitive and emotional wellbeing. Participants will be provided access to the online 6 Lesson Course, which will be delivered over 10 weeks. The Course includes information about identifying symptoms of poor wellbeing, and teaches practical skills for their self-management including; managing thoughts, low mood and anxiety, problem solving, memory and attention, and activity and fatigue levels. Results: Preliminary data on the acceptability and efficacy of the Wellbeing Neuro Course will be presented. Clinical outcomes measures include disability (WHODAS 2.0), anxiety (GAD-7), depression (PHQ-9), fatigue (FSS) and cognitive difficulties (PDQ). Conclusion: This treatment program combines cognitive behavioural therapy and compensatory cognitive rehabilitation, traditionally offered in isolation, in order to target broader outcomes of disability. The findings may be interest to clinicians and researchers working with neurological patients, and transdiagnostic, or internet-delivered, treatments.
Introduction

Exposure to a traumatic event can lead to some people developing post-traumatic stress disorder (PTSD). Literature has indicated that PTSD negatively impacts cardiovascular and autonomic health among the veteran population, with little information about the general population. This is of significant concern as cardiovascular disease contributes to the highest number of mortalities in Australia and the world. This study utilised both blood pressure (BP) and heart rate variability (HRV) to measure and identify the associations that PTSD symptoms have on cardiac risk and autonomic activity respectively within the general population. BP and HRV are non-invasive tools used to assess cardiac autonomic activity. HRV distinguishes the activation of the two branches of the autonomic nervous system, sympathetic and parasympathetic divisions into low frequency (LF) and high frequency (HF) parameters respectively whereas the sympathovagal balance is represented by the LF:HF ratio. This study aims to identify associations between HRV parameters and PTSD symptomatology and associations between BP and PTSD symptomatology among the general population. Fifty-four participants (Males n=32, Females n=22) were recruited from the local community of Sydney in New South Wales. BP recordings were measured and a 10-minute electrocardiogram was obtained to derive HRV parameters. Questions adapted from the Lifestyle Appraisal Questionnaire (Craig, Hancock & Craig 1996) were administered to obtain lifestyle data. Furthermore, the Post-Traumatic Check List – Civilian (PCL) (Blanchard et al. 1996), Depression Anxiety and Stress Scale (DASS) (Lovibond & Lovibond 1995) and General Health Questionnaire (GHQ) (Goldberg 1978) were also completed by each participant. Preliminary data is currently being analysed to identify correlations between cardiac data and PTSD symptoms. The average data from the fifty-four participants aged 32.61 ± 12.95 identified a body mass index of 24.06 ± 3.35, 1.01 ± 1.81 stressful events in the past twelve months, pre-study systolic BP of 117.74 ± 13.32 mmHg and diastolic BP of 76.51 ± 9.22 mmHg. Data for HRV include an average HF and LF of 625.05 ± 669.32 ms2 and 917.55 ± 800.92 ms2 respectively, LF:HF ratio of 2.25 ± 1.9 and a total power of 2363.58 ± 1720.44 ms2. Questionnaire data all within normal range includes a PCL score of 29.92 ± 11.29, DASS scores for depression of 5.8 ± 8.88, anxiety of 5.5 ± 7.44 and stress of 9.3 ± 23.36 and finally a GHQ score of 9.3 ± 12.44. This study assesses the influence of PTSD symptoms on autonomic and cardiac health among the general population to ultimately reduce the burden of both cardiovascular disease and PTSD within society.
Session 1: 11:45-12:00 noon

IMPROVING THE CAPACITY OF AUSTRALIAN BASED COMMUNITY-BASED WORKERS TO PROVIDE ASSISTANCE TO IRAQI REFUGEES WITH MENTAL HEALTH PROBLEMS: AN UNCONTROLLED EVALUATION OF A MENTAL HEALTH LITERACY TRAINING COURSE

Gabriela Uribe
Western Sydney University
m.uribe@westernsydney.edu.au

Maria Gabriela Uribe Guajardo¹, Shameran Slewa-Younan¹, Betty Ann Kitchener², Haider Mannan¹, Yaser Mohammed³, Anthony Francis Jorm⁴.
1. School of Medicine, Western Sydney University, Sydney, Australia. 2. Mental Health First Aid Australia, Adjunct Professor at Deakin University. 3. Bankstown Community Mental Health Services and Ware St Medical & Dental Centre. 4. Melbourne School of Population and Global Health, University of Melbourne, Melbourne, Australia

Background Australia is a multicultural nation with a humanitarian program that welcomes a large number of Iraqi refugees. Despite the high prevalence of trauma related disorders, professional help-seeking in this group is very low. This study sought to evaluate a mental health literacy training (MHL) course that teaches how to provide initial help to Iraqi refugees with depression and PTSD related problems.

Methods An uncontrolled pre, post and follow-up design was used to measure improvement in mental health literacy (MHL) in community-based workers assisting Iraqi refugees. Results Eighty-six participants completed the baseline and post-training questionnaires. Forty-five completed all 3-time point questionnaires. Fifty six percent of participants were able to correctly recognised ‘PTSD’ as the problem depicted in a vignette before the training, and this increased to 77% after training and was maintained at follow-up with 82% correctly recognising the problem. Recognition of depression also increased from 69% at baseline to 83% after training and to 82% at follow-up. There were significant increases in perceived helpfulness of professional treatments for PTSD and depression across times. Significant changes on confidence in participants when helping an Iraqi refugee with PTSD and depression related problems were reported across times. A decrease on social distance mean scores associated with PTSD was also found.

Conclusion This training is a recommendable way to improve and better equipped staff on how to respond to mental health crises and offer mental health first aid in a culturally sensitive manner to Iraqi refugees.
Session 1: 12:00-12:15 pm

MENTAL HEALTH AND HELP-SEEKING BEHAVIOUR IN RESETTLED AFGHAN REFUGEES IN AUSTRALIA.
Shameran Slewa-Younan
Western Sydney University
s.slewa-younan@westernsydney.edu.au

S. Slewa-Younan1, A. Yaser1, M.G. Uribe Guajardo1, H. Mannan1, C. Smith1, J. Mond2.
1. Western Sydney University 2. University of Tasmania

Background: Psychological trauma, in particular, posttraumatic stress disorder (PTSD) and depression, are highly prevalent among resettled refugees. However, little is known regarding the mental health status and associated help-seeking behaviour of resettled Afghan refugees in Australia. Methods: A sample of 150 resettled Afghan refugees (74 males; mean age 32.8 years, SD = 12.2) living in Adelaide, South Australia were recruited. Self-reported measures of PTSD, depression, exposure to traumatic events, functional impairment, self-recognition of PTSD symptomatology and help-seeking behaviours were completed. Multivariate analysis of variables associated with help-seeking was conducted. Results: Forty-four percent of participants met criteria for clinically significant PTSD symptoms and all but one participant reported being exposed to 1 or more traumatic and/or conflict related events, such as ‘losing your property and wealth’. Moreover, 14.7% of participants had symptoms suggestive of clinically significant depression. General practitioners were the most common source of help in relation to mental health problems, with very few participants (4.6%) seeking help from specialist trauma and torture mental health services. Self-recognition of having a PTSD related mental health problem and functional impairment levels were both found to be independent predictors of help-seeking (p = <.05). Conclusions: The findings provide further evidence for high rates of PTSD symptomatology and low uptake of mental care among resettled refugees. Poor self-recognition of the presence and/or adverse impact of PTSD symptoms may need to be targeted in mental health promotion programs designed to improve “mental health literacy” and thereby promote early and appropriate help-seeking where this is needed.
B-VITAMINS AS AN ADJUNCTIVE TREATMENT FOR SCHIZOPHRENIA: FINDINGS FROM A META-ANALYSIS OF RCTS.

Joseph Firth
Western Sydney University
j.firth@westernsydney.edu.au

Joseph Firth NICM, School of Health and Science, University of Western Sydney Jerome Sarris NICM, School of Health and Science, University of Western Sydney

Background and Aims: When used as an adjunctive with antipsychotics, certain vitamins and minerals may be effective for improving symptomatic outcomes of schizophrenia, by restoring nutritional deficits, reducing oxidative stress, or modulating implicated neurological pathways. In this study, we aimed to use meta-analytic techniques in order to examine the effectiveness of each vitamin/mineral trialled in patients with schizophrenia to date. Method: We conducted a systematic review of all randomized controlled trials (RCTs) reporting effects of vitamin and/or mineral supplements on psychiatric symptoms in people with schizophrenia. Random-effects meta-analyses were used to calculate the standardized mean difference between nutrient and placebo treatments. Meta-regressions were used to examine putative factors which may influence treatment effectiveness. Results: An electronic database search in July 2016 identified 18 eligible RCTs, with outcome data for 832 patients. There were no overall effects from antioxidant vitamins, inositol or dietary minerals on psychiatric symptoms. However, subgroup analyses showed that vitamin B treatments (including B6, B8 and B12) reduced psychiatric symptoms significantly more than control conditions \( g = 0.508, 95\% \text{ confidence interval (CI)} 0.01–1.01, p = 0.047, I^2 = 72.3\% \). Similar effects were observed among vitamin B RCTs which used intention-to-treat analyses \( g = 0.734, 95\% \text{ CI 0.00–1.49, p =0.051} \). However, no effects of B vitamins were observed in individual domains of positive and negative symptoms (both \( p > 0.1 \)). Meta-regression analyses showed that shorter illness duration was associated with greater vitamin B effectiveness \( p = 0.001 \). Discussion: Our meta-analysis provides preliminary evidence that certain b-vitamins may provide effective adjunctive treatment in the treatment of schizophrenia. In this talk, we shall discuss how the effects of b-vitamins in schizophrenia may relate to nutritional deficiencies in this population, along with presenting further, more recent meta-analytic evidence supporting the case for early intervention using b-vitamin treatments.
Session 2: 11:00-11:15 am  
**Neurodegeneration**  
Lecture theatre 213  
**Chair:** Prof Gerald Münch  

**STRATEGIC VALUE-DIRECTED LEARNING AND MEMORY IN ALZHEIMER’S DISEASE AND BEHAVIOURAL-VARIANT FRONOTEMPORAL DEMENTIA**  
**Stephanie Wong**  
University of Sydney  
stephanie.wong@sydney.edu.au  

Stephanie Wong (University of Sydney), Muireann Irish (University of Sydney), Greg Savage (Macquarie University), John R. Hodges (University of Sydney), Olivier Piguet (University of Sydney) & Michael Hornberger (University of East Anglia)  

In healthy adults, the ability to prioritize learning of highly valued information is supported by executive functions, and enhances subsequent memory retrieval for this information. In Alzheimer’s disease (AD) and behavioural-variant frontotemporal dementia (bvFTD), marked deficits are evident in learning and memory, presenting in the context of executive dysfunction. It is unclear if these patients show a typical memory bias for higher valued stimuli. We administered a value-directed word-list learning task to AD (n=10) and bvFTD (n=21) patients and age-matched healthy controls (n=22). Each word was assigned a low, medium or high point value and participants were instructed to maximize the number of points earned across three learning trials. Participants’ memory for the words was assessed on a delayed recall trial, followed by a recognition test for the words and corresponding point values. Relative to controls, both patient groups showed poorer overall learning, delayed recall and recognition. Despite these impairments, AD patients preferentially recalled high-value words on learning trials, and showed significant value-directed enhancement of recognition memory for the words and points. Conversely, bvFTD patients did not prioritize recall of high-value words during learning trials, and this reduced selectivity was related to inhibitory dysfunction. Nonetheless, bvFTD patients showed value-directed enhancement of recognition memory for the point values, suggesting a mismatch between memory of high-value information and the ability to apply this in a motivationally salient context. Our findings demonstrate that value-directed enhancement of memory may persist to some degree in patients with dementia, despite pronounced deficits in learning and memory.
BEYOND LANGUAGE: FACIAL IDENTITY AND AFFECT PROCESSING IN PROGRESSIVE NONFLUENT APHASIA.

Rosalind Hutchings
University of Sydney
rosalind.hutchings@sydney.edu.au

Hutchings, Rosalind 1,2 Piguet, Olivier 1,2 Kumfor, Fiona 1,2 1 School of Psychology and Brain and Mind Centre, The University of Sydney, NSW, Australia 2 ARC Centre of Excellence in Cognition and its Disorders, Sydney, NSW, Australia

The ability to recognise and interpret facial cues is integral to social communication. Substantial evidence exists for the contribution of both ‘core’ (e.g., occipito-temporal) and ‘extended’ (e.g., fronto-temporal) systems to face processing. However, debate remains regarding how these systems interact and influence performance. Progressive nonfluent aphasia (PNFA) is a younger-onset dementia syndrome, characterised by expressive language impairments. However, growing evidence suggests emotion processing is also abnormal in PNFA. These patients have relatively focal brain atrophy including the inferior frontal gyrus and insula, regions that form part of the extended network for processing facial emotions. Here, we aimed to investigate the extent that a breakdown in the extended system disrupts discrete aspects of facial affect and identity processing in this group. Twenty-two PNFA participants and 32 healthy, age-matched controls were assessed on four tasks of face processing, including: (i) affect discrimination, (ii) affect selection, (iii) identity discrimination and (iv) identity recognition. Relative to controls, PNFA patients performed significantly worse across all tasks (all ps < 0.05). However, at an individual level multiple patients showed clear dissociations in performance on affect and identity tasks. Our results reveal that despite relative sparing of ‘core’ face processing regions in PNFA, this group has significant deficits across both affect and identity processing. Interestingly, dissociations observed at an individual level suggest specific regions of atrophy might differentially affect performance. Further neuroimaging analyses will examine the relationship between performance and degradation of the face processing network in this syndrome. Overall, this study supports the argument for a feedback-style network underlying face processing, where a breakdown in any part of this network can have pervasive ramifications on the ability to process and interpret facial cues.
CHARACTERISATION OF A NOVEL APOLIPOPROTEIN-D TETRAMER

Claudia Kielkopf
University of Wollongong
csk676@uowmail.edu.au

Claudia S. Kielkopf (1,2), Brett Garner (1,2), Simon H.J. Brown (1,2) 1. School of Biology, University of Wollongong, Wollongong, NSW, Australia 2. Illawarra Health and Medical Research Institute, Wollongong, NSW, Australia

Human apolipoprotein-D (apoD) is a glycosylated lipocalin of 25 kDa and has a protective role in Alzheimer’s disease (AD) pathology. In an AD mouse model, apoD overexpression reduces amyloid-β burden and alters amyloid precursor protein cleavage. Adopting a lipocalin-fold with an eight-stranded β-barrel and adjacent α-helix, apoD binds and transports a range of small hydrophobic ligands such as progesterone and arachidonic acid (AA). Thereby, apoD regulates the levels of pro-inflammatory AA-derived eicosanoids and toxic peroxidised lipids that contribute to oxidative stress in AD. Furthermore, apoD directly reduces peroxidised lipids via a conserved methionine residue leading to apoD dimerisation. Whereas in other lipocalins oligomerisation is important for function and ligand binding, apoD is assumed to exist as monomer. To investigate if apoD forms oligomers, we examined the oligomeric state of apoD in three apoD-containing human fluids: Breast cyst fluid (BCF), CSF and plasma. Whereas in plasma, apoD is associated with high-density lipoprotein, apoD in BCF and CSF is present as multimeric species. Thorough characterisation of apoD oligomerisation was undertaken using apoD purified from BCF. Size exclusion chromatography, blue-native PAGE, protein crosslinking and analytical ultracentrifugation show that apoD forms a ~100 kDa-tetramer. This novel apoD tetramer is stable but dissociates to monomers upon high dilution. Small-angle X-Ray scattering confirms these findings and provides low-resolution structural data for modelling the apoD tetramer utilising the published crystal structure. Together, our experiments challenge the view of apoD as monomer and provide new insights into apoD structure and oligomerisation that may be linked to its protective function in AD.
EFFECT OF CBD ON TRANSGENIC MOUSE MODELS OF ALZHEIMER’S DISEASE

Georgia Watt
Western Sydney University
18568716@student.westsydney.edu.au

Georgia Watt1, Kani Shang2, Hongyun Li4,5, Brett Garner4,5 and Tim Karl1,2,3 1-University of Western Sydney; 2-Neuroscience Research Australia; 3-University of New South Wales; 4-University of Wollongong; 5-Illawarra Health and Medical Research Institute

Background: In Alzheimer’s disease (AD) pathological brain changes include the accumulation of amyloid-β (Aβ) and tau hyperphosphorylation causing neurodegeneration, neuroinflammation and oxidative stress. Current AD treatments do not stop or reverse the disease progression, highlighting the need for more effective therapeutic alternatives. The non-psychoactive phytocannabinoid cannabidiol (CBD) has demonstrated anti-oxidant, anti-inflammatory and neuroprotective properties. Furthermore, chronic CBD treatment (20 mg/kg) has been shown to reverse social recognition memory deficits in an established mouse model for AD (i.e. APPxPS1 transgenic mice). The current project aimed to determine the effect of 50 mg/kg CBD in APPxPS1 mice. Methods: Male APPxPS1 transgenic mice at 12 months of age were treated with CBD (50 mg/kg CBD, daily intraperitoneal injections) starting 3 weeks prior to behavioural testing (WT-VEH n = 10; WT-CBD n = 11; APPxPS1-VEH n = 10; APPxPS1-CBD n = 8). A variety of cognitive domains including object and social recognition memory, spatial memory, and fear-associated memory were evaluated following the initial treatment period. After behavioural test completion, brain tissue was collected and soluble and insoluble Aβ40 and Aβ42 levels were analysed by ELISA as a marker for AD brain pathology. Results: Vehicle treated male APPxPS1 mice demonstrated impaired social recognition memory and impaired reversal learning in the cheeseboard task. These deficits were absent in AD mice undergoing CBD treatment. The ELISA results indicated that soluble Aβ42 levels were not affected by CBD treatment. However, there was a trend for CBD to reduce insoluble Aβ40 levels in the hippocampus in APPxPS1 mice. Conclusions: This study investigated the therapeutic-like effects of 50 mg/kg CBD on cognition and brain pathology of APPxPS1 transgenic males. Chronic CBD treatment could reverse deficits in social recognition memory and spatial learning in the cheeseboard task. Furthermore, CBD treatment trended to reduce insoluble Aβ40 levels in the hippocampus.
UNDERSTANDING ALZHEIMER’S DISEASE PATHOGENESIS USING ABCA7 KNOCKOUT MOUSE

Woojin S. Kim
University of Sydney
woojin.kim@sydney.edu.au

Woojin S. Kim Brain and Mind Centre, Sydney Medical School, The University of Sydney, Camperdown, NSW 2050

ATP-binding cassette A7 (ABCA7) is a strong risk factor for late-onset Alzheimer’s disease (AD). ABCA7 belongs to a group of transporter genes that specializes in regulating lipid transport in the periphery as well as in the brain. ABCA7 has been implicated in a number of roles relating to AD pathology, including phagocytic clearance of amyloid-β peptides. However, the biological role of ABCA7 in AD brain pathogenesis is unclear. We have discovered that deletion of ABCA7 in mouse causes a dramatic reduction in white adipose tissue (WAT) in female knockout mice. WAT is important in AD context because it is the primary producer of leptin, which is a hormone that is known to modulate AD neuropathology. Our transcription analysis revealed that lipin-1 expression was significantly upregulated in female knockout mice, indicating that ABCA7 affects WAT development. The circulating leptin level was significantly reduced in female knockout mice without any change in WAT leptin mRNA or protein expression, indicating that ABCA7 does not affect leptin production, but alters the circulating leptin level indirectly by affecting WAT development. Insulin is a key hormone that regulates WAT development, i.e. adipogenesis, and it was significantly reduced in female knockout mice. These data when put together suggest that ABCA7 plays a role in regulating WAT development and consequently circulating leptin levels, and that ABCA7 affects multiple pathways impacting AD pathology.
NEURODEGENERATION IN ATAXIA TELANGIECTASIA IS DRIVEN BY ACCUMULATION OF CYTOSOLIC DNA AND NEUROINFLAMMATION

Tara Roberts
Western Sydney University
Tara.Roberts@westernsydney.edu.au

Tara L. Roberts 1. The Ingham Institute for Applied Medical Research, School of Medicine, Western Sydney University, Liverpool, New South Wales, Australia. 2. The University of Queensland Centre for Clinical Research, Herston, Queensland, Australia

Loss of the protein Ataxia Telangiectasia Mutated (ATM) in humans leads to development of the disease Ataxia Telangiectasia (A-T). A-T is characterised by progressive neurodegeneration, increased cancer risk and radiosensitivity. ATM plays a central role in a variety of cellular processes including cell cycle control, DNA repair, RNA transcription, protein translation and apoptosis. ATM is a protein kinase that is activated by alterations to chromatin structure, DNA double strand breaks and oxidative stress. Despite an extensive understanding of how ATM responds to DNA damage; how loss of ATM leads to neurodegeneration has been poorly understood. Understanding this biology was severely hampered by the fact that Atm knockout mice do not show neurodegenerative phenotypes. Here we describe an Atm knockout rat model that displays neurodegenerative features reminiscent of that seen in mild forms of A-T. Rats lacking ATM had significant loss of motor neurons and microgliosis in the spinal cord, consistent with onset of paralysis. Loss of Atm in neurons lead to high levels of unrepaired DNA damage and subsequent accumulation of cytosolic DNA. Small fragments of DNA in the cytoplasm of cells can activate innate immune pathways which are usually responsible for the detection of viral or bacterial infection. The significant levels of cytosolic DNA in Atm-deficient cells caused activation of the cGAS-STING pathway leading to neuroinflammation. By treating rats with the anti-inflammatory drug, betamethasone, we could ameliorate this neuroinflammation and the development of paralysis in Atm knockout rats. We are now moving on to examine the role of the microbiome in regulation of systemic and central nervous system associated inflammation.
Plenary Speaker

Dr Jess Nithianantharajah
University of Melbourne

Chair: A/Prof Tim Karl
2:30-3:30 pm
Thursday 14 Sept 2017
Lecture theatre 206

SYNAPSES, COGNITION AND DISEASE

ABSTRACT

Sensory information from the environment is ultimately processed at the level of synapses, the connection between neurons that form the most fundamental information-processing units in the nervous system. In recent years, human genetic studies have increasingly highlighted that many of the mutations implicated in cognitive disorders converge upon genes associated with the synapse. However, very little is known about the genetic basis of distinct aspects of higher cognitive functions such as complex forms of learning and memory, attention and executive functions that are commonly impaired in disorders. Moreover, modelling these complex cognitive processes that are assessed in the clinical setting has been challenging in animal models. Bridging the gap between mouse and human cognitive testing, the recently developed touchscreen methodology provides an innovative tool for assessing higher cognitive functions in rodents. Employing this technology, our recent studies have begun to dissect the functional role of postsynaptic genes in complex cognition in both mice and humans. Our approach aims to aid our understanding of the genetic basis of these different aspects of cognition, and has significant implications for how we address translation from animal models to the clinic.
Session 3: 3:30-3:45 pm  
**Parkinson's**  
Lecture theatre 206  
**Chair:** A/Prof Kay Double

**ALTERATIONS IN BIOMETALS AND METALLOPROTEINS IN THE SOLUBLE FRACTION OF THE PARKINSON’S DISEASE BRAIN**  
**Sian Genoud**  
University of Sydney  
sgen8508@uni.sydney.edu.au

Genoud S, Roberts, BR, Gunn A, Halliday GM, Lewis SJG, Ball HJ, Hare, DJ and Double, KL  
Brain and Mind Centre, University of Sydney  
The Florey Institute, University of Melbourne  
Elemental Bio-imaging Facility, University of Technology Sydney

Alterations in essential biometals characterise vulnerable regions of the Parkinson’s disease (PD) brain and are hypothesised to reflect disease-associated degenerative pathways. The current study employed degenerating and non-degenerating regions of the PD brain (n=8) and age-matched controls (n=8) to perform a bulk metal analysis through Inductively Coupled Plasma-Mass Spectrometry (ICP-MS). Consistent with previous reports, we identified a marked Cu reduction (54% decrease, \( p=0.001 \)) and an elevation in Fe (105% increase; \( p=0.0005 \) respectively) in the degenerating substantia nigra of the PD brain. Further, we found these changes were confined to the soluble tissue fraction (71% Cu decrease; \( p<0.05 \); 77% Fe increase; \( p=0.03 \) respectively), rather than the membrane or insoluble tissue fractions. As biometals are essential cofactors for numerous metalloproteins, we employed Size Exclusion Chromatography hyphenated with ICP-MS to perform a global metalloproteomic analysis. Confined to the molecular mass corresponding to the protein standard for metallothionein, a significant decrease in Cu- and increase in Zn-associated proteins was identified (-18% and +37% respectively, \( p<0.001 \)). A significant increase in Zn-associated, but not Cu-associated protein was also identified at the molecular mass corresponding to the protein standard for superoxide dismutase 1(SOD1; +30%, \( p=0.004 \)). We have previously reported increases in SOD1 protein levels in the substantia nigra in PD thus we posit this increased SOD1 pool is adequately metallated with Zn but not Cu, as Cu-associated SOD1 levels remained unchanged. We propose that Cu-deficient SOD1 may contribute to neuronal vulnerability in this degenerating region.
Vulnerable neuronal populations across all major neurodegenerative disorders share common pathological changes, including substantial changes in the levels of transition metals (Cu, Zn, Fe), increases in oxidative stress and abnormal protein aggregation. We have recently identified substantial accumulation of misfolded, dysfunctional superoxide dismutase 1 (SOD1) protein in degenerating regions of the Parkinson’s disease brain, distinct from characteristic synucleinopathy in these brain regions, which is highly correlated with neuronal loss and α-synuclein deposition. Similarities identified between this novel SOD1 proteinopathy and well-documented neurotoxic SOD1 proteinopathy in familial amyotrophic lateral sclerosis (fALS) suggest SOD1 is copper-deficient in degenerating Parkinson’s disease brain regions, where intraneuronal copper is reduced, and redox-active iron and oxidative stress are elevated. Our data, combined with the large body of data regarding SOD1 dysfunction in fALS, indicates that the combined influence of these factors promotes synergistic loss- and gain-of-SOD1 protein function in these brain regions, which likely contributes to neuronal degeneration. The similarities between SOD1 proteinopathy in both disorder indicates shared mechanisms of neurodegeneration, which may explain the common clinical co-occurrence of ALS and parkinsonism in some populations (Papua, Guam and Kii) and why up to 17% of ALS patients present with clinical parkinsonism and mild-moderate SNc denervation. An understanding of the mechanisms leading to the deposition of SOD1 proteinopathy in Parkinson’s disease may reveal new targets for neuroprotective therapies, based on those already in clinical trials for fALS.
Session 3: 4:00-4:15 pm

NEUROTOXICITY OF THE CYANOTOXIN BMAA THROUGH AXONAL DEGENERATION AND INTERCELLULAR SPREADING

Gilles J Guillemin
Macquarie University
gilles.guillemin@mq.edu.au

Vanessa X Tan¹,², Benjamin Lassus², Chai K Lim¹, Philippe Tixador², Josquin Courte², Alban Bessedè³, Gilles J Guillemin¹* & Jean-Michel Peyrin²*
1- Macquarie University Centre for MND Research, 2- UPMC, Paris, France 3- Immusmol, Pessac, France

β-methylamino-L-alanine (BMAA) is implicated in neurodegeneration and neurotoxicity, particularly in ALS-Parkinson Dementia Complex. BMAA neurotoxic properties have been partly elucidated, while its transcellular spreading capacity have not been examined. Using reconstructed neuronal networks in microfluidic chips, separating neuronal cells into two subcompartments, 1) the proximal, containing first order neuronal soma and dendrites, and 2) a distal compartment, containing either only axons originating from first order neurons or second order striatal neurons, creating a cortico-striatal network. Using this system, we investigated the toxicity and spreading of BMAA in murine primary neurons. We used a newly developed antibody to detect BMAA in cells. After treatment with 10 µM BMAA, the cyanotoxin was incorporated in first-degree neurons. We also observed a rapid trans-neuronal spread of BMAA to unexposed second-degree neurons in 48h, followed by axonal degeneration, without limited somatic death. This in vitro study demonstrates BMAA axonal toxicity at sub-lethal concentrations and, for the first time, the transcellular spreading abilities of BMAA. This neuronal dying forward spread that could possibly be associated with progression of some neurodegenerative diseases especially amyotrophic lateral sclerosis.
THE EFFECTS OF TONIC MUSCLE PAIN ON FUSIMOTOR CONTROL DURING VOLUNTARY CONTRACTIONS

Alex Burton
NeuRA/Western Sydney University
a.burton@westernsydney.edu.au

Lyndon J. Smith¹, Vaughan G. Macefield¹,²,³, Ingvars Birznieks² and Alexander R. Burton¹,²
¹School of Medicine, University of Western Sydney, NSW 1797, Australia
²Neuroscience Research Australia and University of New South Wales, Sydney, NSW 2031, Australia
³College of Medicine, Mohammed Bin Rashid University of Medicine and Health Sciences, Dubai, UA

Animal studies have revealed that nociceptors can excite fusimotor neurones and thereby change the sensitivity of muscle spindles to stretch; such nociceptive reflexes have been suggested to underlie the mechanisms that lead to chronic musculoskeletal pain syndromes. However, the validity of the “vicious cycle” hypothesis in humans has yielded contrasting results to that found in animals. Given spindle firing rates are generally much lower in humans than in animals, it is possible that some of the discrepancies between human experimental data and those obtained in anaesthetised animals could be explained by differences in background fusimotor drive when the leg muscles are relaxed. This study examined the effects of tonic muscle pain during Recordings were obtained from 14 single fusimotor driven muscle spindle afferents (6 primary, 8 secondary) during intramuscular infusion of hypertonic saline. We did not observe any statistically significant increases in muscle spindle nerve activity during hypertonic saline induced tonic pain. Furthermore, a subjects capacity to maintain a constant level of force, while relying on proprioceptive feedback in the absence of visual feedback, was not compromised during tonic pain.
THE EFFECTS OF REPEAT INTRAMUSCULAR ADMINISTRATION OF NGF: A MODEL FOR BETTER PAIN MANAGEMENT

James Dunn
Western Sydney University
James.Dunn@westernsydney.edu.au

James S. Dunn Western Sydney University, Australia. Saad S. Nagi Linköping University, Sweden Peter J. Shortland Western Sydney University, Australia. David A. Mahns Western Sydney University, Australia

It has been shown that intramuscular administration of recombinant β-Nerve Growth factor (NGF) in healthy human volunteers result in a localized, prolonged mechanical and thermal hypersensitivity. In this study, we aimed to observe the ipsilateral effects in addition to the potential contralateral and remote impacts of this intervention, to examine the viability of NGF administration as an experimental model of diffuse chronic painful neuropathy. Recombinant β-NGF (3x5µg at Day 0, 2 and 4) was administered into the flexor carpi ulnaris (FCU) muscle of 11 healthy volunteers. On Day 0, 7 and 14 Pressure Pain Thresholds (PPT) and thermal sensory thresholds were obtained for the area overlying both FCU muscles (ipsilateral and contralateral effects) and both tibialis anterior (TA) muscles (remote effects). Additionally, through microneurography, the ipsilateral ulnar nerve was stimulated at 70-80% of an identified motor threshold on Day 7. During this sub-threshold stimulation subjects reported their pain/discomfort levels on a Visual Analogue Scale (VAS). The repeated intramuscular injections of NGF resulted in the formation of a localized pressure pain allodynia and cold-based thermal hyperalgesia. PPT and cold pain sensory thresholds were significantly elevated at both Day 7 and 14 on the ipsilateral FCU; however, no significant difference was observed across the other test sites. Microstimulation was successfully accomplished in 8 of the 11 subjects, with these subjects reporting a transient pain increase in pain/discomfort time-locked with the stimulation train, which contrasts to the non-perceptual nature of this stimulation in normal subjects. The observation of an ipsilaterally constrained hypersensitivity in the NGF model suggests it’s usefulness to mimic diffuse pain disorders such as fibromyalgia is limited. The percept evoked from microstimulation indicates a sensitized output from the muscle spindles to the CNS. The findings from this study are to be used as a control in a drug-crossover trial examining the effectiveness of minocycline in the treatment of the induced hypersensitivity.
Session 4: 4:00-4.15 pm

THE NATURE OF THE INFLAMMATORY RESPONSE TO SPINAL CORD INJURY DIFFERS SIGNIFICANTLY BETWEEN ADULT AND INFANT RATS

Theresa Sutherland
University of Technology Sydney
theresa.c.sutherland@student.uts.edu.au

Theresa Sutherland, Bronwyn O'Brien, & Catherine Gorrie School of Life Sciences, University of Technology Sydney

Background: Spinal cord injury (SCI) is a complex and devastating condition that results in life-long dysfunction including loss of mobility and sensory deficits. Currently there is no cure for SCI, and no proven treatment in the acute phases of SCI. The tissue damage can progress through a series of secondary injury cascades with the immune system and inflammatory response playing a significant role. While the mechanical properties of the spinal column and spinal cord during development have been well documented, less research has focused on age related differences in the inflammatory response following spinal cord injury. Using a rat model of SCI we have previously shown a decreased inflammatory response in infants compared to adults using immunohistochemistry. We now investigate the inflammatory cells and cytokines after SCI using flow cytometry and multiplex ELISA.

Methods: A mild contusion SCI was surgically induced using a NYU impactor in adult (10 weeks of age) and infant (P7-9) Sprague-Dawley rats (n=98). The animals were euthanased at 1hr, 24hrs and 1wk post-injury and the spinal cord tissue removed. Spinal cells were assessed using flow cytometry to quantitate different phenotypes of macrophages, neutrophils and T-lymphocytes within the injured tissue and multiplex cytokine ELISA on the tissue supernatant.

Results: The results of this study demonstrated significant differences in the nature and progression of both the cellular and molecular inflammatory response between infants and adults. This manifested as greater leukocyte numbers in the injured adult cord than the infants and also higher M1-like than M2-like macrophage percentages of the total leukocyte population at all time points. This trend was reversed in the infants. At 1 week post injury the injured adult spinal cords had a 9 fold increase in M1-like cells and the infants showed a 13 fold increase in M2-like. Neutrophils peaked at 24hrs in both age groups but were present in higher numbers in the adults. T-lymphocytes were highest at 24 hrs in the adults and 1 hr in the infants. Prominent pro-inflammatory cytokine expression (IL-1α, β, IL-6, IL-12) was higher and more sustained in the adults than the infants, while the infants showed a steady increase in IL-4 and IL-13 as well as sustained IL-10 expression.

Conclusions: The results of this study re-enforce our previous studies suggesting the inflammatory response is significantly different in developing and mature spinal cords; the infant response appears more balanced and potentially more beneficial to injury resolution than that displayed by the adults. If the adult responses could be manipulated to resemble the infants this may hold great therapeutic potential for patients of all ages, however greater exploration into the mechanisms behind these observed differences is required.
SELF-REFLECTION AND EMOTIONAL DISTRESS

Andy Hall
Macquarie University
andy.hall@mq.edu.au

Andy Hall, Centre for Emotional Health, Macquarie University

This study psychometrically examines six conceptualised individual differences related to self-reflection or to motivation for self-reflection as well as their relations to various indexes of psychological adjustment. There is no scale that operationalises all of the cognitive or motivational differences that the literature suggests may be important for differentiating adaptive and maladaptive patterns of self-reflection. The need for it is most notably indicated by the well-known self-reflection paradox. The paradox relates to existing scales designed to be sensitive to hypothesised adaptive patterns of self-reflection. The most elaborate conceptualisation of such a pattern that any of these scales operationalises is a moderate amount of self-reflection motivated by need for self-knowledge rather than by perceived threat, loss, or injustice to the self (distress-response). The paradox is that such scales are reliably linearly related to greater self-knowledge but, surprisingly, to worse emotional health. Although correlational research cannot show causality, this counter-theoretical set of findings suggests that any more than a little amount of self-reflection over time may be emotionally detrimental. A radical implication of this suggestion for clinical and counselling psychology is that any insight-oriented technique encouraging in patients the tendency to self-reflect might exacerbate rather than alleviate emotional distress. To address the paradox, other scales have been devised incorporating individual differences that the former scales, it is argued, either do not tap or unwittingly confound. Concerning cognitive differences other than amount, these include the ease or difficulty in disengaging from self-reflection when desired (flexibility) and the evaluative valence of the content of self-reflection. Regarding motivation other than need for self-knowledge and distress-response, a third difference is need for absolute self-knowledge. By this is meant the unlikely goal of a completely objective and definitive self-understanding, rather than an understanding that is at least in some respects subjective and incomplete. Taken together, theories suggest that self-reflection is maximally-adaptive when it is of moderate amount, flexible, not negatively-biased, and motivated not by distress but by need for self-knowledge not intended as rigidly absolute.
Session 4: 5:00-5:15 pm

SENSING YOURSELF: THE EFFECT OF INTEROCEPTION ON EMOTION RECOGNITION IN AGEING.

Jessica L. Hazelton  
University of Sydney  
jessica.hazelton@sydney.edu.au

Jessica L. Hazelton 1, 2; Fiona Kumfor 1, 2, 3  
1. The University of Sydney, School of Psychology, Sydney, NSW, Australia  
2. The University of Sydney, Brain & Mind Centre, Sydney, NSW, Australia  
3. ARC Centre of Excellence in Cognition and its Disorders, Sydney, NSW, Australia

Introduction: Interoception, the awareness of one’s own physiological state, has been linked to the experience of emotions. Previous studies, however, have not formally tested whether recognition of others’ emotional states is causally influenced by interoception. In addition, although evidence suggests that both emotion recognition and interoceptive ability decline with age, how these domains interact has been unexplored.

Methods: Thirty-seven healthy participants (25 younger: aged 21-38; 12 older: aged 55-75) completed an emotion recognition task immediately after three conditions, where interoceptive focus was manipulated within-subjects. In each condition, participants responded via button-press each time they: 1) detected their own heartbeat, without external cues (Cardiac Condition); 2) detected their breaths’ peak inhalation (Respiration Condition); and 3) heard a recorded heartbeat (Control Condition). Then, for the emotion recognition task pictures of emotional faces were displayed for 3 seconds, and participants selected a label that best matched the expressed emotion (happy, sad, anger, fear, disgust, neutral). Each emotion was displayed as a static image at varying intensities (50%, 75%, and 100%).

Results: Interestingly, both participant groups showed improved emotion recognition following cardiac and respiratory interoception compared to the control condition (all p < .01). Additionally, although both younger and older adults showed worse emotion recognition performance at lower intensities (p < .001), older participants performed significantly worse than younger participants at 50% intensity (p = .005), indicating that older adults have more difficulty recognising ambiguous emotions, irrespective of the preceding interoceptive condition.

Conclusion: This study reveals evidence for transient changes in emotion recognition capacity following a period of interoceptive awareness, irrespective of age. Future research should consider simultaneous physiological measurements (e.g., heart and respiration rate) to investigate how accuracy in detecting bodily states is related to the perception of emotion in others and whether this is influenced by age.
Session 4: 5:15-5:30 pm

TOWARDS EQUIVALENT INHIBITORY TASKS IN ERP AND FMRI CONTEXTS

Janette Smith
University of New South Wales
janette.smith@unsw.edu.au

Janette L Smith, National Drug and Alcohol Research Centre, University of New South Wales
Sharna Jamadar, Monash Institute of Cognitive and Clinical Neurosciences, Monash University

The Go/NoGo task has been used for decades to investigate inhibitory capacity in healthy adult controls as well as developmental changes across the lifespan, and in disorders such as Attention-Deficit/Hyperactivity Disorder, substance abuse, and schizophrenia. Because the successful inhibition of a response produces little to quantify behaviourally, neuroscientific techniques such as event-related potentials (ERPs) and functional magnetic resonance imaging (fMRI) have been used to gain understanding of these covert processes. fMRI techniques often require a slower presentation of stimuli (about 1 every 3-4 seconds) due to the slow nature of the BOLD response, in comparison to many ERP studies which have a faster presentation rate (about 1 every second). However, recent research has shown that a slow presentation rate makes the task very easy and fails to tax the inhibitory processes of interest. In this study, we investigate three sets of feedback parameters designed to be used with a slow (fMRI-like) presentation rate, but to elicit inhibitory processing more similar to a fast (ERP-like) presentation rate. Data collection is underway, with data from 80% of the planned sample to be presented at the conference. Analyses will focus on reaction time and error rate, as well as the N2 and P3 components of the event-related potential; the outcome of the study will be guidelines concerning feedback parameters for fMRI researchers to ensure that they sufficiently tax inhibitory capacity in studies designed to measure this construct.
Rapid Changes in Behavioural Control During Discrimination Learning and Reversal

Thomas Burton
University of Sydney
thomas.burton@sydney.edu.au

Thomas J Burton & Atomu Sawatari Discipline of Physiology, School of Medical Sciences, The University of Sydney.

Learning the relationships between events and the environmental cues that predict them is a fundamental process allowing organisms to make effective decisions that maximise prospects of survival, prosperity and procreation. There are multiple neural systems that are thought to control to action selection during the decision making process. Little is known about how these systems operate and integrate with each other, especially when one considers the complex scenarios under which decisions are often experienced. Using the IntelliCage system, we have developed an automated means of assessing a range of cognitive processes in the home cage of group-housed mice. In one experiment, groups of adult male C57BL/6 mice were co-housed in IntelliCages and obtained their drinking water via engaging in a visual cue discrimination task. Once an animal reached acquisition criterion the task contingencies were changed in the style of a rule reversal. This approach allows for the acquisition of rich individual data profiles for discrimination learning, decision making and cognitive flexibility in mice. Detailed change point analysis executed on individual cumulative records of performance and behaviour revealed that mice consistently exhibit distinct phases of behavioural control over action selection during the acquisition and reversal of the discrimination task (p<0.0001). Furthermore, transitions between these phases appear to be abrupt in nature, indicating rapid adjustments in decision strategies. Future experiments will investigate whether these behavioural observations reflect rapid shifts within or between neural systems controlling the decision making process. This novel approach allows for a novel and highly detailed examination of the evolution of mouse choice behaviour across entire epochs of discrimination learning and adaptation to change in complex and naturalistic scenarios.
Session 6: 5:00-5:15 pm

ELECTRONIC CIGARETTE USE DURING MATERNAL PREGNANCY SHOWED BEHAVIOURAL AND EPIGENETIC CHANGES IN THE ADULT MALE OFFSPRING

Tara Nguyen
University of Technology Sydney
tara.nguyen@student.uts.edu.au

Electronic cigarettes (e-cigarettes) are battery-powered devices that convert an oily-flavoured liquid into a vapour. Many people are using e-cigarettes for the delivery of nicotine in replacement of tobacco cigarettes. There is a perception that electronic cigarettes are less harmful than tobacco cigarettes and pregnant woman may decide to use e-cigarettes during their pregnancy as an alternative to smoking tobacco cigarettes. However, there is no evidence that this is a safe alternative as we do not yet know if there are any effects of e-cigarettes in offspring after maternal vaping. The current study investigates the effects of e-cigarettes on offspring after maternal vaping using a mice model. Female Balb/c mice were exposed to cigarette smoke and/or tobacco flavoured e-cigarette vapour prior and during pregnancy until the offspring were weaned at postnatal day (PD) 20. Male offspring were studied at PD1 and postnatal week 13 (P13). Treatment groups were as followed; ambient air (n=8), 0mg nicotine vapour (n=8), 18mg nicotine vapour (n=8) and cigarette smoke before gestation, followed by 18mg nicotine vapour during gestation until the offspring were weaned (n=8). At P13, male offspring were assessed in the elevated plus maze and the novel object recognition test to investigate anxiety and short term memory respectively. Brain from offspring were collected and processed for epigenetic analysis using the RT2 Profiler PCR Array Gene Expression (Qiagen). Behavioural assessments showed hyperactivity and short term memory deficits in offspring from mothers exposed to e-cigarette vapours compared to the sham group. From the epigenetic analysis, gene expression of AurkA, AurkB, AurkC, Dnmt3a, Dnmt3b, ATF2, Kdm5c, Kdm6b were altered. These genes are associated with mitosis, transcription and histone methylation all of which have been linked to brain development, memory and behaviour. This was validated by performing individual qPCR on each gene change. From the behavioural and epigenetic data, this showed that mothers who vaped during their pregnancy caused some neurological problems in the offspring that continued continue on into adulthood. More research is required to determine which brain regions and biological pathways that are affected by maternal vaping.
Session 6: 5:15-5:30 pm

DEFEROXAMINE REDUCES BRAIN INJURY AND IMPROVES FUNCTIONAL OUTCOMES IN A RAT MODEL OF ENDOTHELIN-1 INDUCED FOCAL STROKE

Hong Nguyen
University of New South Wales
hong.nguyen@unsw.edu.au

Hong L Nguyen, Thomas Fath, Nicole M Jones.
School of Medical Sciences, UNSW Sydney, Australia, NSW

Introduction. Stroke is one of the leading causes of death and adult disability in the world. Tissue plasminogen activator is the only approved treatment, but its use is limited due to its short therapeutic window. Increasing the transcription factor, hypoxia-inducible factor-1 (HIF-1) and its target genes, including erythropoietin and vascular endothelial growth factor can protect against stroke injury. Under normoxic conditions, HIF-1α is hydroxylated by the prolyl hydroxylase enzymes (PHDs) which tags it for ubiquitination and proteosomal degradation. Consequently, levels of HIF-1α protein are almost undetectable. The iron chelator, deferoxamine (DFX), inhibits PHDs by binding to Fe2+, a cofactor required for its function. As a result, HIF-1α is allowed to accumulate under normoxic conditions. Preliminary studies have shown that DFX pretreatment can reduce brain injury and this protection involves HIF-1 activation. Aims. To examine whether post-stroke treatment with DFX can reduce brain injury and improve functional recovery.

Methods. Adult male Sprague-Dawley rats (300-350g) were anaesthetised with isofluorane (1.5%, via inhalation in oxygen) and a guide cannula implanted above the middle cerebral artery (MCA). Rats were allowed to recover for 7 days. Stroke was induced by an injection of endothelin-1(120pmol) proximal to the MCA via the previously implanted cannula in conscious rats. Sham animal received saline injection. A single, intraperitoneal (i.p.) injection of DFX (200mg/kg, i.p) or saline was given 6h after stroke. Behavioural testing was performed prior to cannula implantation and 1, 7 and 14 days after stroke induction. On day 14, brains were removed, sectioned and stained to quantify infarct volume. Results. No tissue loss was observed in sham animals (3.3±1.mm3, n=6). Stroke produced an infarct that was significantly larger than the sham group (48±14mm3; p<0.05, ANOVA, Tukey’s post-test, n=5). Stroke rats that received DFX showed a significant reduction in the infarct size (10±3mm3; p<0.05, ANOVA, Tukey’s post-test, n=5) compared to vehicle treated stroke rats. DFX treated animals showed improvements in neurological deficit score, rotarod activity and motor deficits, compared to vehicle-treated stroke rats.

Summary. The findings in this study show that modulation of HIF-1 by DFX can be a novel treatment approach for stroke.
Plenary Speaker

Professor Erica Fletcher
University of Melbourne

Chair: Prof John Morley
9:00 – 10:00 am
Friday 15 Sept 2017
Lecture theatre 206

THE ROLE OF MICROGLIA IN REGULATION OF RETINAL INTEGRITY

ABSTRACT

Microglia are resident immune cells in the retina and Central Nervous System, that are well known for their role in pathological conditions of the nervous system. Over recent years, it has emerged that microglia also play important roles in maintaining normal neuronal function-they constantly survey the synaptic regions of the nervous system. In this presentation, the roles that microglia play in regulating photoreceptor integrity and the vasculature will be summarized. Our results provide an important foundation with which to understanding changes in retinal diseases including age related macular degeneration and diabetic retinopathy.
ORAL MINOCYCLINE HYDROCHLORIDE PREVENTS CAFETERIA DIET-INDUCED COGNITIVE IMPAIRMENT IN MALE RATS

Sarah-Jane Leigh
University of New South Wales
s.leigh@unsw.edu.au

Sarah-Jane Leigh*, Fred Westbrook# and Margaret J. Morris*
*School of Medical Sciences, UNSW Sydney, Australia.
#School of Psychology, UNSW Sydney, Australia

Background: While a large body of literature indicates that obesogenic diets are associated with cognitive impairment in both human and animal models, the underlying mechanisms remain controversial. A key mechanism proposed to drive these cognitive changes is increased inflammatory signalling associated with obesity. Minocycline hydrochloride (MH) has been routinely used to depress microglial activity as it is both anti-inflammatory and easily crosses the blood brain barrier. We used a rodent model to test the hypothesis that blocking inflammatory signalling in the brain with MH would alleviate cafeteria-diet-induced cognitive deficits. Methods: Rats were pre-exposed to vehicle (syrup) or MH (40mg/kg/day) for three days before half were switched from regular chow to a cafeteria diet, consisting of regular chow, various cakes, biscuits, savoury foods and 10% sucrose. Memory was tested using novel object and place recognition tasks at two and four weeks of diet exposure; EchoMRI performed at four weeks determined body composition. Results: Rats fed cafeteria diet and vehicle were impaired on the hippocampal-dependent place recognition task at two and four weeks of diet exposure; EchoMRI performed at four weeks determined body composition. Results: Rats fed cafeteria diet and vehicle were impaired on the hippocampal-dependent place recognition task at two and four weeks and the perirhinal-dependent object recognition task at four weeks. MH treatment prevented these impairments in cafeteria-fed rats, who performed similarly to controls. EchoMRI revealed these differences were not due to reduced adiposity as cafeteria rats on MH had significantly increased fat mass (percent body weight) relative to those receiving vehicle. Conclusions: MH administration prevented both short- and longer-term cafeteria-diet induced cognitive impairments. This indicates that obesogenic diet-induced cognitive impairment may be associated with increased inflammatory signalling, and follow-up molecular investigations will test this.
AN INVESTIGATION OF OBJECTIVE AND SUBJECTIVE TYPES OF BINGE EATING EPISODES IN GENERAL POPULATION COMMUNITY SAMPLE

Natalie Li
Western Sydney University
18058198@student.westernsydney.edu.au

Li N 1, Mitchison 12 D, Hay P 3
1. School of Medicine Western Sydney University 2. School of Psychology, Macquarie University 3. Translational Health Research Institute (THRI) School of Medicine Western Sydney University

Background: Objective Binge Eating episodes (OBEs) are a core diagnostic criteria for both bulimia nervosa (BN) and binge eating disorder (BED), and also often occur in patients with anorexia nervosa (AN). Currently, the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) recognises OBEs as the consumption of an objectively large amount of food that is also associated with the sensation of a loss of control (LOC). However this current criteria excludes the phenomena of Subjective Binge Eating episodes (SBEs), which refers to the consumption of a small or moderate amount of food which is subjectively perceived by the individual as a binge and like OBEs are also associated with LOC. Studies comparing OBEs and SBEs have demonstrated considerable similarities between clinical features, outcomes and impairment of people with these two closely related behaviours, however there is still international dispute regarding its formal inclusion into the DSM criteria for eating disorders. The current study aims to determine whether there are differences in sociodemographic profiles (age, sex, income level), levels of distress regarding binge eating episodes and health-related quality of life (HRQoL) between people with recurrent OBEs only, people with solely recurrent SBEs and people with combined OBEs and SBEs

Methods: This is a cross-sectional analysis of data collected from 3,028 participants of the 2016 Health Omnibus Survey. Participant samples were randomly selected from metropolitan and rural areas in proportion to their population size, and a face-to-face interview was conducted with the selected individual. Participants were categorised into four groups (those experiencing: 1. neither OBE or SBE (control), 2. OBE only (OBE), 3. SBE only (SBE), and 4. both OBE and SBE(OSBE)), which were then compared for sociodemographics (age, sex, income level), levels of distress regarding binge eating episodes and HRQoL. Results: In regards to sociodemographic profiles, participants in the OBE and OSBE groups were on average younger than participants in the control group. A higher mean BMI was also demonstrated in the OSBE group when compared to the SBE and OBE groups, and the OBE group also showed a significantly higher mean BMI when compared to the Control group. No differences in gender distribution or educational attainment were observed between groups. In regards to distress related to binge eating, no significant results were demonstrated between OBE and SBE groups. In regards to HRQoL, the OSBE group revealed lower mental health scores on average when compared to OBE and control groups. Conclusion: The lack of significant differences in clinical features between individuals experiencing OBEs and individuals experiencing SBEs supports the inclusion of SBEs in the diagnostic criteria for eating disorders characterised by recurrent binge eating, as currently proposed by the ICD-11 Feeding and Eating Disorders Working Group.
EXPLORING RELATIONSHIPS BETWEEN RECURRENT BINGE EATING AND ILLICIT SUBSTANCE USE

Henry Lu
Western Sydney University
17812812@student.westernsydney.edu.au

Henry Kewen Lu 1, Haider Mannan 1,2 and Phillipa Hay 2,*
1 School of Medicine, Western Sydney University, Penrith NSW 2751, Australia;
17812812@student.westernsydney.edu.au (H.K.L.); H.Mannan@westernsydney.edu.au (H.M.)
p.hay@westernsydney.edu.au; (P.H.)

Abstract: (1) Background: With the new edition of the Diagnostic and Statistical Manual of Mental disorders, 5th Edition (DSM-5), numerous parallels have been drawn between recurrent binge eating (RBE) and substance use disorders, with many authors examining RBE or binge eating disorder (BED) as a “food addiction”. The present study aims to clarify the relationship between recurrent binge eating (RBE) and illicit substance use (ISU) through investigating the temporal association between the two problems. (2) Methods: This study was embedded within a larger longitudinal study of non-clinical adult women recruited from Australian tertiary institutions. Participants responded at year 2 and year 4 of follow-up to the Eating Disorder Examination—Questionnaire. ISU was measured using a modified questionnaire taken from the Australian Longitudinal Study on Women’s Health. (3) Results: RBE and ISU co-morbidity was 5.88% in this non-clinical sample, and having one condition increased the likelihood of the other. The two conditions had a different trajectory over two years whereby ISU participants had significant risk of developing RBE in addition to or in place of their ISU but the reverse was not found for RBE participants. (4) Conclusion: This unidirectional relationship suggests that in spite of the similarities of RBE and ISU they may be distinct with respect to their co-morbidity over time.
OXYTOCIN TREATMENT DURING ABSTINENCE FROM METHAMPHETAMINE SELF-ADMINISTRATION IN MALE AND FEMALE RATS: EFFECTS ON RELAPSE TO DRUG-SEEKING, SOCIAL AND ANXIETY-LIKE BEHAVIOURS.

Nicholas A Everett
Macquarie University
nick.everett@mq.edu.au

Everett, Nicholas Baracz, Sarah Cornish, Jennifer Macquarie University

Methamphetamine (METH) is a highly addictive psychostimulant, abuse of which is characterised by long term psychiatric and social consequences, and chronic relapse to drug-taking. Currently, there are no approved therapies for treating METH dependence. However, acute administration of the neuropeptide oxytocin has shown great promise as an anti-craving treatment for METH dependence in animal models of addiction. Oxytocin treatment has also been shown to promote pro-social behaviours, and reduce anxiety-related behaviours in healthy rats. However, the effects of repeated oxytocin therapy in METH-experienced rats are not known. This is the first study to examine the effects of repeated oxytocin treatment during abstinence from methamphetamine self-administration on cue-, stress- and METH-induced relapse, METH-related anxiety, and METH-induced social deficits. Male and female Sprague-Dawley rats with implanted jugular vein catheters were trained to self-administer METH (0.1mg/kg/infusion) under a fixed-ratio 1 schedule of reinforcement for 2 hours per day. After 12 sessions, half the rats were switched to 6-hour daily sessions for another 11 days, whilst the other half remained on 2-hour daily sessions, and then all rats underwent 30 days of drug abstinence. On day 2 of abstinence, rats underwent a cue-induced reinstatement test, and then were tested on measures of anxiety and social interaction on subsequent days. Following this, rats received daily i.p. injections of oxytocin (1mg/kg) or saline for 15 days. Three days after the last oxytocin or saline injection, rats underwent the same battery of behavioural tests. On day 30 of abstinence, rats underwent another cue-induced reinstatement test. Lever pressing behaviour was then extinguished, and rats underwent primed reinstatement tests following injection with the anxiogenic drug yohimbine (0.625 and 1.25mg/kg i.p.) and METH (0.3 and 1.0 mg/kg i.p.). Escalated daily intake of METH resulted in the incubation of METH-craving from day 2 to day 30 of abstinence, as well as augmented METH-primed reinstatement to lever pressing. Importantly, the incubated response was partially attenuated in the rats which received 15 days of oxytocin treatment during abstinence. The oxytocin group also exhibited reduced METH- and yohimbine- primed reinstatement depending upon METH exposure and priming dose. Multiple post-hoc interactions between sex, METH intake, and oxytocin treatment were revealed within the anxiety and social behavioural data, and will be discussed. Overall, these findings demonstrate that repeated therapy with oxytocin may partially attenuate the incubation of drug cravings, remediate METH-induced behavioural changes, and protect against future drug-induced relapse, providing further support for oxytocin as a pharmacotherapy for METH dependence.
NEURAL CORRELATES OF ALCOHOL CUE-INDUCED BRAIN ACTIVATION AND NEUROPSYCHOLOGICAL EXECUTIVE FUNCTIONING MEASURES IN PATIENTS WITH ALCOHOL DEPENDENCE

Warren Logge
Macquarie University
warren.logge@students.mq.edu.au

Logge WB¹, Morris RW ², Morley KC², Haber PS²,³, Baillie AJ¹.
1. NHMRC Centre of Research Excellence in Mental Health and Substance Use, Macquarie University, Sydney, NSW. 2. NHMRC Centre of Research Excellence in Mental Health and Substance Use, The University of Sydney, Sydney, NSW. 3. Drug Health

Alcohol dependent (AD) individuals fail to regulate alcohol consumption, potentially due to dysfunctional regulation of motivational responses after exposure to alcohol cues. We tested a role of executive functioning in this regulation, examining a relation of EF performance and brain imaging cue-induced activation, and patients’ dysregulated drinking history. Twenty-eight drinking AD patients and 11 healthy controls completed a visual fMRI alcohol cue activation task. Within AD patients, we examined whether alcohol cue reactivity in prefrontal regions negatively correlated with patients’ previous history of dysregulated drinking (alcohol use disorder severity, experienced negative drinking consequences) and poorer EF performance (Stroop; Trail making test: Trails), indicating poorer regulation of alcohol cue-elicited responses. Conjunction analyses assessed potential overlap of the neural activity in prefrontal regions associated with greater dysregulated drinking history and poorer EF performance. AD patients demonstrated more cue-induced activation to alcohol cues than control cues compared to HC group in reward/motivational pathways. Within AD patients, Stroop and Trails performance were both correlated with alcohol cue-induced activation in prefrontal regulatory regions; while alcohol use disorder severity was negatively correlated with these regions. Conjunction analyses showed convergence of neural activation for the negative correlation with poorer Stroop performance and alcohol cue-activation, and negative correlation for ADS score and alcohol cue-activation in the dorsolateral prefrontal cortex. Executive functioning and dysregulated drinking history related to alcohol cue reactivity within AD patients. Reduced activation in prefrontal regulatory areas may involve dysfunctional regulation of responses to alcohol cues related to executive functioning deficits and greater alcohol use severity.
DETERMINING THE EFFICACY AND LONGEVITY OF INHIBITORY CONTROL TRAINING RELATIVE TO CURRENT PSYCHOLOGICAL INTERVENTIONS FOR THE REDUCTION OF RISKY ALCOHOL CONSUMPTION.

Lisa Hu & Qizhang Liu
Macquarie University
z5017166@ad.unsw.edu.au

Qizhang Liu¹, Lisa Hu¹, Janette Smith², Louise Mewton²
1. UNSW Medicine ILP students 2. National Drug and Alcohol Research Centre, The University of New South Wales, Sydney

BACKGROUND Inhibitory control enables an individual to cease, delay or alter inappropriate or impulsive responses. Deficits in this cognitive function is associated with risky drinking. As inhibitory control demonstrates plasticity, it may be strengthened to help reduce impulsive drinking. While evidence suggests that inhibitory control training (ICT) using computerised tasks can lead to reductions in alcohol consumption, much of this research has been in comparison to interventions which appear to increase alcohol intake, and few has compared with current gold-standard for alcohol abuse intervention: Brief Alcohol Intervention (BAI).

AIMS This study has two parts, the first aims to assess the efficacy of one form of inhibitory task (the “Beer-NoGo” task) relative to three important control conditions. The second part aims to determine the efficacy of the Beer-NoGo tasks compared to the currently well-established method of Brief Alcohol Intervention (BAI) and determine whether it has any long lasting effects up to 4-weeks post-training. Overall, this project aims to contribute evidence to whether a new alcohol intervention (Beer-NoGo) is effective in reducing drinking with wider implications for the development of new simple and cost-effective interventions for substance dependence.

METHODS In the Beer No-go group, participants are instructed to press the button to a letter superimposed on images of water, and refrain from pressing to another letter superimposed on images of beer. The mapping is reversed for the Beer-Go group, while the control group is presented with letters only, and inhibition is not required. The last group completes an online BAI. Participants' alcohol consumption will be measured immediately post-test using a bogus taste-test, and at 1-week and 4-week follow-up using the Timeline Followback questionnaire. RESULTS Data collection is ongoing and is projected to be completed by August 24th 2017. We will present study results from 85 participants divided randomly across 4 groups. CONCLUSION We will assess the apparent effectiveness of Beer-NoGo ICT relative to a previously used Beer-Go comparison group, to a no-training control, and to the gold standard BAI. We will also assess if there are any long lasting effects of the Beer-Nogo task, with measurement immediately post-training, 1 week and 4 weeks post-training.
TWO GREAT AND INFLUENTIAL PAPERS IN MODERN NEUROSCIENCE: BOTH SEEMINGLY UNAWARE OF THEIR HISTORICAL GENESIS AND COUNTERPOISED PHILOSOPHICAL CHARACTER

John Carmody
University of Sydney
john.carmody@sydney.edu.au

John Carmody, Discipline of Physiology (Faculty of Medicine) University of Sydney, Sydney, 2006

The diagnosis and management of mental illness are as much philosophical as scientific challenges. To make this argument, this paper will focus on the neuroscientific dimension and will consider two landmark publications in neuroscience, by Cole and Curtis (in the USA) and Hodgkin and Huxley (in Britain), each of which appeared in 1939. In their quest to understand inter alia the biophysics of nervous conduction, both of those laboratories exploited the experimental advantages of JZ Young’s recent re-discovery of the “giant axon” of the squid, but both had significant deficiencies in their historical awareness. More important, though unwittingly, they respectively revealed the long contestation between the “positivist” approach (a reflection of the “Vienna Circle”) and the Popperian philosophy of “falsification”. This paper will argue that the British publication was the more important, not least because it had the greater scientific influence, largely on account of its stronger philosophic foundation; this was despite the fact that its authors seemed unaware of that essence, just as their American rivals also seemed unaware of the philosophical basis for their thinking. Nonetheless, the outcome could fairly be categorised as a “Kuhnian Revolution” in bioscience and it has implications for the clinic no less than for science.
THE MODULATION OF NEURAL GAIN FACILITATES A TRANSITION BETWEEN FUNCTIONAL SEGREGATION AND INTEGRATION IN THE BRAIN

Mac Shine
University of Sydney
mac.shine@sydney.edu.au

James M. Shine, Matthew J. Aburn, Michael Breakspear and Russell A. Poldrack
Affiliations 1 – Department of Psychology, Stanford University, Stanford, CA, USA 2 – The University of Sydney, NSW, Australia 3 – QIMR Berghofer Medical Research Institute, QLD, Australia

Cognitive function relies on a dynamic, context-sensitive balance between functional integration and segregation in the brain. Previous work has proposed that this balance is mediated by global fluctuations in neural gain by projections from ascending neuromodulatory nuclei. To test this hypothesis in silico, we studied the effects of neural gain on network dynamics in a model of large-scale neuronal dynamics. We found that increases in neural gain pushed the network through an abrupt dynamical transition, leading to an integrated network topology that was maximal in frontoparietal ‘rich club’ regions. This gain-mediated transition was also associated with increased topological complexity, as well as increased variability in time-resolved topological structure, further highlighting the potential computational benefits of the gain-mediated network transition. These results support the hypothesis that neural gain modulation has the computational capacity to mediate the balance between integration and segregation in the brain.
Synchronous activity within neuronal networks gives rise to neural oscillations, which are thought to be involved in several physiological processes, such as bias of input selection, temporal linkage of neurons into assemblies and facilitation of synaptic plasticity. It has been postulated that at least ten distinct mechanisms are required to cover the large frequency range of cortical oscillations, however the mechanism that gears the transition between different oscillatory frequencies is still unknown. In this study, we have explored the potential involvement of astrocytic K$^+$ clearance in the modulation of neural oscillations at the network and single-cell levels. Our results indicate that local rise in extracellular K$^+$ concentration leads to alterations in oscillation frequencies and amplitude across a wide spectrum. Reduced astrocytic K$^+$ spatial buffering capabilities through bath application of Barium (100 μM), as well as restricted astrocytic connectivity by the selective blockers GAP-26/27, resulted in increased cellular and network excitability, as indicated by elevated number of spikes, longer excitability durations and reduced number of Biocytin-stained astrocytes. In addition, altered K$^+$ clearance shifted the neuronal resonance frequency towards higher frequencies and increased the power governing network oscillations in the range of beta and gamma frequencies. Our study suggests that modulators of extracellular K$^+$ likely influence the neuronal resonance frequency, which imposes alterations in network activity. Since astrocytes are essential for maintaining ion homeostasis in the CNS, we suggest that modulation of astrocytic K$^+$ clearance mechanisms is a potential target to impact neural oscillations, and thereby mediating the transition between brain waves.
PATHWAYS LEADING TO DOPAMINE RELEASE IN THE MAMMALIAN RETINA

Victor Perez Fernandez
Western Sydney University
v.perezfernandez@westernsydney.edu.au

Pérez-Fernández V, Morley JW, Cameron MA. Department of Anatomy and Cell Biology, School of Medicine, Western Sydney University, Australia.

Adaptation of the retina to distinct light conditions relies considerably on modulation of retinal pathways by dopamine (DA) released in response to light by a sub-set of neurons: dopaminergic amacrine cells (DACs). Cones, rods and intrinsically photoresponsive retinal ganglion cells (ipRGCs) have been shown to provide an input to DACs, but thus far, only rods and cones have been shown to cause DA release. We measured light-induced DA release in an ex vivo preparation of the mouse eye in animals with impaired photoreceptor function. Irradiance-response curves were performed for wild-type, Gnat2A517G (lacking functional cones) and rd/rd mice (lacking both rods and cones). A significant increase (p-value<0.001) in DA was observed in response to high irradiances (>1000 lux) in wild-type and Gnat2A517G but not in rd/rd. Interestingly, while all evidence suggests rods are driving the majority of this input, the threshold for DA release is 6 log units above rod threshold. Gap junction blockage by meclofenamic acid caused a significant reduction, but not total loss of light-induced DA in both wild-type and Gnat2A517G, meaning a rod-driven gap-junction-independent pathway is involved. In wild-types, GABA antagonists significantly increased DA release in darkness suggesting a constitutive block of DACs by GABAergic amacrines. In agreement with the literature, glutamate receptor blockers L-AP4 and CNQX completely blocked light-driven DA release. Moreover, the NMDA receptor blocker AP5 abolished the majority of DA release. We postulate that rods and ipRGCs work in synergy through NMDA/AMPA coincidence detection to provide a reliable signal for light-adaptation in the retina.
THE ROLE OF TOP-DOWN MODULATION ON EARLY VISUAL PROCESSING

Sam Merlin
Western Sydney University
s.merlin@westernsydney.edu.au

Sam Merlin - Western Sydney University, Alessandra Angelucci - University of Utah

In the cerebral cortex, information travels through feedforward connections through a hierarchy of areas, with increasing response complexity, which in turn send feedback connections back to lower areas. Feedback has been implicated in attention, expectation and visual saliency, however, the mechanisms underlying these diverse feedback connections are unknown. Using optogenetic inactivation of feedback connections from extrastriate cortex to striate cortex, we have identified a role for feedback connections in controlling fundamental response properties, including receptive field size and response gain. These functions may suggest a role for feedback to dynamically regulate spatial resolution, sensitivity to features, and efficiency of coding natural images in lower cortical areas.
SYNTHETIC CANNABINOID ACTIVATION OF hTRPA1 AND NATURALLY OCCURRING CHANNEL VARIANTS

Saarin Pearson
Macquarie University
saarin.pearson@hdr.mq.edu.au

Saarin Pearson*, Mark Connor*, Jordyn Stuart*
* Faculty of Medicine and Health Sciences, Macquarie University

THC, the primary psychoactive compound in cannabis, is a low efficacy agonist of the CB1 receptor. Synthetic cannabinoids (SC’s) are compounds structurally unrelated to THC, which also function as agonists of the CB receptors. Recreational SC products have been monitored since the emergence of JWH-018 in 2008, with new compounds rapidly developed to evade legislation and detection. SC consumption, including mass intoxication events, is associated with a range of adverse effects uncharacteristic of plant derived cannabinoids, such as psychomotor agitation, aggression, cardiac arrhythmias, seizures and death. The mechanisms of SC toxicity are not established, however, some SCs are higher efficacy agonists of CB receptors than common research cannabinoids, and have the potential to act at non-CB receptor targets. Polymorphic variants of these targets may influence individual toxicity. Transient receptor potential ankyrin 1 (TRPA1) is a calcium-permeable ion channel highly expressed in the brain, sensory neurons and the epithelium of the lungs. TRPA1 is activated by THC and some synthetic cannabinoids, with several naturally occurring polymorphic variants in humans.

HEK293 cells stably transfected with human TRPA1 and five select SNP variants were studied by measuring changes in intracellular [Ca2+] in response to selected high concern SC’s and some natural ligands. The SC’s PB-22, 5F-PB-22, MDMB-CHMICA and XLR-11 activate TRPA1 and each mutant, although they exhibited varying degrees of efficacy between the mutants. R3C, R58T, E179K and H1018R mutations resulted in increased potency and higher maximal effect by PB-22 and 5F-PB-22 when compared to WT, with XLR-11 and MDMB-CHMICA showing lower efficacy at all but E179K. Cinnamaldehyde, a prototypic TRPA1 agonist, showed a similar profile to PB-22 and 5F-PB-22. These data show that the efficacy of SCs varies at naturally occurring TRPA1 polymorphisms, but that different drugs are affected in distinct ways. If SC toxicity is related to actions at non-CB proteins such as TRPA1, mechanisms of drug toxicity may be highly individualized.
OPTOGENTIC STUDIES OF A SPINAL SENSORY PROCESSING

ABSTRACT

The spinal dorsal horn is a key site for sensory processing and contains a large, diverse population of interneurons. Several decades of research has highlighted the critical role of inhibitory interneurons in gating sensory signals and preventing aberrant sensations such as allodynia, where touch causes pain. Surprisingly, excitatory interneurons outnumber the inhibitory population in this region 2:1, yet our understanding of the role they play in the spinal cord is far less developed. This presentation will cover recent work from our group employing an optogenetic approach to better understand the how a specific population of excitatory interneurons, that express the calcium binding protein calretinin, contribute to sensory processing. A combination of in vitro channelrhodosin-2-assisted circuit mapping and in vivo photostimulation experiments highlight this population as part of a potent spinal amplifier circuit. This data expands the potential repertoire of excitatory interneurons in the spinal dorsal horn, and provides an updated view of spinal sensory processing.
ALTERED AMYGDALA-CORTICAL CONNECTIVITY IN ANXIOUS CHILDREN: MAGNETOENCEPHALOGRAPHIC EVIDENCE

Wei He
Macquarie University
wei.he@mq.edu.au

Wei He1, Jennifer L. Hudson2, Blake Johnson1, Lauren McLellan2, Quincy Wong2, Suzanne Broeren3, Helen Dodd4
1. Centre for Cognition and its Disorders, Department of Cognitive Science, Macquarie University. 2- Centre for Emotional Health, Department of Psychology, Macquarie University. 3 Department of Public Health, Erasmus University. 4 Helen Dodd, School of Psychology and Clinical Language Sciences, University of Reading.

Altered amygdala-cortical connectivity in anxious children: magnetoencephalographic evidence Wei He1, Jennifer L. Hudson2, Blake Johnson1, Lauren McLellan2, Quincy Wong2, Suzanne Broeren3, Helen Dodd4 1 Centre for Cognition and its Disorders, Department of Cognitive Science, Macquarie University. 2 Centre for Emotional Health, Department of Psychology, Macquarie University. 3 Department of Public Health, Erasmus University. 4 Helen Dodd, School of Psychology and Clinical Language Sciences, University of Reading.

Deregulation on emotion processing (particularly to human facial expressions) is deemed critical for the development of generalized anxiety disorder (GAD, Mochcovitch et al., 2014 J Affect Disord, 167: 336-42). Dynamic causal modelling (DCM) of magnetoencephalographic (MEG) brain activity in human adults revealed a subcortical pathway to amygdala that enables rapid processing of faces (Garvert et. al., 2014, NeuroImage 102: 309-16). This study aims to examine the differences in brain activation between anxious and non-anxious children in response to emotional faces and to see whether or not the subcortical connection between the amygdala and early visual areas plays a role in explaining the observed dereferences. MEG data were collected from 13 Generalized Anxiety Disorder (GAD, 10.4±1.5 years) and 22 non-anxious age-matched children (10.0±1.3 years) while passively viewing faces with happy, angry, neutral, sad and fearful expressions. MEG evoked fields were significantly reduced in GAD children in viewing happy faces compared to non-happy expressions, an effect that was absent in non-anxious children. Apart from this, GAD children showed a much weaker responses to happy faces compared to non-anxious participants. These happy versus non-happy differences were better explained by DCM models containing the subcortical path from amygdala in non-anxious children. Whereas in GAD children, this subcortical connection only engaged in the circuit towards the end of the evoked fields peak at ~ 180 ms. Results suggest reduced cortical response to positive emotion processing in GAD children, which could be due to the lack of subcortical amygdala contribution to low-level sensor networks in the early stage of information processing.
Reduced Gamma-Aminobutyric Acid is Associated with Emotional and Behavioral Problems in Prader Willi Syndrome

Lauren Rice
University of Sydney
lauren.rice@sydney.edu.au

Lauren Rice\textsuperscript{1,2}, Jim Lagopoulos\textsuperscript{1,3}, and Stewart Einfeld\textsuperscript{1,2}

\textsuperscript{1}Brain and Mind Centre, University of Sydney. \textsuperscript{2}Centre for Disability Research and Policy, University of Sydney. \textsuperscript{3}Queensland Mind and Neuroscience Thompson Institute, University of the Sunshine Coast

Prader Willi syndrome (PWS) is characterized by infantile hypotonia, hypogonadism, small hands and feet, distinct facial features and usually intellectual impairment. The disorder is associated with severe behavioral disturbances which include hyperphagia leading to morbid obesity, temper outbursts, skin-picking and compulsive behaviors. While the brain mechanisms that underpin these disturbances are unknown these behaviors suggest a lack of inhibition and thus gamma-aminobutyric acid (GABA), the main inhibitory neurotransmitter may be implicated. In the present study, we investigated in vivo brain GABA and its relationship with emotion and behavior in individuals with PWS. Single voxel proton magnetic resonance spectroscopy (\textsuperscript{1}H-MRS) was performed on 15 individuals with PWS and 15 age- and gender-matched typically-developing controls. GABA levels were measured in the parieto-occipital lobe. All other metabolite levels (N-acetyl aspartate, myo-Inositol, glutathione, glutamate and glutamine + glutamate) were measured in the anterior cingulate cortex (ACC). GABA levels were significantly lower in the participants with PWS who had clinically significant emotional and behavioral problems relative to typically developing control participants and participants with PWS who did not have emotional and behavioral problems within the clinically significant range. GABA levels were negatively correlated with total behavioral problem scores as well as temper outbursts, skin-picking, depression, social relating difficulties and a tendency to be self-absorbed. Our data suggests that alterations of the GABAergic system may play an important role in aspects of the pathophysiology of PWS. Pathological mechanism found in PWS may be relevant to understanding the control of similar behaviors in the general population.
Session 9: 3:00-3:15 pm

PAVLOVIAN-TO-INSTRUMENTAL TRANSFER IMPAIRMENT IN PEOPLE WITH OBSESSIVE-COMPULSIVE DISORDER: COMPULSION-CORRELATED ORBITOFRONTAL CORTEX HYPERACTIVITY AND CORTICAL DISCONNECTION

Iain Perkes
University of Sydney
ia.in.perkes@sydney.edu.au

IE Perkes,1-6 RW Morris,1,5,6 S Quail,1 PL Hazell,2-3 BW Balleine1,6
1- Brain & Mind Centre. 2- Department of Psychiatry, The University of Sydney. 3- Sydney LHD. 4- NSW Institute of Psychiatry. 5- Australian Research Council, Centre for Cognition and its Disorders. 6- School of Psychology, UNSW

Obsessive-compulsive disorder (OCD) is common, disabling, and starts in childhood. Seventeen years divide symptoms from treatment. Understanding pathophysiology will enable development of more specific diagnostic methods to deliver targeted treatment earlier. Sights and sounds predicting effective handwashing seem not to control obsession-prompted compulsive handwashing in people with OCD. The lateral orbitofrontal cortex (OFC) integrates sensory input for healthy decision-making. OCD imaging studies repeatedly implicate the OFC. Decision-neuroscience can interrogate OCD pathophysiology. Here we present the first use of pavlovian-to-instrumental transfer (PIT) to investigate OCD. We partnered PIT with task-related functional magnetic resonance imaging (fMRI) and diffusion tensor imaging (DTI). We found adolescents (n=21) with OCD, compared to controls (n=20), had impaired use of pavlovian (predictive) stimuli to target instrumental actions to earn rewards; the vigour of actions was intact. Synchronous rostral OFC hyperactivity positively correlated with OCD compulsions (R=0.59). DTI analysis seeded from hyperactive regions identified negative correlation between lateral OFC hyperactivity and tract strength to the precentral gyrus. The application of appetitive paradigms allowed interrogation of underpinning endophenotype rather than symptom-specific investigation. Compulsion correlation with OFC hyperactivity and associated altered white matter tractography implicates disconnection and aberrant decision-making as core OCD deficits. It may be that impaired integration of predictive information to guide choice leads to doubt and incapacity to quell inbuilt harm avoidance systems – obsessions and compulsions – the hallmarks of OCD.
Anxious depression occurs in roughly half of the Major Depressive Disorder (MDD) population and is characterised by a more serious clinical profile and a poor response to antidepressant treatment. However, diagnostic criteria for anxious depression vary, impacting effective treatment. This study compared four definitions of anxious depression (two common, two novel) on their ability to differentiate anxious from non-anxious depression on clinically relevant measures. To further explore each definition’s clinical relevance, clinical measures were assessed on their ability to predict antidepressant treatment outcome. 1,008 adults with a current MDD diagnosis from the international Study to Predict Optimised Treatment in Depression (iSPOT-D) were assessed at baseline on clinical features, sociodemographic features, psychological profile, functional capacity and resilience/wellbeing. Participants were then randomized to one of three antidepressants and re-assessed at 8 weeks regarding Hamilton’s Rating Scale for Depression (HRSD) and Quick Inventory of Depressive Symptoms (QIDS) remission and response. While the two novel definitions were better able to differentiate anxious from non-anxious depression, only the syndromally defined non-anxious depression group (i.e., MDD with no comorbid anxiety disorder) significantly predicted QIDS response (75% cross-validated accuracy) over and above the null (51% cross-validated accuracy) and covariate (60% cross-validated accuracy) models. Our results suggest that while novel definitions of anxious depression present with a more serious clinical profile, characteristics of syndromally defined anxious depression better predict antidepressant treatment outcome. Future research is suggested to explore the endophenotypes of syndromally defined anxious depression to facilitate better treatment and prediction of antidepressant treatment outcome.
INCREASED EXCITATORY REGULATION OF THE HYPOTHALAMIC PVN AND CIRCULATING VASOPRESSIN UNDERLIE THE HIGH BLOOD PRESSURE OBSERVED IN POLYCYSTIC KIDNEY DISEASE

Conor Underwood
Macquarie University
conor.underwood@hdr.mq.edu.au

Conor F Underwood, Rochelle Boyd, Jacqueline K Phillips, Cara M Hildreth Faculty of Medicine and Health Sciences, Macquarie University, Sydney, Australia.

Hypertension is common in individuals with polycystic kidney disease (PKD), a leading cause of renal failure. The underlying cause is poorly understood, but considerable evidence suggests it may be neurally mediated. We therefore examined the hypothesis that increased neuronal activation in the hypothalamic paraventricular nucleus (PVN), a centre for the neurohumoral regulation of blood pressure, contributes to hypertension in the Lewis polycystic kidney (LPK) rat. In urethane-anaesthetised animals, bilateral PVN inhibition with muscimol (10mM, 100nl) resulted in a greater depressor response in the LPK compared with control Lewis rats (−43 ± 4 versus 18 ± 3 mmHg; P<0.0001), which was not associated with a greater decrease in renal or splanchnic sympathetic nerve activity (SNA) (P>0.05). Blockade of ionotropic glutamatergic receptors in the PVN with kynurenic acid (100mM, 100nl) also produced a greater depressor response in the LPK (P<0.001) but did not affect SNA (P>0.05) and was not associated with a difference in AMPA or NMDA receptor mRNA levels. Blocking peripheral V1a receptors with OPC-21268 (3mg/kg i.v.) reduced SBP in LPK only (206 ± 9 vs.181 ± 13 mmHg; P<0.001), but did not affect the depressor response to PVN inhibition. Remarkably, the combination of peripheral V1a receptor blockade and PVN inhibition normalised blood pressure in the LPK (122 ± 11 vs. 115 ± 6 mmHg; LPK vs. Lewis P>0.05). Our data show that in the LPK model of PKD, hypertension is caused by both an upregulation of PVN neuronal activity and systemic V1a receptor activation. Interventions that decrease PVN neuronal activity and/or block peripheral V1a receptors may assist in the management of hypertension in PKD.
Session 10: 2:45-3:00 pm

THE ROLE OF NEUROPEPTIDE Y IN THE COORDINATION OF ENERGY BALANCE AND PHYSICAL ACTIVITY

Marina Ulanova
University of New South Wales/Garvan Institute
m.ulanova@garvan.org.au

Marina Ulanova\textsuperscript{1,2}, Herbert Herzog\textsuperscript{2}, Lei Zhang\textsuperscript{2}
\textsuperscript{1}. School of Medical Science, The University of New South Wales, Australia. \textsuperscript{2}-Neuroscience Division, Garvan Institute of Medical Research

Background: A commonly observed facet seen in patients suffering from anorexia nervosa (AN) is increased hyperactivity despite severe weight loss. This paradox can be captured in the activity-based anorexia (ABA) model where food restriction is combined with running wheel access. Neuropeptide Y (NPY) is a key player in regulating energy homeostasis and physical activity. This study aims to investigate the coordinated control of physical activity and energy metabolism by NPY using the ABA paradigm.

Method: Wild type (WT) and NPYcre/cre (equivalent to NPY/-/-) mice underwent the ABA in a high throughput metabolic and behavioural phenotyping cage system. A cre-activated adeno-associated viral vector containing NPY was injected into the brains of NPYcre/cre mice to examine whether reintroducing NPY into NPY neurons could rescue the phenotype. NPYcre/+\textsuperscript{2}Rosa26eGFP-L10a mice undergoing ABA were sacrificed at various stages of ABA and different regions of their brains were collected. Subsequently, translating ribosome affinity purification and RNA-sequencing technologies were applied to these samples to investigate the transcriptomic changes occurring in NPY neurons during the development of ABA.

Results: WT mice displayed a slight increase in overall activity during the first 2-3 days of ABA with a subsequent decline to a baseline activity level. NPY expression reached a maximum in the first three days of ABA. In addition, there was a shift in activity from dark phase to the 6 hours preceding food access, known as food anticipatory activity (FFA). Interestingly, NPYcre/cre mice showed a sustained increase in activity during ABA with significantly damped FFA response compared to WT mice. Phenotypic data on the rescue experiments and samples from NPYcre/+\textsuperscript{2}Rosa26eGFP-L10a mice for transcriptome analysis are currently being collected.

Conclusions: Data collected so far suggest NPY plays a key role in regulating activity during the development of ABA and mediating appetitive behaviour such as FFA. Results from this project will shed light on mechanisms underlying the paradoxical hyperactivity in AN and identify new treatment targets for this illness.
THE ROLE OF INSULIN SIGNALLING IN NEUROPEPTIDE Y NEURONS IN HIPPOCAMPAL DEPENDENT COGNITIVE FUNCTIONING

Elisabeth Goodman
University of New South Wales
z3420121@ad.unsw.edu.au

Goodman, E. K.¹, Teo, J. D.¹, Herzog, H.², Begg, D. P.¹

1School of Psychology, The University of New South Wales, Sydney, NSW, Australia, 2Garvan Institute of Medical Research, Sydney, NSW, Australia

The pancreatic hormone, insulin, acts in the regulation of a number of systems including energy balance, glucose homeostasis and cognitive functioning. However, the neuronal subpopulation through which insulin enhances cognitive performance remain unidentified. Insulin receptors are found in neuropeptide-Y expressing neurons, which are abundant in the hypothalamus and hippocampus; regions controlling feeding behaviours, learning, and memory. This study investigated whether insulin’s role in hippocampal-dependent memory and learning is dependent on insulin receptor signalling in neuropeptide-Y expressing neurons. Mice with a genetic knock out of insulin receptors in neuropeptide-Y expressing neurons (IR-NPY-KO) and control mice completed hippocampal-dependent (i.e., Morris water maze, MWM; and object location task, OLT) and perirhinal cortex-dependent (i.e., novel object recognition task, NORT) cognitive tasks. IR-NPY-KO mice demonstrated impaired performance in both the MWM and NORT compared with control mice, supporting previous studies that have demonstrated insulin signalling plays a crucial role in cognitive functioning. These data suggest that the mechanisms through which insulin influences cognitive functioning is at least in part, via insulin receptor signalling in neuropeptide-Y expressing neurons. Moreover, that the cognitive effects of insulin extend beyond the hippocampus and also affect perirhinal dependent cognitive functioning. These results potentially contribute to the understanding of cognitive impairments observed in obesity and type 2 diabetes that appear to be due to impaired insulin signalling.
Schizophrenia patients carrying Neuregulin 1 (NRG1) HapICE risk alleles appear to overproduce the NRG1 type III (III) isoform in their brain. In order to assess the impact of NRG1 III overexpression on the mammalian brain, we previously generated a mouse that overexpresses Nrg1 III in CamKII+ neurons. This transgenic mouse (Nrg1 III tg) exhibits several schizophrenia-like behavioural deficits including impaired fear conditioning, a task that requires intact hippocampal functioning. Given this finding, we sought to assess potential mechanisms by which Nrg1 III overexpression may perturb biological functioning in the hippocampus. To achieve this, we performed a transcriptomic microarray (Affymetrix GeneChip Mouse Gene 2.0 ST) of the hippocampus of 8 Nrg1 III tg and 10 WT mice. Using the Benjamini-Hochberg correction and a threshold criteria of a fold change of > ± 1.2 and a false discovery rate of < 0.2, we found 187 transcripts to be significantly altered across genotype. Interestingly, several of these downregulated transcripts including 5-hydroxytryptamine (serotonin) receptor 2C and angiotensin converting enzyme are implicated in hippocampal function and are altered in people with schizophrenia. Additionally, several transcripts involved in the insulin-like growth factor (Igf) pathway (including Igf2, Igf binding protein 2 and Igf binding protein 7) are also downregulated and were confirmed via qPCR (p < 0.5). Abnormal Igf signaling may be of interest as downstream Igf1/Igf receptor 1 signaling may converge on downstream Nrg1 signaling via the PI3K kinase pathway (a pathway which mediates numerous crucial biological processes including cell survival, apoptosis and proliferation). Supplementing this, we found several more transcripts that mediate the PI3K pathway to be altered including phosphoinositide-3-kinase, class 2, beta polypeptide, Growth arrest-specific 6 (upregulated), and Serine Peptidase Inhibitor, Kunitz Type 2 (downregulated). In sum, microarray analysis has uncovered several potentially relevant pathological processes in the hippocampus that may be driven by Nrg1 III overexpression. In particular, the role of Nrg1 on Igf signaling in the brain is completely unknown and thus this work provides the first insight into the possible juncture between these two crucial biological pathways within the context of Nrg1 III overexpression in schizophrenia.
AN fNIRS INVESTIGATION INTO THE BRAIN ACTIVITY OF YOUNG CHILDREN ON THE AUTISM SPECTRUM DURING SOCIAL EXPERIENCES

Amanda Mazzoni
University of New South Wales
a.mazzoni@student.unsw.edu.au

Amanda Mazzoni, Rachel Grove, Jason Bruggemann, Valsamma Eapen

Background: It is well established that children’s brains respond differently when they are presented with social and non-social experiences. However, it is less known what this response looks like in the brain of children on the autism spectrum. A detailed understanding of the relationship between clinical features and brain connectivity will allow for a meaningful understanding of social development and allow us to determine if certain subgroups are emerging. Aim: To compare differences in the brain between children on the autism spectrum and controls in response to social and non-social stimuli. To examine if any subgroups emerge based on brain connectivity and clinical features. Method: Children on the autism spectrum aged two to five attending an autism specific preschool were included in the study. A comparison group of children attending a mainstream service were also recruited. We evaluated children’s cognitive abilities, autism severity and symptoms, adaptive function and language skills. Functional Near-Infrared Spectroscopy (fNIRS) was used to assess brain activity. This consisted of children wearing an fNIRS cap while watching a 15 minute video segment of nursery rhymes and toys being activated. Results: Differential activation in the brain was observed when viewing nursery rhymes and toys in both groups. Differences were also observed in cognitive ability, adaptive function language skills and connectivity between the children on the autism spectrum and controls. Discussion: The results from this study provide a meaningful comparison of how the brain responds to social and non-social stimuli in children with autism. Overall, these results increase our understanding of the relationship between the brain and behaviour of children on the autism spectrum. Key Learning Outcomes: Deeper understanding and meaningful comparison of how the brain of children on the autism spectrum is responding to social and non-social experiences compared to a control group. A greater understanding of emerging groups based on neurological and behavioural outcomes.
Tourette Syndrome (TS) is a neurodevelopmental disorder, characterised by motor and vocal tics. TS is often co-morbid with other conditions including attention deficit disorder, obsessive compulsive disorder and possibly autism spectrum disorder. Due to the complex aetiology of the disease, the genetic factors relevant to the development of TS are yet to be fully understood. A targeted gene association study in TS patients has identified an association between TS and a mutation in the inner mitochondrial membrane peptidase subunit 2 (IMMP2L) gene. Germline knockout (KO) of Immp2l in mice results in mitochondrial dysfunction, increase ischemic brain damage and infertility. Due to a previous Immp2l KO model being generated in a blind strain, the impact of Immp2l on behaviour is unknown. In this study, we aimed to characterise the behavioural consequences of Immp2l deletion in both male and female adult mice (C57/BL6 background). Heterozygous and homozygous Immp2l KO mice were compared to control littermates in a battery of behavioural tests relevant to TS including open field (OF), social interaction (SI), novel object recognition (NOR), marble burying (MB) and prepulse inhibition (PPI). The effect of acute dexamphetamine (5 mg/kg) on open field behaviour was also investigated. In the OF, the time spent in the centre zone was significantly longer in male homozygous KO mice compared to control males indicating an anxiolytic-like phenotype. Locomotion measures including the total distance travelled and the average speed were not significantly different across genotypes. The NOR test indicated a deficit in male heterozygous and homozygous males to explore a novel object when compared to wild type-like control mice. These behavioural changes were not detected in female mice. Further tests including PPI, SI, dexamphetamine OF and MB are currently being analysed. Deficiency in Immp2l decreased the anxiety response of male KO mice in the OF and compromised the object recognition memory of these mice. The effects of Immp2l deficiency appeared gene-dose and sex-specific. These preliminary results indicate that this model may possess partial face validity for preclinical research into TS disease and therapy.
SESSION 11: 4:30-4:45 PM

DYSREGULATED OSCILLATORY ACTIVITY DURING VISUAL PROCESSING IN AUTISM SPECTRUM DISORDER

Robert Seymour
Aston Brain Centre, UK/Macquarie University
robert.seymour@students.mq.edu.au

Robert Seymour (1,2), Gina Rippon (1), & Klaus Kessler (1).

1. Aston Brain Centre, The Aston Triangle, Birmingham B4 7ET, United Kingdom 2. ARC Centre of Excellence in Cognition and Its Disorders, Department of Cognitive Science, Macquarie University, Sydney, Australia, 2109.

Autism Spectrum Disorder (ASD) is associated with atypical sensory processing, however the computational and neurophysiological principles underlying this remain largely unknown. Recent MEG-autism research has suggested that one candidate mechanism may be disorganised local oscillations in response to sensory stimuli combined with reduced top-down modulation. To investigate this further, we utilised an interactive visual paradigm combined with non-invasive MEG in a group of 17 participants diagnosed with ASD and 17 matched controls. As expected, gamma-band (30-60Hz) power increases and alpha-band (8-13Hz) power decreases localised to occipital regions. In the ASD group, virtual electrode time-courses from area V1 showed reduced coupling between the amplitude of gamma-band oscillations and the phase of alpha-band oscillations. Furthermore, inter-regional connectivity in the alpha band from area V4 to V1 was reduced in the ASD group. Overall, our work suggests that the complex interplay of alpha and gamma oscillations within the human visual system is dysregulated in autism, and that this may underlie sensory processing difficulties.
ALTERED DISTRIBUTION AND NEUROPROTECTIVE EFFECT OF ALPHA-TOCOPHEROL IN SPORADIC ALZHEIMER’S DISEASE INDUCED PLURIPOTENT STEM CELL DERIVED NEURONS

Rachelle Balez
University of Wollongong
rb478@uowmail.edu.au

Balez R(1), Bruinen A(2), Fisher G(3), Heeren R(2), Ooi L(1).

1. Illawarra Health and Medical Research Institute, University of Wollongong, Australia. 2. Maastricht Multimodal Molecular Imaging Institute, Maastricht University, Netherlands. 3. Physical Electronics, Chanhassen, MN, United States.

Clinical trials suggest that alpha-tocopherol (α-toc) may be protective against the early stages of cognitive decline in Alzheimer’s disease (AD). However, little is known regarding the distribution and molecular alterations associated with the neuroprotective action of α-toc in human neurons. Here we image the distribution of α-toc in the lipid membrane of induced pluripotent stem cell (iPSC) derived neurons from a sporadic AD and non-AD (control) patient and determine the effect of α-toc treatment on neurite length, as well as markers of oxidative and nitrosative stress. Simultaneous tandem time-of-flight secondary ion mass spectrometry imaging indicated that the distribution of α-toc was restricted to the soma in sporadic AD neurons, in contrast to control neurons, where it was localised in the neurites and soma. Neurite length in sporadic AD neurons was significantly reduced in comparison to control neurons, while treatment with α-toc for 7 days increased neurite length in both sporadic AD and control neurons. In addition, α-toc treatment significantly reduced the level of peroxidation, a marker of oxidative stress, and nitrite, a marker of nitrosative stress, in sporadic AD neurons. Our results indicate that sporadic AD neurons could have an increased susceptibility to lipid peroxidation and oxidative stress due to the restricted distribution of α-toc to the soma of neurons. Furthermore, we demonstrate that treatment with α-toc is neuroprotective by increasing neurite length, in association with reducing markers of AD pathology including oxidative and nitrosative stress.
THE UBIQUITIN SIGNALLING PLAYS AN ESSENTIAL ROLE IN THE GENERATION OF INDUCED PLURIPOTENT STEM CELLS AND iPSC-DERIVED MOTOR NEURONS

Monique Bax
Illawarra Health and Medical Research Institute
monique_bax@outlook.com

Monique Bax¹, Jess McKenna², Dzung Do-Ha¹, Martin Engel¹, Shu Yang³, Ian Blair³, Justin Yerbury¹, Darren Saunders², Lezanne Ooi¹

1. Illawarra Health and Medical Research Institute, 2 University of New South Wales
3 Macquarie University

The ubiquitin proteasome system (UPS) is an essential post-translational modifying mechanism which is increasingly implicated in both development and disorders such as motor neurone diseases. We investigated the susceptibility of induced pluripotent stem cell (iPSC)-derived motor neurons and derivative cell stages including iPSCs and fibroblasts to UPS stress, and subsequently, UBA1 inhibition via PYR41 treatment. UBA1 inhibition at a high concentration (10 µM PYR41) significantly decreased early stage neurite outgrowth in motor neuron precursors and was cytotoxic upon repeated doses; long-term low level UPS stress (1 µM PYR41) was found to significantly decrease motor neuron viability over a four week treatment. Surprisingly, iPSC were extremely susceptible to UBA1 inhibition which caused total cell death in less than 16 h at 1 µM PYR41. Together these results indicate that the UPS is fundamental in the generation of iPSC-derived motor neurons. We therefore sought to map the changing ubiquitinated proteome (ubiquitome) in cultured motor neurons and the same derivative cell stages. We have identified ~1500 ubiquitinated proteins across various functional pathways including neuron differentiation, cell cycle and the UPS itself. These findings indicate a significant role for ubiquitin in the regulation of a wide variety of cellular mechanisms essential to these cell types. Studying these changes could further improve motor neuron modelling, an essential task for therapeutic development for a range of devastating motor neurone diseases.
BRAINPHYS AND SMALL MOLECULE INHIBITORS IMPROVE NEURONAL DIFFERENTIATION AND MATURATION OF INDUCED PLURIPOTENT STEM CELLS INTO MOTOR NEURONS

Dzung Do-Ha
University of Wollongong
pddh859@uowmail.edu.au

Do-Ha D¹, Stevens CH¹, Cabral-da-Silva MC¹, Bax M¹, Yang S², Blair I², Engel M¹, Buskila Y³, Ooi L¹

1. IHMRI, SMAH, University of Wollongong 2. Centre for MND Research, Faculty of Medicine and Health Sciences, Macquarie University 3. School of Medicine, Western Sydney University

The use of induced pluripotent stem cells (iPSCs) has revolutionised research into neurodegenerative diseases, including motor neurone disease. However, the challenge remains to generate, in a short time period, mature neuronal cultures that closely resemble neurons in vivo in terms of their protein expression profile and electrophysiological properties. In this study we investigated the effects of altering basal medium and growth factor composition to differentiate functional and mature motor neurons. Using immunocytochemistry and whole cell patch clamping we confirmed the expression of motor neuron markers and measured neuronal membrane properties, voltage-dependent K+ and Na+ currents and firing properties of iPSC-derived motor neurons. After 4 weeks of maturation, neurons cultured in Neurobasal medium exhibited a resting membrane potential (RMP) of -10 mV, while neurons cultured in BrainPhys, which closely resembles physiological ion concentrations, exhibited a significantly lower RMP of -35 mV (p < 0.0001). The use of small molecule inhibitors (SMIs) in combination with BrainPhys yielded neurons with a RMP of -45 mV within 3 weeks of maturation. Only 50% of patched neurons were active using BrainPhys without SMI, while 100% of patched neurons were electrophysiologically active when maturing with SMIs. Spike trains, which were only observed in SMI treated neurons, were present in 76% of neurons. Concurrently Na+ currents in SMI-treated neurons peaked at 2.4 nA, whilst neurons cultured in BrainPhys without SMIs only reached 0.75 nA. Together this data suggests the use of BrainPhys with SMI is useful for efficient generation of homogenous, functionally mature motor neurons in vitro.
ARE PUBERTY BLOCKERS AS SAFE AS CLAIMED?

ABSTRACT

Gonadotrophin releasing hormones (GnRH) are formed in the hypothalamus and released in pulsatile fashion into the pituitary portal veins to bind to receptors on the anterior pituitary to stimulate the release of the gonadotrophin hormones, FSH and LH.

Analogs of GnRH bind tenaciously to pituitary receptors preventing release of FSH and LH. Originally used to block secondary release of sex hormones in such diseases as prostate cancer, use was extended to precocious puberty, then childhood gender dysphoria. Medical witnesses have advised Family Courts of Australia that such use is ‘safe’ with ‘effects that are entirely reversible’. Is that so?

Literature review and discussions with prominent researchers reveals widespread presence and effect of GnRH, and deleterious consequences from blocking. Receptors have been found in extra-pituitary sites including the limbic system, spinal cord and myenteric bowel plexi. Blocking of puberty in sheep resulted in hypertrophy of the amygdala associated with major interruption of its genetic activity and interference in memory and increased emotional vulnerability. Administration of GnRH into the brains and ventricles of rats and sheep facilitates sexualised behaviour. Administration of blockers to adults with prostate cancer and endometriosis has strongly suggested reduction in executive function, and been associated with gastro-intestinal symptoms.

Therefore, blockers may not be as safe as claimed. Perhaps their deleterious effect is due to interruption of neuromodulation by neurosteroids. One researcher argues a reduction in neuronal aromatase.

Conclusion. Though blockers are claimed to be safe in childhood gender dysphoria, experience in adults suggests otherwise, while laboratory research confirms disruption in sexualised behaviour and limbic function.
Protein arginine methylation is a post-translational modification involved in many cellular processes, such as regulation of signal transduction, transcription, facilitating protein-protein interactions, RNA transport and splicing. It is becoming increasingly evident that protein arginine methylation is also an important regulator of the cell cycle and DNA damage repair pathways. Important regulatory proteins, such as cyclin D1, p53, p21, and the retinoblastoma protein are methylated or associate with protein arginine methyltransferases (PRMTs), the enzymes responsible for arginine methylation. PRMTs are often overexpressed in cancers, leading to aberrant methylation patterns correlating with poor recovery prognosis. Brain cancer is one of the most aggressive types of cancer— the 5 year survival rate for patients in Australia is only 20%. PRMT1 forms a complex, the methylosome, to initiate methylation of histone 4 arginine 3 to activate transcription of genes associated with glioblastoma, such as EGFR, AKT, and CDK6. PRMT1 expression was upregulated in glioblastoma tissues and cell lines when compared to normal brain tissues. PRMT8 is only present in the CNS and supposedly not expressed in glioblastoma. The aim of this study is to further investigate the role of protein arginine methylation in cancer by investigating PRMT1 regulation of the cell cycle in glial and glioblastoma cells. Preliminary data suggest that the PRMT1/8-specific inhibitor CID5380390 is cytotoxic to glial cells but cytostatic to glioblastoma cells. Inhibition of PRMT1/8 also leads to cell cycle arrest in the S phase of the glial cell line SVGp12 and the glioblastoma cell lines A172 and U87MG, while the glioblastoma cell line T98G is arrested in the G2/M phase. Further work is required to determine the pathway by which this regulation occurs. It is critical to identify drug targets for the development of novel cancer treatments that will reduce the high mortality rate associated with brain cancer.
Eating disorders are serious, complex mental illnesses. Binge eating is a debilitating cardinal symptom of eating disorders, seen across the Diagnostic and Statistical Manual (DSM-5) eating disorder diagnostic groups. Recurrent binge eating is a diagnostic criteria for Bulimia Nervosa (BN), Binge Eating Disorder (BED) and Anorexia Nervosa-Binge Purge type (AN-BP) and is a common feature of Other Specified Feeding and Eating Disorder (OSFED). With advances in neuroimaging techniques, an emerging body of research has been published on the neurobiological processes and potential underpinnings of Anorexia Nervosa (AN). There have been a large number of structural neuroimaging studies completed since the 1980’s, followed by a growing body of research using functional magnetic resonance imaging (fMRI) in more recent years. However the neurobiological research on BN and BED is not as substantial. A clear and comprehensive understanding of the neurobiological functioning of people who binge eat in the form of a systematic review was therefore required. A systematic literature search was completed across five electronic databases: PubMed, PsycInfo, Medline, Web of Science and Google Scholar. A quality appraisal was undertaken. Overall, n=32 studies were included in the review, utilising a heterogenous range of neuroimaging techniques and procedures. The findings summarise a number of structural and functional brain differences found in individuals with a diagnosed eating disorder characterised by recurrent binge eating, including: areas of neural activation in response to images of food; reward-related brain regions; neurotransmitter function; regional cerebral blood flow; and, blood oxygen level dependent response (BOLD).
LABORATORY DIETS HIGH IN SOY LEAD TO SEX-SPECIFIC CHANGES IN BODY WEIGHT AND ESTROGEN RECEPTOR GENE EXPRESSION

Caitlin Finney
University of New South Wales
c.finney@student.unsw.edu.au

Finney C (1), Jenner AM (2), Westbrook RF (1), Clemens KJ (1)
1. School of Psychology, University of New South Wales. 2. Bioanalytical Mass Spectrometry Facility, University of New South Wales.

Standard laboratory rodent diets used in Australia often contain high amounts of soy-derived xenoestrogens known as isoflavones. These isoflavones are direct, high-affinity agonists at brain estrogen receptors (ER) α and β. The consequences of dietary isoflavones on estrogen signaling in the brain are unknown. We compared the effects of two commonly used Australian standard rodent diets, Gordon’s Premium Rat and Mouse Pellets (G-Std) and Specialty Feed’s Irradiated Rat and Mouse Diet (SF-Std), with Specialty Feed’s phytoestrogen-free diet (SF-AIN93G) on body weight and estrogen receptor expression in the striatum of adult male and female rats. Gas Chromatography-Tandem Mass Spectrometry (GC/MS/MS) analysis of each diet confirmed isoflavone content was highest in SF-Std and ordered SF-Std > G-Std > SF-AIN93G. Male, but not female, rats fed the SF-AIN93G diet gained significantly more weight than those fed the other diets. Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) analysis revealed that expression of the ERβ gene in the striatum was less in both male and female rats receiving SF-AIN93G diet than those fed the other diets. However, there were no between-group differences in ERα gene expression. These data show that dietary isoflavone content affects estrogen receptor expression in the rat brain, which may have implications for rodent models of neurobiological diseases that are influenced by estrogen, including schizophrenia and addiction.
Poster Session

LIGHTING THE PATHWAY FOR PARKINSON’S DISEASE
Caroline Xie
University of New South Wales
asheeta.prasad@unsw.edu.au

Caroline Xie and Asheeta A. Prasad School of Psychology, UNSW Sydney

The striatum is the brain region critical in regulating movement and has two major outputs, known as the direct and indirect pathways. The direct pathway directly inhibits dopamine neurons, which facilitates movement. Whereas the indirect pathway projects to the globus pallidus (GP) which then relays to the subthalamic nucleus (STN), glutamatergic inputs from the STN excites dopamine neurons and inhibits motor output. These pathways work in concert to exert well-balanced control over movement. Disturbances in these neural pathways are hallmarks of Parkinson’s Disease. In addition to motor control, basal ganglia connectivity also influences motivation, cognition and reward seeking behaviour. PD patients also suffer from anxiety, motivation and cognition deficits. Deep brain stimulation of Subthalamic nucleus (STN) and Globus pallidus (GP) are current therapeutic surgical procedures for patients with Parkinson's disease. Yet the effects of STN and GP manipulation on non-motor behaviours are unclear. We found simultaneous chemogenetics inhibition of ventral GP and STN has no effect on locomotor, however significantly reduces motivation for reward (alcohol) seeking. Consistent with other studies our results show that inhibition of these brain regions does not affect motor control. These results demonstrate that these brain regions are important for motivational behaviour.
Poster Session

RATE OF RISE IN DIASTOLIC BLOOD PRESSURE INFLUENCES VASCULAR SYMPATHETIC RESPONSE TO MENTAL STRESS

Chloe Taylor
Western Sydney University
c.taylor@westernsydney.edu.au

Chloe E Taylor(1), Khadigeh ElSayed(1), Vaughan G Macefield(1,2), Sarah L Hissen(1), Michael J Joyner(3)
1. Western Sydney University, Australia 2. Mohammed Bin Rashid University of Medicine and Health Sciences, Dubai 3. Mayo Clinic, Rochester, US

Research indicates that individuals may experience a rise (positive responders) or fall (negative responders) in muscle sympathetic nerve activity (MSNA) during mental stress. The aim was to examine the early blood pressure response to stress in positive and negative responders and thus its influence on the direction of change in MSNA. Blood pressure and MSNA were recorded continuously in 21 healthy young males during 2 min mental stressors (mental arithmetic, Stroop test) and physical stressors (cold pressor, handgrip exercise, post-exercise ischaemia). Participants were classified as negative or positive responders according to the direction of the mean change in MSNA during the stressor tasks. The peak changes, time of peak and rate of changes in blood pressure were compared between groups. During mental arithmetic negative responders experienced a significantly greater rate of rise in diastolic blood pressure in the first minute of the task (1.3 ± 0.5 mmHg s−1) compared with positive responders (0.4 ± 0.1 mmHg s−1; P = 0.03). Similar results were found for the Stroop test. Physical tasks elicited robust parallel increases in blood pressure and MSNA across participants. It is concluded that negative MSNA responders to mental stress exhibit a more rapid rise in diastolic pressure at the onset of the stressor, suggesting a baroreflex-mediated suppression of MSNA. In positive responders there is a more sluggish rise in blood pressure during mental stress, which appears to be MSNA-driven. This study suggests that whether MSNA has a role in the pressor response is dependent upon the reactivity of blood pressure early in the task.
Cardiac perivascular and myocardial remodelling in animal model of chronic kidney disease

Cindy Sia
Macquarie University
cindy.sia@students.mq.edu.au

SIA, CR, Vander Wall, RJ, Underwood, CF, Phillips, JK. Faculty of Medicine and Health Sciences, Macquarie University, Sydney, Australia.

Chronic kidney disease (CKD) is commonly associated with hypertension and cardiac remodelling. We tested the hypothesis that cardiac perivascular fibrosis and myocardial remodelling contributes to the pathogenesis of cardiovascular disease in the Lewis Polycystic Kidney rat (LPK) model of CKD. Left ventricular free wall tissue samples from LPK (n=5) and control Lewis rats (n=5) were used to record the ratio of perivascular fibrosis to vascular diameter. Left ventricle tissue samples were fixed in 4% formaldehyde, embedded in paraffin, sectioned into 7-μm-thick slices and mounted onto slides. Following this, the sections were stained with Masson’s trichrome solution and imaged using a light microscope (Zen 2.0 Pro) equipped with a computer-based image analyser. The thickening of the perivascular fibrosis and myocardial interstitial fibrosis was determined from 20x magnification image from each animal. Results indicated the degree of fibrosis in 12 week old LPK vs. Lewis was a significant difference. T-test comparison showed elevation of fibrosis formation was present in LPK (p<0.05). This data suggests that in the LPK, perivascular fibrosis formation in cardiac tissues contributes to the pathogenesis of cardiovascular remodelling of CKD. Further investigation will be necessary to elucidate the source of this mechanism responsible for mediating this homeostatic response in this model of CKD.
Poster Session

THE BEHAVIOURAL AND HISTOLOGICAL EFFECTS OF REPEATED HYPERTONIC SALINE INJECTIONS ON RAT MUSCLE TISSUE, USING MINOCYCLINE AS A NEUROPROTECTANT

Clare Loudon
Western Sydney University
C.Loudon@westernsydney.edu.au

Clare J.L. Loudon\textsuperscript{1}, Mohamad S. Samour\textsuperscript{1}, David A. Mahns\textsuperscript{1} and Peter J. Shortland\textsuperscript{2}
1-School of Medicine, 2-Science and Health, Western Sydney University, Penrith NSW 2751 Australia

Repeated intra-muscular injections of 5\% hypertonic saline (HS) in humans produce cutaneous and muscle hypersensitivities to mechanical and thermal stimuli that can be moderated by oral administration of the tetracycline antibiotic minocycline. However, the mechanisms underlying this change remain elusive. In this study, an animal model was developed that replicates many of the behavioural changes seen in humans. Repeated injections of HS induced bilateral mechanical, but not heat, hypersensitivity by the fourth injection. Concurrent administration of minocycline (40\text{mgkg}\textsuperscript{-1} i.p.), but not normal (0.9\%) saline, prevented the induction of mechanical hypersensitivity with repeated HS injections. Histological staining of the calf muscles with H&E and subsequent quantitative analysis of the muscle fibre perimeter and diameter using image\textsuperscript{J} software revealed that there was slight damage to muscle fibres at the injection site along with heavy infiltration of inflammatory cells, erythrocytes. Adjacent to, and further away from, the injection site, analysis showed that HS injection had no discernible effects on fibre diameter or perimeter compared to normal saline injection or naïve, non-injected muscles. Surprisingly, minocycline treatment produced a significant increase in muscle fibre area compared to all other groups. The results show that this model replicates the human model of persistent hypersensitivity and can be used to further explore the mechanisms of minocycline in preventing pain hypersensitivities.
Poster Session

CENTRAL COMMAND, BUT NOT THE METABOREFLEX, IS RESPONSIBLE FOR THE INCREASE IN MUSCLE SYMPATHETIC NERVE ACTIVITY TO CONTRACTING MUSCLE DURING STATIC EXERCISE IN HUMANS

Daniel Boulton
Western Sydney University
d.boulton@westernsydney.edu.au

Boulton D1, Taylor CE1,2, Green S1,2,3, Macefield VG2,3,4
1. School of Science and Health, Western Sydney University, Sydney 2. School of Medicine, Western Sydney University, Sydney 3. Neuroscience Research Australia, Sydney 4. Mohammed Bin Rashid University of Medicine & Health Sciences, Dubai, UAE

Purpose. Central command is an important controller of muscle sympathetic nerve activity (MSNA) to contracting muscle (Boulton et al., 2014). The muscle metaboreflex can increase MSNA to non-contracting muscle during exercise and post-exercise ischaemia when central command is absent, but it is unclear whether it also increases MSNA to contracting muscle. The present study tested the hypothesis that the metaboreflex does not contribute to the increase in MSNA to contracting muscle. Methods. MSNA was recorded continuously (microneurography) from the left common peroneal nerve. Eleven subjects performed four-minute ankle dorsiflexions at 10% of maximum voluntary force under three different conditions: with no ischaemia during and after exercise, with post-exercise ischaemia only and with ischaemia during and after exercise, which were repeated in the right leg. Results. MSNA to contracting muscles increased and plateaued within one minute of contraction (34±10 vs 50±18 spikes/min, no ischaemia, P=0.01), returned to pre-contraction levels within one minute of ending contraction and was not influenced by ischaemia during or after contraction. In contrast, MSNA to non-contracting muscles was not different to pre-contraction levels in the first minute of contraction (32±5 vs 34±9 spikes/min, no ischaemia, P=0.48), but was significantly greater by the second minute (44±8 spikes/min, P=0.01). Ischaemia augmented the MSNA response to contraction to non-contracting muscles only and caused MSNA to remain elevated during post-exercise ischaemia. Conclusion. These findings indicate that metaboreflex activation increases MSNA to non-contracting, but not contracting muscle, and that only central command is responsible for the increase in MSNA to contracting muscles. Boulton D, Taylor CE, Macefield VG & Green S. (2014) Effect of contraction intensity on sympathetic nerve activity to active human skeletal muscle. Frontiers in Physiology, 5(194), 1-9.
DISORDERED EATING BEHAVIORS, WEIGHT ADEQUACY AND BMI TRAJECTORY IN STUDENTS FROM RIO DE JANEIRO: A LONGITUDINAL STUDY IN ADOLESCENTS.

Danilo Dias Santana
Western Sydney University
D.DiasSantana@westernsydney.edu.au

Danilo Dias Santana1,2; Diana Cunha3, Rosely Sichieri3, Gloria Valeria da Veiga1 1 Josué de Castro Institute of Nutrition, Federal University of Rio de Janeiro, Brazil 2 Visiting Fellow, School of Medicine, WSU 3 Institute of Social Medicine, University of State of Rio de Janeiro, Brazil.

Objective: To investigate associations between disordered eating behaviors (DEB), weight adequacy and BMI trajectories in adolescents. Methods: High school students, n=1131, from two public schools and four private ones, were followed from the 1st to 3rd year (2010 until 2012). Participants completed a self-report survey including questions on binge eating episode frequency, purgative behaviors (laxative and diuretic misuse and self-induced vomiting) and restrictive dieting. Weight adequacy was estimated from BMI (kg/m2) and classified according to WHO criteria. Chi-square tests were used to analyse associations between the variables, and linear models of mixed effects were used for analysis of repeated measures in time with p value <0.05 for statistical significance. Results: More than half of the students (57.1%) had episodes of binge eating, 29.9% were on a restrictive diet, and 7.4% had purgative behaviors. The frequency of disordered eating behaviors was higher in girls than in boys. Higher frequency of overweight was observed in girls from private schools who had binge eating compared to those who did not have this behavior (31.6% vs 19.3%, p = 0.021). Boys (private schools: 52.1% vs 30.6%, p = 0.005, public schools: 43.9% vs 16.5%, p <0.001) and girls (private schools: 40.2% vs 16.6%, p <0.001, public schools: 28.7% vs 19.0%, p = 0.040) who were on a restrictive diet also had a higher frequency of overweight compared to those who did not have this disordered eating behavior. There was no association between disordered eating behaviors and BMI trajectory in the follow-up period. Conclusion: The association of disordered eating behaviors with adequacy of weight indicates that these are health problems that may influence the nutritional status of adolescents. Advances and applications of the study: The study advances knowledge regarding the association of disordered eating behavior with BMI trajectory and weight adequacy in adolescents from public and private schools. Keywords: disordered eating behaviors, body mass index, adolescents, middle school, high school. Financing source: National Research Council, Foundation for Research Support of the State of Rio de Janeiro e Commission for the Improvement of Higher Education Personnel. Conflict of interest: None to declare.
INVESTIGATING CELLULAR PATHWAYS TRIGGERING AXONAL DEGENERATION IN A CONDITIONAL KNOCK IN MOUSE MODEL FOR X-LINKED DISTAL HEREDITARY MOTOR NEUROPATHY (Atp7aT985I)

Giulia del Rosso
ANZAC Research Institute
giul.delrosso@gmail.com

Giulia del Rosso1,4, Gonzalo Perez-Siles1,3, Melina Ellis1, Carolyn Ly1, Garth A. Nicholson1,2,3, Marina L. Kennerson1,2,3.

1. Northcott Neuroscience Laboratory, ANZAC Research Institute, Concord, NSW, Australia. 2. Molecular Medicine Laboratory, Concord Hospital, Concord, NSW, Australia. 3. Sydney Medical School

Distal hereditary motor neuropathies (dHMN) comprise a clinically and genetically heterogeneous group of disorders predominantly affecting motor neurons in the peripheral nervous system. X-linked dHMN (dHMNX) is caused by mutations in the ATP7A gene (Kennerson, et. al 2010). ATP7A is a P-type ATPase essential for cellular copper (Cu) transport and homeostasis. We recently published an Atp7a conditional knock in mouse model of dHMNX expressing Atp7aT985I, the orthologue of the human ATP7AT994I mutation identified in dHMNX patients (Perez-Siles et. al 2016). Atp7aT985I mice show evidence of nervous system Cu dysregulation and a molecular phenotype in Atp7aT985I embryonic fibroblasts that recapitulates the pathogenic cellular events observed in dHMNX patient fibroblasts with the ATP7AT994I mutation. Despite the absence of a global neuromuscular phenotype in aged mice, 24 months old affected mice have abnormal muscle pathology. This data indicates Atp7aT985I mice represent a valuable model to investigate early cellular events caused by dysregulation of Cu that precede degeneration of axons. In this project we aim to identify cellular pathways affected by Cu dysregulation that may contribute to axonal degeneration in Atp7aT985I. Using primary motor neurons and tissues from Atp7aT985I animals we are currently investigating cellular processes including NMDA mediated excitotoxicity, aberrant protein interactions of mutant ATP7A with specific targets and autophagy. Alterations of these processes may be the cause of selective degeneration of motor neurons. We are also performing histopathology on 6 and 12 months old Atp7aT985I mice to determine the specific time points where the abnormal muscle pathology is first observed in affected animals. Together, these experiments will allow further characterisations of the molecular phenotype of dHMNX and the time course of cellular events leading to the process of axonal degeneration in this disease.
Poster Session

TENILSETAM ATTENUATES NEUROINFLAMMATION IN GFAP-IL6 MICE
Huazheng Liang
Western Sydney University
a.liang@westernsydney.edu.au

Huazheng Liang1,2*, Erika Gyengesi1,2*, Christopher Millington1, Gerald Münch1,2
1. Department of Pharmacology, School of Medicine, Western Sydney University 2. Molecular Medicine Research Group, School of Medicine, Western Sydney University

Aims: To test whether tenilsetam, a radical scavenger and anti-oxidant, has anti-inflammatory effect in a neuroinflammation model GFAP-IL6 mice. Methods: GFAP-IL6 mice were divided into 2 groups and they were fed with tenilsetam enriched food pellets and control food pellets respectively, for 5 and 15 months starting from the age of 3 months. Wild type C57BL/6 mice were fed with control food pellets for the same time periods as a control group. A marker for neuroinflammation- activated microglia and cerebellar volume were examined using the unbiased stereological method. Results: Tenilsetam decreased the number of activated microglia in the cerebellum of GFAP-IL6 mice at both time points with a further reduction at 18 months. Tenilsetam also restored the cerebellar volume at 8 months. Regarding the density of microglia in the cerebellum, tenilsetam decreased the density of microglia in GFAP-IL6 mice to a similar level after 5 and 15 months’ feeding. Conclusion: Tenilsetam has anti-inflammatory effect evidence by the decreased number of activated microglia and restored tissue volume.
IMPAIRED BEHAVIOURAL FLEXIBILITY AFTER REWARD DEVALUATION IN PEOPLE WITH OBSESSIVE-COMPULSIVE DISORDER: VENTROMEDIAL PREFRONTAL CORTEX HYPOACTIVITY AND CORTICOSTRIATAL DISconnection
Iain Perkes
University of Sydney
iain.perkes@sydney.edu.au
IE Perkes,1-6 RW Morris,1,5,6 S Quail,1 PL Hazell,2-3 BW Balleine1,6
5. Australian Research Council, Centre for Cognition and its Disorders 6. School of Psychology, UNSW

Obsessive-compulsive disorder (OCD) is common, disabling, and current treatments are inadequate for half of people with OCD. Understanding pathophysiology will enable development of better treatment options. Painful skin damage resulting from handwashing fails to reduce obsession-prompted compulsive handwashing in people with OCD. OCD imaging studies repeatedly implicate the caudate. Repetitive behaviour despite changing outcomes characterises OCD, autism, eating disorders, substance use, schizophrenia, and dementia. With variable clinical phenotypic operationalisation, we do not know the neural substrates of repetitive behaviour within or between clinical diagnoses. Outcome devaluation, a cross-species test of behavioural flexibility, provides physiological and anatomical specificity. Anatomical correlates of behaviours targeting valued outcomes after devaluation include the caudate and medial PFC. We found adolescents (n=21) with OCD, compared with controls (N=20), were less able to earn achieve preferred outcomes after devaluation. That impairment was associated with ventromedial prefrontal cortex (vmPFC) hypoactivity relative to controls. The vmPFC and caudate were physiologically responsible for this task. vmPFC-seeded DTI analysis found reduced tract strength to the caudate in adolescents with OCD. There was also a positive correlation between vmPFC-caudate tract strength and difference between valued and devalued actions. Behavioural insensitivity to outcome devaluation tests, and associated vmPFC changes, are also present in adults with schizophrenia. The current finding contributes to transdiagnostic research of behavioural flexibility in brain disorders. We know need to understand points of difference that give rise to various phenotypic expressions.
REGIONAL BRAIN NETWORK ORGANIZATION DISTINGUISHES THE COMBINED AND INATTENTIVE SUBTYPES OF ATTENTION DEFICIT HYPERACTIVITY DISORDER

Jacqueline Saad  
University of Sydney  
Jacqueline.saad@sydney.edu.au

Jacqueline F. Saad¹,², Kristi R. Griffiths¹, Michael R. Kohn¹,³, Simon Clarke¹,³, Leanne M. Williams⁴,⁵, Mayuresh S. Korgaonkar¹,²

¹.Brain Dynamics Centre, The Westmead Institute for Medical Research, The University of Sydney  
².The Discipline of Psychiatry, University of Sydney Medical School

Aims Attention Deficit Hyperactivity Disorder (ADHD) is characterized clinically by hyperactive/impulsive and/or inattentive symptoms which determine diagnostic subtypes as Predominantly Hyperactive-Impulsive (ADHD-HI), Predominantly Inattentive (ADHD-I), and Combined (ADHD-C). Neuroanatomically though we do not yet know if these clinical subtypes reflect distinct aberrations in underlying brain organization.

Methods We imaged 34 ADHD participants defined using DSM-IV criteria as ADHD-I (n=16) or as ADHD-C (n=18) and 28 matched typically developing controls, aged 8-17 years, using high-resolution T1 MRI. To quantify neuroanatomical organization we used graph theoretical analysis to assess properties of structural covariance between ADHD subtypes and controls (global network measures: path length, clustering coefficient, and regional network measures: nodal degree). As a context for interpreting network organization differences, we also quantified gray matter volume using voxel-based morphometry.

Results Each ADHD subtype was distinguished by a different organizational profile of the degree to which specific regions were anatomically connected with other regions (i.e., in “nodal degree”). For ADHD-I (compared to both ADHD-C and controls) the nodal degree was higher in the hippocampus. ADHD-I also had a higher nodal degree in the supramarginal gyrus, calcarine sulcus, and superior occipital cortex compared to ADHD-C and in the amygdala compared to controls. By contrast, the nodal degree was higher in the cerebellum for ADHD-C compared to ADHD-I and in the anterior cingulate, middle frontal gyrus and putamen compared to controls. ADHD-C also had reduced nodal degree in the Rolandic operculum and middle temporal pole compared to controls. These regional profiles were observed in the context of no differences in gray matter volume or global network organization.

Discussion Our results suggest that the clinical distinction between the Inattentive and Combined subtypes of ADHD may also be reflected in distinct aberrations in underlying brain organization.
OPTOGENETIC DISSECTION OF A NEURAL CIRCUIT LINKING THE AMYGDALA, NUCLEUS ACCUMBENS SHELL AND THE LATERAL HYPOTHALAMUS.

Jun Hua Bowen Lim
University of New South Wales
bowenlimjh@gmail.com

Jun Lim¹, Gabrielle Gibson², Gavan McNally² and John Power¹
1- School of Medical Sciences, UNSW Sydney 2- School of Psychology, UNSW Sydney

The neural circuits underlying the extinction of drug seeking behaviour are poorly understood. Previous studies have implicated neuronal projections from the basolateral amygdala (BLA) to the accumbens shell (AcbSh) (BLA->AcbSh) as well as projections from the AcbSh to the lateral hypothalamus (LH) (AcbSh->LH), to be involved in the extinction of drug seeking. However, despite their related functionality, it is unclear whether the BLA, AcbSh and LH are connected directly via a BLA-AcbSh-LH pathway. Here we used electrophysiological recordings, optogenetic stimulation, and retrograde neural labelling to determine whether BLA neurons synapse on AcbSh neurons that project to the LH. A virus encoding Channel Rhodopsin 2 (ChR2) was injected into the BLA and Alexa Fluor 555 conjugated Cholera Toxin Subunit B (CTb555) was injected into the LH of male Sprague Dawley rats. Whole-cell patch clamp recordings were made from LH projecting (CTb555 labelled) AcbSh neurons in brain slices. Photo-activation of BLA terminals evoked a short latency excitatory synaptic response, indicative of a monosynaptic connection in 7 of 14 neurons. AcbSh projection neurons are GABAergic, thus excitation of BLA neurons would have an inhibitory action on LH target neurons.
A PRACTICAL METHOD FOR PARAFFIN EMBEDDING OF INDIVIDUAL ZEBRAFISH LARVAE

Lea Abdulkhalek
University of Sydney
labd7903@uni.sydney.edu.au

Lea Abdulkhalek (1), Maggie Lee (2), Michael Buckland (1, 2), Marco Morsch (3), and Manuel B. Graeber (1)
The University of Sydney (1), RPA Hospital (2), and Macquarie University (3), Sydney, NSW, Australia

Several methods for performing high-throughput zebrafish histology exist (1-2). However, research projects requiring work-up of individual larvae are not eligible for this approach. Consequently, technical issues with handling zebrafish larvae have to be overcome on an individual basis. They are substantial and it has been claimed that "due to their small size (~ 4 mm x 0.5 mm x 1 mm for 7-day-old zebrafish), histology on individual larvae is impractical" (1). Yet, as part of our research into synaptic and glial changes we require detailed histological analyses of individual zebrafish brains following experimental manipulation of extrinsic axons. We have successfully used surgical biopsy foam pads to hold individual zebrafish larvae in place and to preserve their overall anatomic orientation during automatic tissue processing in a Leica TP1020 tissue processor. Specifically, individual zebrafish larvae were sandwiched between two pads of the type that is commonly used for securing the smallest surgical biopsies in embedding cassettes of various pore sizes for paraffin processing. The foam inlays provided reliable support not only for the actual embedding run but also during subsequent target preparations and the remounting of blocks, which is sometimes required. As expected, use of diagnostic quality foam pads did not interfere with downstream tissue processing thus allowing both sectioning and staining of paraffin sections at a high standard. We recommend the use of surgical biopsy foam pads for the effective paraffin embedding of individual zebrafish larvae.

Poster Session

MOUSE MODEL OF AN AMYOTROPHIC LATERAL SCLEROSIS-ASSOCIATED PROFILIN 1 MUTATION
Merryn Brettle
University of New South Wales
M.brettle@unsw.edu

Merryn Brettle1,2, Holly Stefen1,3, Josephine Chan1, Aleksandra Djordjevic1, Fabien Delerue2,4, Yazi Ke2, Lars Ittner2,4,5, Thomas Fath1,3 ANAT, SOMS, UNSW, Sydney, Australia

Amyotrophic lateral sclerosis (ALS) is a devastating neurodegenerative disease that impacts upper and lower motor neurons. Although sporadic disease is more common, familial models provide a unique tool for studying the pathogenesis of ALS. Sporadic and familial disease present with similar symptoms and histopathological features. Mutations in profilin 1, an actin-associated protein, are a rare cause of familial ALS. To elucidate the role that PFN1C71G plays in ALS, we have developed a novel mouse model with expression of PFN1C71G targeted to α-motor neurons in the spinal cord. Data shows V5-PFN1C71G expression in the anterior horn of the neural tube starting from embryonic stages in transgenic mice. Mendelian inheritance is observed at embryonic ages, however, at the time of weaning, significantly reduced numbers of transgenic mice results in a shift away from Mendelian inheritance. Motor testing shows that transgenic mice have motor deficits on RotaRod when compared with control littermates. This novel mouse model of PFN1C71G will provide a potential tool to understand the role that PFN1 plays in the pathogenesis of ALS. Understanding the pathogenesis of ALS is essential for the development of treatments.
COMPARISON OF THE BALLISTIC CONTRACTILE RESPONSES GENERATED DURING MICROSTIMULATION OF SINGLE HUMAN MOTOR AXONS WITH BRIEF IRREGULAR AND REGULAR STIMULI

Michael Leitch
Western Sydney University
m.leitch@uws.edu.au

M.A. Leitch & V.G. Macefield, School of Medicine, Western Sydney University, NSW, Australia, 2560.

Introduction: Ballistic contractions are generated by brief, high frequency (60-100 Hz) trains of action potentials in motoneurones. During ramp voluntary contractions human motoneurones exhibit significant discharge variability of ~20% and this discharge variability has shown to be advantageous to the neuromuscular system. We hypothesized, that ballistic contractions incorporating discharge variability (irregularity) generate greater isometric forces than constant-frequency (regular) trains with zero physiological variability.

Methods: High impedance tungsten microelectrodes were inserted into the common peroneal nerve and single motor axons were stimulated with both irregular and regular trains of stimuli, with identical mean frequencies ranging from 57.8-68.9 Hz. Results: Irregular trains generated significantly greater isometric peak forces than regular trains over identical mean frequencies.

Conclusions: That the high forces generated by ballistic contractions are not solely based on high frequencies, but rather a combination of the high firing rates and physiological discharge irregularity. It appears that irregular ballistic trains take advantage of the “catch-like property” of muscle, allowing augmentation of force.
Poster Session

INVESTIGATING THE ASSOCIATIONS BETWEEN ADHD SYMPTOMATOLOGY AND CHRONIC ILLNESS: CARDIOVASCULAR DISEASE AND DIABETES MELLITUS

Michael Vine
University of Technology
Michael.A.Vine@student.uts.edu.au

Michael Vine *,*** Ty Lees *,*** Najah Nassif ** Ann Simpson ** Sara Lal *,** Neuroscience Research Unit * School of Life Sciences ** University of Technology Sydney

Attention-deficit/hyperactivity disorder (ADHD) is a prevalent mental health disorder affecting both children and adults, although a large population may remain undiagnosed. The autonomic nervous system (ANS) is vital in the maintenance of functions affected by ADHD, therefore a relationship may exist between ADHD and ANS dysfunction. Furthermore, the ANS has key roles in the cardiac and metabolic systems. Heart rate variability (HRV) is a prevalent method of measuring ANS function and has been used to assess cardiovascular disease (CVD) and metabolic risk. As there have been no significant studies of HRV and/or DM in adult ADHD, the current study aimed to address this research gap. This exploratory study recruited 41 (21 male: 20 female; mean age =28.76 ± 11.38) participants from the general population. ADHD symptoms were assessed using the Adult ADHD Self-Report Scale, and HRV parameters (low frequency/LF, high frequency/HF, LF:HF ratio and total power/TP) were assessed via a 3 lead, 10-min resting electrocardiogram. Blood glucose levels and glycated haemoglobin measurements were taken using the finger prick method. Mean inattentive ADHD subtype scores = 15.37 ± 5.72, mean hyperactive/impulsive ADHD subtype scores = 14.41 ± 5.51 (both with maximum scores of 36) and mean combination ADHD subtype scores = 29.78 ± 9.75 (maximum score = 72). Mean blood glucose level = 5.22 ± 0.63mmol/L and mean glycated haemoglobin = 5.0 ± 0.46%. Preliminary data has shown no significant correlations between combination and inattentive ADHD, and dependent variables, however hyperactive/impulsive ADHD was significantly correlated with LF HRV (r = 0.340, p = 0.03) and TP (r = 0.364, p = 0.02). Further statistical analysis is currently underway. Should the present associations between ADHD and LF HRV and TP be supported by further research (involving clinical sample groups and controls), diagnosed individuals should be monitored for CVD and possibly DM risks. Implications also include encouragement of suspected ADHD individuals to seek early formal diagnosis and treatment, and the inclusion of HRV as an objective measurement in the assessment of ADHD.
IDENTIFICATION OF NOVEL PROTEOFORMS CANDIDATES IN CUPRIZONE-INDUCED DEMYELINATION IN MICE
Mohammed Almuslehi
Western Sydney University
90930753@westernsydney.edu.au

Monokesh K Sen¹, Mohammed S Almuslehi¹, David A Mahns¹, Peter J Shortland² and Jens R Coorssen³

Multiple sclerosis (MS) is an inflammatory, demyelinating disease of the human central nervous system (CNS). Two competing theories are proposed for demyelination: an ‘outside in’ mechanism where peripheral factors breach the blood brain barrier (BBB) leading to CNS demyelination or an ‘inside-out’ mechanism where demyelination causes BBB disruption leading to an autoimmune response. Oral ingestion of cuprizone (CPZ) in animals induces CNS demyelination and inflammatory responses; however, it does not evoke the recruitment of the peripheral immune system as the BBB remains intact. We hypothesised that BBB disruption by pertussis toxin (PT) will trigger an autoimmune response and proteomic changes in the presence of available myelin antigens in CPZ treated mice. Demyelination was induced by oral administration of 0.1% CPZ to C57Bl/6 male mice for 5 and 12 weeks. PT was injected intraperitoneally at week 2 and repeated at week 3 of the experiment. Histological analysis shows that CPZ alone, or CPZ with PT, does not have any synergistic/additive effect on oligodendrocyte depletion (demyelination), activation of astrocytes and microglia, nor the recruitment of CD4 and CD8 cells to the corpus callosum and cerebral cortex. 2D gel electrophoresis and bioinformatics analysis revealed some disease specific protein candidates that are responsible for inflammatory responses, neurodegeneration, metabolic pathways, and signal transduction. Key words: Multiple sclerosis, cuprizone, pertussis toxin, demyelination, blood brain barrier disruption, proteome.
Poster Session

DO EMOTIONAL RESPONSES TO FOOD IMAGES DIFFER BETWEEN PEOPLE WITH DIVERSE EATING DISORDERS?

Nasim Foroughi
Western Sydney University
n.foroughi@westernsydney.edu.au

N Foroughi¹, P Hay¹, S Madden², S Clarke³, M Kohn³, S Touyz⁵
1. Western Sydney University 2. Children’s Hospital at Westmead 3. Westmead Hospital
4. University of Sydney

The purpose of this study was to investigate the negative and positive emotional responses to images of food in women suffering from different types of eating disorders (EDs). We compared the emotional responses to food images in women with Anorexia Nervosa (AN), Atypical AN, Bulimia Nervosa (BN), Binge Eating Disorder (BED), and an aged-matched healthy Control group. Adolescents and adult women aged ≥ 14 years old with (n=139) and without (n=41) a history of an ED were recruited. The participants were asked to rate 16 images of different foods evoking fear, disgust, and happiness (n=16) and 4 neutral images. The images were shown to participants at half-minute intervals and were rated using three separate visual analogue scales (one per image). The Control group was significantly happier, less fearful, and less anxious prior to viewing the food images compared to women with an ED. The negative emotive responses of fear and disgust were significantly greater (p<.001) in the ED participants compared to the Control group controlling for age and BMI; however, groups did not differ in terms of happiness. The emotional responses towards food images were not significantly different within the ED groups. These findings highlight the importance of considering basic emotive responses when discussing food consumption and diet in people with EDs of all body weights. As people recover from anorexia nervosa they may continue to have strong negative emotive responses to food requiring ongoing psychological therapy. Following the training participants will be able to: 1. be informed about negative emotive responses to food in people with diverse EDs. 2. be aware of the need to assess levels of negative emotions towards food in people with diverse EDs. 3. be aware of the need to address levels of negative emotions towards food in people with diverse EDs.
Poster Session

PROFILING PTSD: USING THE MMPI-2-RF TO DETECT PTSD FEIGNING

Natalie Morrison
Western Sydney University
n.morrison@westernsydney.edu.au

Natalie Morrison1, 2,3, David Mutton2, Ben Morrison3
1. School of Medicine, Western Sydney University 2. School of Social Sciences and Psychology, Western Sydney University 3. School of Psychological Sciences, Australian College of Applied Psychology

Objective: Diagnoses of Posttraumatic Stress Disorder (PTSD) are accompanied by the highest rates of malingering across all mental health diagnoses. Such prevalence of malingering not only increases stigma against and within this population but also spreads thin the clinical resources available to legitimate PTSD sufferers. Detecting malingering is resisted by many clinicians given the unreliable methods currently available. A number of measures intended to highlight malingering have been examined but to date many of these investigations have concentrated exclusively on indicators of the act of malingering to the absence of also identifying discriminators that differentiate the content being maledgered. Here the Minnesota Multiphasic Personality Inventory-2-Restructured Form (MMPI-2-RF) was used to ascertain a comprehensive profile of genuine PTSD; facilitating a measure of both the act of malingering and the content being malingered. The role of perceived control, as an indicator of trauma origin, was considered in the moderation of this profile given previous challenges in obtaining a single PTSD exemplar.

Method: 250 individuals (111 males, 139 females), 50 with genuine PTSD who were split into (i) high-control and (ii) low-control groupings, and, 150 with no-PTSD history who were divided into three groups; PTSD feigning (iii) high-control (iv) low-control, and (v) no feigning. Participants completed the MMPI-2-RF and the Perceived Control Over Stressful Events Scale (PCOSES).

Results: Unsurprisingly the Validity scales were able to provide some predictive capacity to discriminate between those who were genuinely reporting PTSD symptomology and those that were asked to feign their presentation; with feigners over-reporting of symptoms or endorsing unusually clustered symptoms. The failed capacity to discriminate genuine from feigned responses was found exclusively within genuine high-control group who were inaccurately categorised as feigning. The Restructured-Clinical Scales revealed some interesting insight into the differing PTSD profiles; those in the genuine PTSD low-control group endorsed clinical levels of a small number of symptom clusters to a lower degree, the PTSD high control group who endorsed clinical levels of a differing set of symptom clusters to a high degree and the PTSD feigning groups who endorsed a large number of symptom clusters to a moderate degree.

Conclusion: The use of the Restructured Clinical scales demonstrates differing genuine PTSD profiles that are associated with differing levels of perceived control at the time of the traumatic incident. Importantly, while the Validity Scales are useful in differentiating feigning from one of the two genuine PTSD profiles here they are unable to provide such clarity with the other group. It is here that the power of the Restructured Clinical Scales comes to bare as they demonstrated that feigners over-endorsement (highlighted on the Validity Scales) developed from an over-endorsement of many symptom clusters while for the genuine PTSD group their over-endorsement arose from extremely high levels of very specific symptom clusters (highlighted on the Restructured Clinical Scales). This shows that effective malingering classification will be enabled following a better understanding the heterogeneous PTSD profile.
Poster Session

A POTENTIAL ROLE FOR GALANIN IN THE CHEMOSENSORY RESPONSE TO CHRONIC INTERMITTENT HYPOXIA

Natasha Kumar
University of New South Wales
natasha.kumar@unsw.edu.au

Dereli AS (1), Jones NM (1), McMullan S (2), Kumar NN(1).
1. Department of Pharmacology, University of New South Wales, NSW 2. Department of Biomedical Sciences, Macquarie University, NSW

Chemoreceptor neurons in the retrotrapezoid nucleus (RTN) play a crucial role in the respiratory chemoreflex response to hypercapnia and hypoxia. A subpopulation of RTN neurons express the inhibitory neuropeptide galanin. Microinjection of galanin into the ventral respiratory column (VRC), the brain region that generates the rhythmic breathing pattern, inhibits breathing in the rat. Monosynaptic projections from galaninergic RTN chemosensory neurons to the VRC have been demonstrated in the rat. The mechanism by which galanin inhibits ventilation and the receptor substrates involved needs to be elucidated to understand its role in the CNS control of breathing. We aimed to examine the distribution of galanin receptor subtype 1 (GalR1) mRNA in the mouse brain and map brainstem populations that project to the VRC. We also aimed to quantify preprogalanin (ppGal) mRNA levels in RTN and ventrolateral medulla (VLM) after exposure to chronic intermittent hypoxia (CIH). Brainstem tissue sections from adult male C57BL/6 mice (n=4) were processed for either GalR1 or ppGal in situ hybridisation. Neonatal Sprague Dawley rats (n=4-5) were exposed to CIH (12% O2, 1 hour/day for 5 days). The results show that there is moderate expression of GalR1 in nucleus of the solitary tract (NTS), RTN, VRC, locus coeruleus (LC), median raphe, thalamus, hypothalamus, amygdala and lateral septum. ppGal mRNA is expressed in NTS, RTN, inferior olive, spinal trigeminal nucleus (SP5), LC and hypothalamus. Following injection of the retrograde tracer, CTB-555, into the VRC in adult mice, we identified specific neuronal populations that project to VRC including NTS, as described previously (Alheid G et al, 2011), and dorsal raphe, LC, parabrachial nucleus, Kolliker fuse nucleus, cuneate nucleus, SP5 and inferior olive. The CIH results showed that there was a significant decrease of ppGal expression in the VLM and RTN in mice exposed to intermittent 12% O2 compared to normoxia (p<0.01). In conclusion, we have identified all brainstem projections to the VRC in the mouse. The expression of galanin in RTN and GalR1 in VRC in the mouse provides for a circuit for homeostatic regulation of respiration by galanin. This is supported by decreased ppGal expression in both RTN and VLM during CIH.
 WHICH SUBJECTIVE ASSESSMENT METHODS ARE SENSITIVE INDICATORS OF REDUCED NERVE CONDUCTION VELOCITY?

Nicholas Stacey
University of New South Wales
n.stacey@student.unsw.edu.au

Nicholas Stacey Richard Vickery Ingvars Birznieks Affiliations: Neuroscience Research Australia UNSW School of Medical Sciences

Diabetic polyneuropathy can cause afferent fiber demyelination which can result in a range of symptoms and slow nerve conduction velocity (NCV). NCV slowing can increase temporal dispersion and so ‘spread out’ the original afferent signal to disrupt sensory function (Johnson & Lamb, 1981). This disruption and resulting changes in sensory perception can be detected using subjective tests, which are an efficient method of screening for neural abnormalities. The aim of this study was to characterize the changes in tactile perception caused by a disruption to afferent signalling in the posterior tibial nerve. This included evaluating whether apparent motion discrimination is a sensitive indicator of NCV slowing. 13 healthy subjects had their NCV assessed using electromyography. Tactile perception was subjectively assessed on the foot sole using nylon monofilaments to determine mechanical detection threshold (MDT), a neurothesiometer to determine vibration perception threshold (VPT) and an apparent motion device to determine the apparent motion discrimination threshold (AMDT). The leg was then cooled for at least 45 minutes to slow NCV and subjective testing was repeated. Following cooling there was an average increase in conduction latency of 7.84ms (34% increase) compared to baseline latency (95%CI 5.5 to 10.2, p<0.0001). There was no significant change in MDT (95%CI -0.0006 to 0.19, p=0.052) or in AMDT (95%CI -3.5 to 4.5, p=0.726). There was a statistically significant increase in VPT from 7.62μm to 8.54μm post-cooling (95%CI 0.21-3.26, p=0.0296). These results suggest that significant changes in temporal dispersion can be accounted for by the central nervous system to maintain relatively intact sensory perception in a context of NCV slowing.
Alzheimer’s disease (AD) is a neurodegenerative disorder characterized by significant impairment of cognitive function and memory. There are several hypotheses regarding the etiology of AD. Loss of cholinergic innervation in the hippocampus and neocortex contributes significantly to the cognitive symptoms associated with AD, and gave rise to the “cholinergic hypothesis” of AD. However, the source underlying the loss of cholinergic cells is still unknown. Recent findings suggest that neuroinflammation is an early process in the pathogenesis of AD. However, the impact of neuroinflammation on the physiological properties of cholinergic neurons is still unknown. In this study, we have investigated the impact of acute and chronic neuroinflammation on the biophysiological properties of cholinergic neurons. Acute neuroinflammation was induced by peripheral administration of lipopolysaccharide (500 μg/kg) into ChAT(BAC)-eGFP mice at different ages (3-18 months), while age-matched control animals received saline. Chronic neuroinflammation was investigated in GFAP-IL6 mice (3-18 months), which overexpress the proinflammatory cytokine IL-6 in astrocytes. The electrophysiological properties of cholinergic neurons were measured in acute brain slices containing the septo-hippocampal pathway. Our results indicate that while acute neuroinflammation had only minor influence on neuronal excitability, chronic neuroinflammation caused a significant decrease in neuronal excitability as seen by the increase of rheobase and spike amplitude. Moreover, aged, saline-injected animals showed a significant decrease of membrane excitability, comparing to young animals. These results are indicative of alterations in intrinsic excitability, which may contribute to the cholinergic loss during ageing and thus promote the formation of AD.
SUBSENSORY ELECTRICAL NERVE STIMULATION FOR THE IMPROVEMENT OF VIBRATION PERCEPTION IN PATIENTS WITH HIV RELATED PERIPHERAL NEUROPATHY

Paul Breen
Western Sydney University
p.breen@westernsydney.edu.au

Karpul D¹,², McIntyre S¹,³, Heckmann JM², van Schaik A¹, Breen PP¹.
1. The MARCS Institute, Western Sydney University, Penrith, NSW, AUS. 2. Division of Neurology, Department of Medicine, University of Cape Town, Observatory, Cape Town, South Africa, 3. Neuroscience Research Australia, NSW, AUS

Length dependant peripheral neuropathy affects millions of people worldwide. Approximately half of people with HIV in South Africa have peripheral neuropathy (HIV-PN), the effects of which include loss of sensation and various forms of pain. Subsensory Electrical Nerve Stimulation (SENS) is the application of stochastic electric current through surface electrodes at imperceptible amplitudes. This form of therapy has been shown to immediately improve sensation distal to the application site in both healthy participants and elderly participants during application. We applied SENS to the ankle of 19 patients previously diagnosed with HIV-PN and 19 age-matched healthy controls. All participants were recruited in Cape Town, South Africa. We measured sinusoidal vibration thresholds (VPT) at 25 Hz, 50 Hz and 128 Hz under the hallux with a 5 mm spherical probe contacting the skin. We found that vibration frequency influenced VPT (p<4e-9), and that HIV-PN status also significantly altered VPT (p<0.025). The effect of SENS on vibration sensitivity was not significant under any of the test conditions. Further investigation should be conducted as to why this cohort did not exhibit the response to SENS, as this may elucidate both the mechanism of SENS and the mechanisms of HIV-PN.
Poster Session

MUSCLE SYMPATHETIC NERVE ACTIVITY PEAKS IN THE FIRST TRIMESTER IN HEALTHY PREGNANCY: A LONGITUDINAL CASE STUDY

Sarah Hissen
Western Sydney University
s.hissen@westernsydney.edu.au

Sarah L Hissen,1 Khadige El Sayed,2 Vaughan G Macefield,2,3 Rachael Brown2,3 & Chloe E Taylor1,2
1.School of Science and Health, Western Sydney University, Sydney, Australia 2.School of Medicine, Western Sydney University, Sydney, Australia 3.Neuroscience Research Australia, Sydney, Australia

Introduction: Previous research indicates that muscle sympathetic nerve activity (MSNA) is elevated during normotensive pregnancy, with some studies indicating increases in the first trimester and others increases towards the end of the gestational period. In order to further our understanding of sympathetic activation during normal pregnancies, it is important to define the levels of MSNA and its modulation via the baroreflex throughout pregnancy using a longitudinal study design. The aim of this case study was to examine MSNA and baroreflex modulation of both MSNA and heart rate at rest throughout a normal, healthy pregnancy.

Methods: Blood pressure, heart rate, MSNA and baroreflex sensitivity (BRS) were measured for 10 min at rest before, during (weeks 6, 11, 17, 22, 25, 33 and 36) and after a normotensive pregnancy. Sympathetic BRS was determined by plotting MSNA burst incidence against diastolic pressure (3 mmHg bins) and cardiac BRS was determined using the sequence method.

Results: Diastolic blood pressure dropped early in pregnancy (Δ12mmHg) and was maintained at this low level for the duration of pregnancy and up to 16 weeks post-partum. Successive increases in heart rate were observed from 17 weeks gestation to birth (peak of 89beats/min at 36weeks vs 77beats/min pre-pregnancy) with heart rate returning to pre-pregnancy levels post-partum. MSNA was elevated during pregnancy with a large peak in the first trimester (Δ17 bursts/min) and a secondary peak in the third trimester (Δ11 bursts/min). Cardiac BRS peaked in the first trimester (10ms/mmHg vs. 6ms/mmHg pre-pregnancy) and then gradually decreased, whereas sympathetic BRS was greater throughout pregnancy compared with pre-pregnancy levels.

Conclusion: There is an increase in MSNA early in pregnancy but this cannot be explained by a reduction in BRS. A secondary increase in MSNA burst frequency in the third trimester may, in part, be explained by elevated heart rate.
THE PREVALENCE OF DEPRESSION IN A COHORT OF AUSTRALIAN NURSES

Shamona Maharaj
University of Technology
shamona.maharaj@student.uts.edu.au

Shamona Maharaj 1, Ty Lees 1, Christopher Zaslowski 2, Kaneez Fatima-Shad 2, Sara Lal 1
1- Neuroscience Research Unit, School of Life Sciences, University of Technology Sydney.
2- School of Life Sciences, University of Technology, Sydney

Background: With a continued demand for health-care services, nurses remain at the forefront of patient care. However, their role in both direct and indirect patient care can burden them with an unbearable workload. The stressful and demanding nature of the occupation leave nurses strained, exposing them to a higher risk of developing negative mental states like depression. Hence, the current study aimed to assess the prevalence of depression in a cohort of Australian nurses and to determine demographic and work characteristics associated with depression. Methods: The Depression Anxiety Stress Scale was administered to a sample of 96 nurses. Information about demographic and work characteristics was obtained using in-house designed questionnaires. Descriptive statistics and binomial logistic regressions were performed to determine prevalence and risk factors respectively. Results: The prevalence of depression in the current cohort was found to be 30.2%. The logistic regression model was significant (p<0.05), explaining 42.6% (Nagelkerke R2) of the variance in depression, and correctly classified 79.7% of cases. Depression was significantly associated with shift length and job satisfaction (p<0.05) with nurses who work over 8 hours, and nurses with poor job satisfaction being at a higher risk of developing depressive symptoms. Conclusion: The prevalence of nurses affected by depressive symptoms was high and it is possible that poor mental health can be detrimental to the delivery of patient care. Further research in the area is needed to identify support strategies and interventions aimed at improving the mental health needs of nursing professionals.
FUNCTIONAL CHARACTERISATION OF FILAMENTOUS ACTIN PROBE EXPRESSION IN NEURONAL CELLS
Tamara Tomanic
University of New South Wales
t.tomanic@student.unsw.edu.au

Shrujna Patel(1), Sandra YY Fok(1), Holly Stefen(1,2), Merryn Brettele(1), Tamara Tomanić(1), Esmeralda Parić(1), Rosanna Herold(1), Aleksandra Djordjevic(1), Thomas Fath(1,2) (1) Neurodegeneration and Repair Unit, UNSW, Sydney, AU (2) Neuron Culture Core Facility, UNSW, Sydney, AU

Genetically encoded filamentous actin probes are a commonly used scientific tool to visualize actin structures in neurons. They are powerful markers in the studies of assessing neuronal morphology and intercellular dynamics. However, the actual impact that these probes might have on the structure of a neuron has not been quantitatively analysed. In this study, we have systematically characterized the effect of actin probes on neuronal morphology in primary hippocampal neurons. We used probes such as Lifeact, Utrophin and F-tractin, and assessed the effect that choice of different vectors and promoters in various constructs might have on the overall neuronal structure. Our data shows the significant decrease in dendritic complexity with the expression of Lifeact-GFP, controlled by CAG promoter and a significant decrease in total axonal length with the expression of Lifeact-GFP, controlled by pBABE promoter. The expression of other probes, like Lifeact-7-mEGFP and F-tractin-EGFP in a pEGFP-C1 vector, under the control of a CMV promoter, didn't result in any significant changes in dendritic branching or axon length. Under the control of the same promoter, expression of Utr261-EGFP resulted in a significant decrease in dendritic complexity. As these probes are a valuable tool for actin visualisation, it is important to recognise the impact that they have on neuronal morphology and, potentially, the neuronal function.